# Proposed Course of Action

#### The United States Federal Government should substantially increase its economic engagement towards Venezuela through the development of solar power satellites.

# Contention 1 – Relations

#### CONTENTION 1 IS RELATIONS –

#### **Warming is real and anthropogenic – keeping it below 2-C is key.**

Economist 9/27—“It's still our fault”, 2013, http://www.economist.com/blogs/babbage/2013/09/ipcc-climate-change-report) EL

The report is more definitive than in the past about the role of people in causing climate change. It say that it is "extremely likely"—IPCC speak for having a probability of over 95%—that man is responsible. This contrasts with the tentative tone of the early IPCC reports. “The observed increase [in surface air temperatures] could be largely due to this natural variability,” said the first one, in 1990. The next report in 1995 merely suggested a link between rising temperatures and human activity. That link was deemed “likely” (which means probability of 66%) in 2001, and “very likely” (90%) in 2007. The latest iteration identifies radiative forcing, the difference between the amount of heat coming into the climate and the amount reflected back, as the immediate cause of warming. Radiative forcing is expressed in watts per square metre (W/m2), a unit of energy. A rise indicates that heat is building up in the system. Total radiative forcing from man-made sources since 1750 (ie, before industrialisation) has risen from 0.29-0.85W/m2 in 1950 to 0.64-1.86W/m2 in 1980 to 1.13-3.33W/m2 in 2011. The average has jumped from 0.57 to 1.25 to 2.29, respectively—a four-fold increase in 60 years. The big change recently, the report points out, is that the cooling effect of aerosols seems to have been less strong than it used to be. But there is no sign that the rise in radiative forcing has slowed during the past 15 years of flat surface temperatures. The best estimate for total man-made radiative forcing in 2011 is 43% above 2005 levels. Of course, more heat does not necessarily equal perceptible climate change. The IPCC admits the pause in the rise of surface air temperatures is real. “The rate of warming over the past 15 years,” it says, “[is] 0.05ºC per decade...smaller than the rate calculated since 1951.” In its 2007 report the panel had said the rate of warming was 0.2ºC per decade in 1990-2005 (four times the current rate). It predicted that this would continue for the next two decades. But it plays down the long-term significance of the shift, saying that “due to natural variability, trends based on short records are very sensitive to the beginning and end dates and do not in general reflect long-term climate trends.” The start of the recent 15-year trend, in 1998, was a year of a strong worldwide fluctutation in the climate known as El Niño. This produced a temperature spike. Still, all the extra heat implied by higher radiative forcing has to go somewhere. It isn’t going into the air. It is possible that not all that much is going into the surface waters of the oceans, either. The report says that “it is about as likely as not that ocean heat content from 0-700 metres increased more slowly during 2003-2010 than during 1993-2002.” That only leaves one other heat sink: the deep oceans below 700 metres, where it could be locked up in the deep oceans without affecting other parts of the climate. And indeed, most of the extra heat does go into the oceans, which is not surprising given that they cover two thirds of Earth’s surface and have a much greater capacity to absorb heat than the air does. “Ocean warming,” the report says, “is largest near the surface and the upper 75 metres warmed by 0.11ºC per decade over the period 1971-2010.” It adds that more than 60% of the net energy increase in the climate system is stored in the upper ocean (0-700 metres)...and about 30% is stored in the ocean below 700 metres. In fact, vasty deeps are a plausible candidate to explain the pause in surface air temperatures. The trouble is that measurements deep down, while improving, remain patchy. The IPCC says that it is likely that the ocean warmed from 3,000 metres to the bottom in 1992-2005 and that heat will penetrate from the surface down. Moreover, in a report earlier this month in Nature (published too late to make it into the IPCC report), Yu Kosaka and Shang-Ping Xie of the Scripps Institute of Oceanography, in San Diego, suggests that a cooling trend in an area of the eastern equatorial Pacific ocean may be “the cause of the pause”. But at the moment, this conclusion remains tentative. Global warming is, then, continuing unabated in the watery world. It is not clear whether the trend itself has changed dramatically since 1990 or whether the rise is due to improved measurements, which have enabled scientists to gauge more exactly what has been going on. Probably the latter. The new assessment says that, since the fourth report in 2007, "instrumental biases in upper-ocean temperature records have been identified and reduced, enhancing confidence in the assessment of change." Either way, the trend is worrying. Since water, like almost everything else, expands as it gets hotter, its rising temperature causes sea levels to rise. It is "very likely", the report adds, “that the mean rate of global averaged sea level rise was 1.7mm a year between 1901 and 2010, 2.0mm a year between 1971 and 2010 and 3.2mm a year between 1993 and 2010.” The rate of sea-level rise all but doubled between the start of the 20th century and its end. That is a significant change and one that the first IPCC assessment report in 1990 had little inkling of. That report reckoned that “the average rate of rise over the last 100 years has been 1.0-2.0 mm a year. There is no firm evidence of acceleration in sea level rise during this century.” The rate is now thought to be higher—and growing. New instruments are providing better information about the rate at which ice sheets and glaciers are melting, too. In particular, the launch of the twin GRACE satellites has provided more detail about how much ice there actually is. GRACE, which stands for Gravity Recovery and Climate Experiment, enables the mass of objects on Earth to be worked out more precisely by measuring tiny changes in their gravitation pull. The report says that “the average rate of ice loss from glaciers around the world, excluding glaciers on the periphery of the ice sheets, was very likely 226Gt [trillion tonnes] a year over the period 1971-2009 and very likely 275Gt a year over the period 1993-2009.” In other words, it has speeded up. The Greenland ice sheet, the Antarctic sea ice and the Arctic sea ice have all lost mass (got thinner). The extent of the Arctic sea ice has shrunk by 3.5-4.1% a decade in 1979-2012, more than was estimated in 2007, and the summer sea-ice minimum is shrinking by about 10% a decade, though this year’s summer ice melt was smaller than last year’s. What does that mean for the future? The report uses four new sets of scenarios for greenhouse-gas concentrations to claim that “global surface temperature change for the end of the 21st century is projected to be likely to exceed 1.5ºC relative to 1850 to 1900 in all but the lowest scenario considered, and likely to exceed 2ºC for the two high scenarios.” The 2ºC mark is widely considered to be the dividing line between warming which is just about tolerable and that which is dangerous. For the first time, the IPCC gives some credence to the possibility that Earth’s climate may not be responding to higher concentrations of greenhouse gases quite as sharply as was once thought. The response is referred to as “equilibrium climate sensitivity” and defined as the rise in surface temperatures in the long term which accompanies a doubling of the concentration of CO2 in the atmosphere. In its previous report, the IPCC put this at between 2ºC and 4.5 ºC, with a most likely figure of 3ºC. But recent work, partly influenced by the pause in temperatures, has suggested sensitivity might be somewhat lower. The IPCC’s new range of 1.5-4.5ºC (the same as in its first report) reflects the new consensus (though some new research puts the upper bound of sensitivity below 4.5ºC). The IPCC also decided to scrap its central “best guess”. Perhaps this is meant to reflect uncertainty in the science. If so, some scientists argue, then perhaps it should not have increased its confidence that man is the main cause of global warming. In theory, a lower climate sensitivity means temperatures would rise more slowly for any given amount of extra radiative forcing. Earth might hence have a little more time to adjust to a changing climate. But whether such breathing space actually exists depends on how many tonnes of greenhouse gases people are putting into the atmosphere. So, for the first time, the IPCC has set what is usually called a carbon budget. To have a two-thirds chance of keeping global warming below 2ºC, it says, “will require cumulative CO2 emissions from all anthropogenic sources to stay between 0 and about 1,000 [trillion tonnes]”. The world has already blown through just over half that amount (531 trillion tonnes) by 2011. At current rates of greenhouse-gas emission, the rest of the budget will have been spent before 2040. The odds of keeping the eventual rise in global temperatures to below 2ºC will lengthen—even if climate sensitivity is lower than was thought and even if the pause in surface air temperatures persists for a while. As Thomas Stocker, the co-chair of the report depressingly put it: “we are committed to climate change…for many centuries even if emissions of CO2 stop.”

#### Models prove warming causes biodiversity loss and extinction.

IPCC 07—“Climate Change 2007: Working Group II: Impacts, Adaptation and Vulnerability”, http://www.ipcc.ch/publications\_and\_data/ar4/wg2/en/ch4s4-4-11.html) EL

Considerable progress has been made since the TAR in key fields that allow projection of future climate change impacts on species and ecosystems. Two of these key fields, namely climate envelope modelling (also called niche-based, or bioclimatic modelling) and dynamic global vegetation modelling have provided numerous recent results. The synthesis of these results provides a picture of potential impacts and risks that is far from perfect, in some instances apparently contradictory, but overall highlights a wide array of key vulnerabilities (Figures 4.2; 4.4; 4.5, Table 4.1). Climate envelope modelling has burgeoned recently due to increased availability of species distribution data, together with finer-scale climate data and new statistical methods that have allowed this correlative method to be widely applied (e.g., Guisan and Thuiller, 2005; McClean et al., 2005; Thuiller et al., 2005b). Despite several limitations (Section 4.3 and references cited therein) these models offer the advantage of assessing climate change impacts on biodiversity quantitatively (e.g., Thomas et al., 2004a). Climate envelope models do not simulate dynamic population or migration processes, and results are typically constrained to the regional level, so that the implications for biodiversity at the global level are difficult to infer (Malcolm et al., 2002a). In modelling ecosystem function and plant functional type response, understanding has deepened since the TAR, though consequential uncertainties remain. The ecophysiological processes affected by climate change and the mechanisms by which climate change may impact biomes, ecosystem components such as soils, fire behaviour and vegetation structure (i.e., biomass distribution and leaf area index) are now explicitly modelled and have been bolstered by experimental results (e.g., Woodward and Lomas, 2004b). One emerging key message is that climate change impacts on the fundamental regulating services may previously have been underestimated (Sections 4.4.1, 4.4.10, Figures 4.2; 4.3; 4.4). Nevertheless, the globally applicable DGVMs are limited inasmuch as the few plant functional types used within the models aggregate numerous species into single entities (Sitch et al., 2003). These are assumed to be entities with very broad environmental tolerances, which are immutable and immune to extinction. Therefore, underlying changes in species richness are not accounted for, and the simultaneous free dispersal of PFTs is assumed (e.g., Neilson et al., 2005; Midgley et al., 2007). The strength of DGVMs is especially in their global application, realistic dynamics and simulation of ecosystem processes including essential elements of the global C-cycle (e.g., Malcolm et al., 2002b). Thus, it is reasonable to equate changes in DGVM-simulated vegetation (e.g., Figure 4.3) to changes in community and population structures in the real world. What overall picture emerges from the results reviewed here? It appears that moderate levels of atmospheric CO2 rise and climate change relative to current conditions may be beneficial in some regions (Nemani et al., 2003), depending on latitude, on the CO2 responsiveness of plant functional types, and on the natural adaptive capacity of indigenous biota (mainly through range shifts that are now being widely observed – see Chapter 1). But as change continues, greater impacts are projected, while ecosystem and species response may be lagged (Sections 4.4.5, 4.4.6). At key points in time (Figure 4.4), ecosystem services such as carbon sequestration may cease, and even reverse (Figure 4.2). While such ‘tipping points’ (Kemp, 2005) are impossible to identify without substantial uncertainties, they may lead to irreversible effects such as biodiversity loss or, at the very least, impacts that have a slow recovery (e.g., on soils and corals). Figure 4.4 Figure 4.4. Compendium of projected risks due to critical climate change impacts on ecosystems for different levels of global mean annual temperature rise, ΔT, relative to pre-industrial climate (approach and event numbers as used in Table 4.1 and Appendix 4.1). It is important to note that these impacts do not take account of ancillary stresses on species due to over-harvesting, habitat destruction, landscape fragmentation, alien species invasions, fire regime change, pollution (such as nitrogen deposition), or for plants the potentially beneficial effects of rising atmospheric CO2. The red curve shows observed temperature anomalies for the period 1900-2005 (Brohan et al., 2006, see also Trenberth et al., 2007, Figure 3.6). The two grey curves provide examples of the possible future evolution of temperature against time (Meehl et al., 2007, Figure 10.4), providing examples of higher and lower trajectories for the future evolution of the expected value of ΔT. Shown are the simulated, multi-model mean responses to (i) the A2 emissions scenario and (ii) an extended B1 scenario, where radiative forcing beyond the year 2100 was kept constant to the 2100 value (all data from Meehl et al., 2007, Figure 10.4, see also Meehl et al., 2007, Section 10.7). In the two simulations presented in Figure 4.2 (warming of 2.9°C and 5.3°C by 2100 over land relative to the 1961-1990 baseline), the DGVM approach reveals salient changes in a key regulating service of the world’s ecosystems: carbon sequestration. Changes in the spatial distributions of ecosystems are given in Figure 4.3 (where it must be stressed that the figure highlights only key vulnerabilities through depicting appreciable vegetation type changes, i.e., PFT change over >20% of the area of any single pixel modelled). In the B1 emissions scenario (Figure 4.3b) about 26% of extant ecosystems reveal appreciable changes by 2100, with some positive impacts especially in Africa and the Southern Hemisphere. However, these positive changes are likely to be due to the assumed CO2-fertilisation effect (Section 4.4.10, Figure 4.3). By contrast, in mid- to high latitudes on all continents, substantial shifts in forest structure toward more rain-green, summer-green or deciduous rather than evergreen forest, and forest and woodland decline, underlie the overall drop in global terrestrial carbon sequestration potential that occurs post-2030, and approaches a net source by about 2070 (Figure 4.2; 4.3). In the A2 emissions scenario, roughly 37% of extant ecosystems reveal appreciable changes by 2100. Desert amelioration persists in the regions described above, but substantial decline of forest and woodland is seen at northern, tropical and sub-tropical latitudes. In both scenarios the current global sink deteriorates after 2030, and by 2070 (ΔT ~2.5°C over pre-industrial) the terrestrial biosphere becomes an increasing carbon source (Figure 4.2; see also Scholze et al., 2006) with the concomitant risk of positive feedback, developments that amplify climate change. Similar results were obtained by using a wide range of climate models which indicate that the biosphere becomes consistently within this century a net CO2 source with a global warming of >3°C relative to pre-industrial (Scholze et al., 2006). On the other hand, it must be noted that by about 2100 the modelled biosphere has nevertheless sequestered an additional 205-228 PgC (A2 and B1 emissions scenarios respectively) relative to the year 2000 (Lucht et al., 2006). Climate envelope modelling suggests that climate change impacts will diminish the areal extent of some ecosystems (e.g., reduction by 2-47% alone due to 1.6°C warming above pre-industrial, Table 4.1, No. 6) and impact many ecosystem properties and services globally. Climate impacts alone will vary regionally and across biomes and will lead to increasing levels of global biodiversity loss, as expressed through area reductions of wild habitats and declines in the abundance of wild species putting those species at risk of extinction (e.g., 3-16% of European plants with 2.2°C warming (Table 4.1, No. 20) or major losses of Amazon rainforest with 2.5°C warming above pre-industrial, Figure 4.4, Table 4.1, No. 36). Globally, biodiversity (represented by species richness and relative abundance) may decrease by 13 to 19% due to a combination of land-use change, climate change and nitrogen deposition under four scenarios by 2050 relative to species present in 1970 (Duraiappah et al., 2005). Looking at projected losses due to land-use change alone (native habitat loss), habitat reduction in tropical forests and woodland, savanna and warm mixed forest accounts for 80% of the species projected to be lost (about 30,000 species – Sala, 2005). The apparent contrast between high impacts shown by projections for species (climate envelope models) relative to PFTs (DGVMs) is likely to be due to a number of reasons – most importantly, real species virtually certainly have narrower climate tolerances than PFTs, a fact more realistically represented by the climate envelope models. DGVM projections reveal some increasing success of broad-range, generalist plant species, while climate envelope model results focus on endemics. Endemics, with their smaller ranges, have been shown to have a greater vulnerability to climate change (Thuiller et al., 2005a), and may furthermore be dependent on keystone species in relationships that are ignored in DGVMs. Therefore, for assessing extinction risks, climate envelope modelling currently appears to offer more realistic results. As indicated in the TAR, climate changes are being imposed on ecosystems experiencing other substantial and largely detrimental pressures. Roughly 60% of evaluated ecosystems are currently utilised unsustainably and show increasing signs of degradation (Reid et al., 2005; Hassan et al., 2005; Worm et al., 2006). This alone will be likely to cause widespread biodiversity loss (Chapin et al., 2000; Jenkins, 2003; Reid et al., 2005), given that 15,589 species, from every major taxonomic group, are already listed as threatened (Baillie et al., 2006). The likely synergistic impacts of climate change and land-use change on endemic species have been widely confirmed (Hannah et al., 2002a; Hughes, 2003; Leemans and Eickhout, 2004; Thomas et al., 2004a; Lovejoy and Hannah, 2005; Hare, 2006; Malcolm et al., 2006; Warren, 2006), as has over-exploitation of marine systems (Worm et al., 2006; Chapters 5 and 6). Overall, climate change has been estimated to be a major driver of biodiversity loss in cool conifer forests, savannas, mediterranean-climate systems, tropical forests, in the Arctic tundra, and in coral reefs (Thomas et al., 2004a; Carpenter et al., 2005; Malcolm et al., 2006). In other ecosystems, land-use change may be a stronger driver of biodiversity loss at least in the near term. In an analysis of the SRES scenarios to 2100 (Strengers et al., 2004), deforestation is reported to cease in all scenarios except A2, suggesting that beyond 2050 climate change is very likely to be the major driver for biodiversity loss globally. Due to climate change alone it has been estimated that by 2100 between 1% and 43% of endemic species (average 11.6%) will be committed to extinction (DGVM-based study – Malcolm et al., 2006), whereas following another approach (also using climate envelope modelling-based studies – Thomas et al., 2004a) it has been estimated that on average 15% to 37% of species (combination of most optimistic assumptions 9%, most pessimistic 52%) will be committed to extinction by 2050 (i.e., their range sizes will have begun shrinking and fragmenting in a way that guarantees their accelerated extinction). Climate-change-induced extinction rates in tropical biodiversity hotspots are likely to exceed the predicted extinctions from deforestation during this century (Malcolm et al., 2006). In the mediterranean-climate region of South Africa, climate change may have at least as significant an impact on endemic Protea species’ extinction risk as land-use change does by 2020 (Bomhard et al., 2005). Based on all above findings and our compilation (Figure 4.4, Table 4.1) we estimate that on average 20% to 30% of species assessed are likely to be at increasingly high risk of extinction from climate change impacts possibly within this century as global mean temperatures exceed 2°C to 3°C relative to pre-industrial levels (this chapter). The uncertainties remain large, however, since for about 2°C temperature increase the percentage may be as low as 10% or for about 3°C as high as 40% and, depending on biota, the range is between 1% and 80% (Table 4.1; Thomas et al., 2004a; Malcolm et al., 2006). As global average temperature exceeds 4°C above pre-industrial levels, model projections suggest significant extinctions (40-70% species assessed) around the globe (Table 4.1). Losses of biodiversity will probably lead to decreases in the provision of ecosystem goods and services with trade-offs between ecosystem services likely to intensify (National Research Council, 1999; Carpenter et al., 2005; Duraiappah et al., 2005). Gains in provisioning services (e.g., food supply, water use) are projected to occur, in part, at the expense of other regulating and supporting services including genetic resources, habitat provision, climate and runoff regulation. Projected changes may also increase the likelihood of ecological surprises that are detrimental for human well-being (Burkett et al., 2005; Duraiappah et al., 2005). Ecological surprises include rapid and abrupt changes in temperature and precipitation, leading to an increase in extreme events such as floods, fires and landslides, increases in eutrophication, invasion by alien species, or rapid and sudden increases in disease (Carpenter et al., 2005). This could also entail sudden shifts of ecosystems to less desired states (Scheffer et al., 2001; Folke et al., 2004; e.g., Chapin et al., 2004) through, for example, the exeedance of critical temperature thresholds, possibly resulting in the irreversible loss of ecosystem services, which were dependent on the previous state (Reid et al., 2005)

#### Ocean acidification is occuring now and will cause extinction but it’s not game over – emissions cuts are key.

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They are calling it “the other CO2 problem”. Its victim is not the polar bear spectacularly marooned on a melting ice floe, or an eagle driven out of its range, nor even a French pensioner dying of heatstroke. What we have to mourn are tiny marine organisms dissolving in acidified water. In fact we need to do rather more than just mourn them. We need to dive in and save them. Suffering plankton may not have quite the same cachet as a 700-kilo seal-eating mammal, but their message is no less apocalyptic. What they tell us is that the chemistry of the oceans is changing, and that, unless we act decisively, the limitless abundance of the sea within a very few decades will degrade into a useless tidal desert. In every way — economically, environmentally, socially — the effects of ocean acidification are as dangerous as climate change, and even harder to resist. It has been a slow dawning. Until recently, marine scientists have had little luck in engaging the public or political mind. The species most directly at risk — plankton, corals, sea snails, barnacles and other stuff that most people have never heard of — seemed as remote from our lives as cosmic dust. But now at last “the other CO2 problem” may have found a mascot of its own — the tiny but colourful clownfish, winsome star of the Disney classic Finding Nemo. In the film, Nemo gets lost. Now it turns out that real clownfish might lose their way too. In early February, the American academic journal Proceedings of the National Academy of Sciences (PNAS) carried a paper titled “Ocean acidification impairs olfactory discrimination and homing ability of a marine fish”. The sombre language concealed a stark message. What the researchers had found was that clownfish larvae in acidified water were unable to detect the odours from adult fish that led them to their breeding sites. The implications were obvious. If the fish don’t breed, the species will not survive, and what is true for one species must be true for others. In time, the world’s fishing fleets will be less a food resource than a disposal problem. What’s happening is this: the oceans absorb carbon dioxide (CO2) from the atmosphere. As most climate scientists and governments now agree, human activity — most importantly, burning fossil fuels — has intensified CO2 in the atmosphere, causing long-term climate change. The good thing is that the seas have absorbed a lot of the gas and so have slowed the pace of atmospheric warming. The bad thing is that CO2 reacts with sea water to make carbonic acid. Since 1800, humans have generated 240 billion tonnes of carbon dioxide, half of which has been absorbed by the sea. On average, each person on Earth contributes a tonne of carbon to the oceans every year. The result is a rapid rise in acidity — or a reduction in pH, as the scientists prefer to express it — which, as it intensifies, will mean that marine animals will be unable to grow shells, and that many sea plants will not survive. With these crucial links removed, and the ecological balance fatally disrupted, death could flow all the way up the food chain, through tuna and cod to marine mammals and Homo sapiens. As more than half the world’s population depends on food from the sea for its survival, this is no exaggeration. This is why 155 marine scientists from 26 countries recently signed the Monaco Declaration, identifying the twin threats of global warming and ocean acidification as “the challenge of the century”. It is, nevertheless, a challenge they have taken up only recently. “The whole scientific community was caught with its pants down,” says Jason Hall-Spencer, research lecturer at Plymouth University, who was one of the signatories. The term “ocean acidification” was coined only in 2003 — by odd coincidence the same year Finding Nemo was released and 35,000 people died in the European summer heat wave — though, unlike global warming, it has not had to face the opposition of truth-deniers. Verging on panic in 2005, the Royal Society published a 68-page report in which it calculated that acidification had increased by 30% in 200 years. If we went on as we were, it said, this would rise to 300% by 2100, making the seas more corrosive than they had been at any time for hundreds of millennia. In every practicable sense, the damage was irreversible. “It will take tens of thousands of years for ocean chemistry to return to a condition similar to that occurring at pre-industrial times,” the Royal Society said. It is a truism that might have been minted for the Darwin bicentenary. A species once lost is gone for ever. You can’t rewind evolution, or reinvent fish. We are not talking about dispossessing our children, or even our grandchildren’s grandchildren. We are talking so many generations into the fog of geological time that we might not even be talking about the same species. We are certainly not talking about low-lying countries protected by coral reefs, such as the Maldives. In future they will not be studying the marine environment: they will be part of it. Doomy stuff like this, of course, is nothing new. The “warmists”, as the deniers like to call them, have been telling us for years that our rate of consumption is unsustainable and that future generations will pay a terrible price for our carelessness. If you don’t want to believe in climate change, you can argue that forecasts created by computer modelling are “theoretical”. Or you can confuse the long-term graph of “climate” with the short-term spikes of “weather”. Look, there’s a snowflake! Global warming can’t be happening! But acidification permits no such equivocation. It is demonstrable, visible and measurable, and there is nothing theoretical about how it is caused or what it does. All the same, until now there has been one significant shortcoming. As with the clownfish, it has been easy enough under laboratory conditions to see how individual species respond to acidity. What is much less easy is to observe the effects on entire ecosystems. This problem has now been cracked by a team from Plymouth led by Jason Hall-Spencer, who scanned the world for a location where the sea conditions expected in future were already happening naturally. They found it in the Bay of Naples, just off the holiday island of Ischia. The sea bed here is chalk. Deep geological activity converts some of this into carbon dioxide and forces it up through volcanic vents into the water. In and around the neighbourhood of these vents, the result is a perfect “gradient” of pH levels from the normal 8.1 all the way down to 7.4 (remember: the lower the pH, the higher the acidity). To non-scientists, the giving or taking of a few decimal points can look undramatic. To experts they mark the difference between life and death. The 30% increase in acidity during the industrial age is reflected by a drop in pH of just 0.1. On current trends, it will plummet by another 0.4 points to hit an unprecedented low of 7.7 by 2100. By 2300 it could be down to 7.3. Few species living in the sea have experienced conditions like these at any time throughout their entire life on Earth. With pH as low as this, it is at least questionable that land creatures emerging from the primal swamp could have evolved into the bony specimens that roam the Earth today. And it is certain that the pace of environmental change is far too fast for evolution to keep in step. As a recipe for life on Earth, it is about as efficacious as nuclear war. Experiments have shown that the tipping point at which shell growth ceases comes at a pH of 7.8. This is the level which, on current trends, will be the global norm before the end of the century, and it is the level at which the Plymouth team has focused its attention. Given all the dire warnings, the first visual impression at Ischia is something of a surprise. There are plenty of fish. Is it, then, a false alarm? Could the world’s scientists have got their statistical knickers in a twist and jumped to a false conclusion? Will life just go on as normal? Alas, no. The acidified water is a small zone in a wider sea. There is no barrier. The fish are just visitors. They come to feed on the soft-bodied algae that survive in the altered conditions, then they swim away again. What they don’t do is breed — which is exactly what the Nemo research predicts. “Fish breed naturally at a pH of 8.1,” says Hall-Spencer. He believes the sensory loss observed in clownfish is only one part of the story. “Losing the sense of smell,” he says, “is not likely to be the only effect. It’s much more likely to be one impairment among many. Eggs in these conditions cannot develop normally.” Shelled creatures in the Ischian waters are visibly suffering. Sea urchins thin out and disappear as the acidity increases; so do corals, limpets and barnacles. Sea snails straying into the zone have thin, weak shells, and produce no young. There is another important absentee, too — the coralline algae (seaweed with a chalk skeleton) that glues coral reefs together. Without it, reefs become weakened and fall apart. In just a few decades, if the output of carbon dioxide does not abate, this will be the condition of all the world’s oceans. Many if not all commercially fished species, including shellfish, will suffer. So, too, will coral reefs, whose disintegration will leave low-lying coasts in the tropics unprotected from the rising seas and fiercer storms that climate change will unleash. By some calculations reefs will have vanished by 2065, and nobody expects them to survive into the 22nd century. Nature, however, will continue to abhor a vacuum. Species that disappear will be replaced by alien invaders. Shelled and vertebrate creatures will be replaced by the soft and the blobby. Celebrity chefs, if they survive as a species, will be teaching us how to stuff jellyfish. The plant species that thrive around the volcanic vents in the Bay of Naples are alien to the Mediterranean, laying the foundations of an entirely different ecosystem. Already, says Hall-Spencer, similar changes are occurring along the southern coasts of England. Oyster farmers and ships discharging ballast water have accidentally introduced Japweed, Sargassum muticum, a fast-growing brown seaweed that clogs beaches and harbours. Originally a native of southeast Asia and Japan, it is unfazed by low pH and almost impossible to eradicate. As in the classic case of the grey squirrel ousting the red, the invasive alien expels and replaces the natives. “It perturbs the ecosystem and drives out things that should live there,” says Hall-Spencer. Plants are the base of the food chain, so everything in the water depends on them directly or indirectly. With the professional caution of the scientist, he declines to speculate on which species will be the first to disappear, but acknowledges that many creatures have little hope of survival. To reprise the old Star Trek mantra, there will be life here, but not life as we know it.

#### Latin American countries are moving towards addressing warming now – sends a global signal that economic growth and combating warming are compatible.

Edwards and Arias 8/6-- Guy Edwards is a Brown University Research Fellow with a focus on Latin America, international relations & climate change & co-founder of Intercambio Climatico, Gilberto Arias was formerly Ambassador from Panama to the UK and Head of Delegation from Panama to the International Maritime Organization and co-chairing IMO's Expert Group on Market-based Measures dealing with international shipping emissions, principal negotiator for Panama at the UNFCCC and remains active in a number of negotiating track (2013, “Can Latin America’s leaders balance climate and growth?” http://www.rtcc.org/2013/08/06/can-latin-americas-leaders-balance-climate-and-growth/) EL

In a bid to protect future prosperity from serious climate change impacts, Latin American countries are attempting to balance climate action with economic growth, through domestic policy and at the UN climate talks. Latin American countries are challenging the conventional wisdom that confronting climate change undermines economic growth by arguing that climate action provides an opportunity to leapfrog traditional development, while delivering low carbon, sustainable development. Following the Stern Review on the Economics of Climate Change’s principal conclusion that taking action now to reduce emissions is cheaper than dealing with climate impacts later, these countries strongly back an ambitious global regime to avoid these future costs. The Inter-American Development Bank says these costs could reach US$100 billion annually in the region by 2050, even under a 2˚C average global temperature increase. Examples from Brazil, Mexico and the Dominican Republic suggest that climate policies do not necessarily undermine economic growth, while an example from Ecuador reveals how climate-related policies run the risk of being sidelined by the need to use natural resources. Brazil has established a national greenhouse gas reduction target of roughly 36 percent of projected emissions by 2020. Brazil’s greenhouse-gas emissions fell nearly 39%, with a 76% drop in cumulative emissions from deforestation, between 2005 and 2010. Brazil attributes the dramatic improvements in forestry protection to a raft of policies implemented in 2004. However, research also points out that decreasing prices for agricultural products also led to a reduction in deforestation. As Viola suggests reducing emissions does not necessarily mean compromising economic growth. From 2005-09 Brazil dramatically reduced its carbon emissions while maintaining economic growth at 3.5% annually. New legislation Mexico was the first developing country to create a comprehensive climate change law in 2012 with targets to reduce GHG emissions by 30% by 2020 and 50% by 2050. The law also states that 35% of energy should come from renewable sources by 2024. Investments in renewable energy in Mexico grew from US$352 million in 2011 to US$1.9 billion in 2012, highlighting the opportunity to combine clean energy and job creation. The Dominican Republic recently presented a voluntary pledge to reduce 25% of absolute 2010 emissions by 2030. The plan, protected by law, is projected to add 100,000 permanent jobs while expanding the DR’s renewable energy capacity and integrating low-carbon development in the tourism sector. Climate-related policies can be undermined by the need to use natural resources for economic growth. Ecuador’s Yasuní-ITT Initiative seeks compensation for roughly half the estimated value of certain untapped oil deposits, in order to leave these resources untouched. The funds are earmarked to protect national parks and promote renewable energy. However, the plan has so far raised less than US$500 million, leading President Correa to announce a re-evaluation of the initiative and its limits on oil extraction. Competitive edge Latin American countries are fast growing economies with growing middle classes with substantial development and infrastructure goals. They can take advantage of the opportunities and competitive advantages arising in a future carbon constrained world through the early introduction of climate policies for carbon-efficient economies. The region will be required to almost double its installed power capacity to roughly 600 GW by 2030, yet the Inter-American Development Bank says Latin America can meet its future energy needs through renewable sources including solar and wind, which are sufficient to cover its projected 2050 electricity needs 22 times over. Investments in sustainable development in the region are increasing, delivering climate-resilient economies while avoiding emissions. This drive has led to the introduction of cross-ministerial policies, but climate policy across the region suffers from weak implementation. Trade-offs between climate action and economic interests are inevitable, however, these trade-offs appear less significant than the major economic costs associated with climate impacts. Climate policy is becoming a fixture on Latin American political agendas, including the recognition of vulnerability to climate impacts and that early action on reducing emissions will avoid greater costs later. Latin American countries are attempting to promote a new narrative that early climate action is compatible with low-carbon, sustainable prosperity. Successful experiences in Latin America can also positively feed into the UN climate change negotiations and help push for higher ambition and strengthen the discourse that climate change action is compatible with economic growth.

#### Venezuela blocks climate progress –

#### 1. Regional fragmentation.

Shifter 13— President at Inter-American Dialogue (“So Long, Chávez Where Does This Leave Venezuela?”, 3/5, http://www.foreignaffairs.com/articles/139014/michael-shifter/so-long-chavez) EL

Since 1999, however, when the recently deceased Venezuelan President Hugo Chávez came to power, the sense of community in the region has dissipated. Policy divergences among Latin American countries have become sharper; free trade and liberal democracy are no longer popular goals; and Latin America and the United States have, albeit cordially, gone their separate ways. Admittedly, generalizations about Latin America are risky; after all, for every country that has deviated from democratic norms, another has moved toward them. And Chávez was not single-handedly responsible for deflating the hopeful spirit that prevailed two decades ago. But his relentless defiance of Washington and its chief allies -- often accompanied by aggressive, even belligerent, rhetoric -- polarized the region. To be sure, Chávez’s boldness partially helped inspire pride and political self-confidence in the region, in addition to revitalizing the dream of leftist revolution in Latin America. Chávez’s contributions, however, were minimal compared with the positive impact of larger and more important factors, such as the rise of Brazil, the commodity boom, the growing assertiveness of many of the region’s countries, and the acute fiscal and political shortcomings of the United States. Far from unifying Latin America and thereby realizing the vision of Chávez’s hero, nineteenth-century independence leader Simón Bolívar, Chávez contributed to the fragmentation of the hemisphere. His attempts at regional cooperation, such as the socialist Bolivarian Alternative for the Americas (ALBA), appealed to only a handful of like-minded countries. After all, both at home and abroad, Chávez was mainly intent on accumulating power, not fostering cooperation. That is what motivated him to curtail Washington’s influence in Latin America and around the world. To pursue his aims, Chávez not only relied on his endless energy and seductive rhetoric but also a great deal of money. The former president took full advantage of the benefits of being at the helm of one of the world’s largest oil producers. Despite declining oil production and exports stemming from Venezuela’s dismal governance and crumbling institutions, Chávez got lucky during his reign: the price of oil skyrocketed, from just $10 a barrel in 1999 to around $100 today; the peak, in 2008, was $145 per barrel. Unique among Latin American leaders in the scope of his ambitions and resource wealth, Chávez forged security and economic alliances with China, Iran, and Russia. He also became the chief benefactor to a host of regional governments, which he supplied with subsidized oil under highly favorable financing terms. In 2005, Chávez made this patronage more official by establishing the Petrocaribe oil alliance, which now includes some 18 countries throughout Central America and the Caribbean. Many member states have profited from reselling part of their share of subsidized Venezuelan oil. In Haiti, for example, the practice accounts for roughly $400 million a year, or four percent of GDP. Precise figures are hard to come by, but there is little question that a number of Petrocaribe countries depend on Venezuelan largess. In ALBA countries, shared political ideology has deepened economic reliance. Cuba, for example, imports an estimated 100,000 barrels of Venezuelan oil every day at preferential prices. The annual subsidy is approximately $3 billion to $4 billion a year, a substantial part of Cuba’s overall economy. Under Chávez’s rule, Venezuela essentially supplanted the Soviet Union as Cuba’s lifeboat. Similarly, Nicaragua enjoys roughly $500 million a year in subsidies from Venezuela. Whether even a like-minded successor government could maintain such commitments is a major worry for dependent governments, especially in light of mounting economic pressures in Venezuela. Chávez left his imprint on recently founded regional organizations, too, all of which exclude the United States and Canada. Chief among them are the Union of South American Nations, created in 2008, and the Community of Latin American and Caribbean States, which was launched in 2011 and also includes Mexico and Central American countries. Although the organizations were designed to reflect Latin America’s unity, independence, and reorientation away from the United States, there is considerable disagreement among members on key issues of economic and trade policy, democracy, and U.S. relations. This raises doubts about how meaningful a role such institutions can play in the region.

#### 2. Oil potential and a global treaty.

Edwards and Mage 13(Guy, research fellow at Brown University's centre for environmental studies and is co-founder of Latin America's first multilingual website on climate change, Intercambio Climático. Susanna Mage is a recent graduate from Brown University and is currently interning at Intercambio Climático, Death of Hugo Chávez gives Venezuela a choice on climate change: Will the oil-rich country become a key engineer in a new global climate deal, or will it sabotage progress?” http://www.theguardian.com/environment/blog/2013/mar/07/death-hugo-chavez-venezuela-climate-change)//DR. H

Regardless of one's position on el Comandante Hugo Chávez, the death of the Venezuelan president opens the door for a policy debate on a critical issue for Venezuela and the world's security: climate change. As the 2015 deadline to create a new global treaty on climate change approaches, the question for the oil-rich country looms: will Venezuela be a key architect of an ambitious and equitable deal, or will it sabotage progress?

The International Energy Agency reports that no more than one-third of proven fossil fuel reserves can be consumed prior to 2050 if we are to limit warming to 2C. Writer Bill McKibben pointed out that if Venezuela were to exploit its heavy crude oil and Canada's tar sands are fully tapped, this would mean "game over" for the climate as both reserves would fill up the remaining "atmospheric space" or "carbon budget."

President Chávez oversaw a schizophrenic posture on climate change. He insisted that climate change is an existential crisis caused by capitalism, while simultaneously pushing for the development of the Orinoco's heavy crude. Under Chávez, Venezuela's oil dependency increased and it now obtains 94% of export earnings and more than 50% of its federal budget from oil revenues.

Due to high oil prices and Chávez's leadership, poverty and inequality have dropped. Chávez's administration appeared committed to increase oil production to continue funding its social programmes, often through long-term agreements with China to supply oil. Venezuela's "commodity backed loans" from China, estimated at more than $35bn, require it to pay back China in oil.

The key to solving climate change is shifting all countries to low carbon economies. At a United Nations negotiation in Bonn, Germany, in 2009, however, a Venezuelan official said that a shift to a low-carbon economy would adversely impact developing country oil exporters, suggesting that a robust climate change treaty would conflict with Venezuela's development model.

At the climate negotiations, Venezuela has clung to arguments that developing countries have the right to emit to ensure their development. Undermining Venezuela's position at the negotiations has been their often vociferous rhetoric, while exhibiting a lack of action at home. Meanwhile, a number of poorer countries have shown a willingness to take on far more ambitious emissions cuts.

Venezuela releases only 0.56% of the global total of greenhouse gas emissions, but its per capita emissions (at approximately six tonnes per person) are much higher than the world's poorest nations. Venezuela's current emissions, however, pale in significance compared to what is at stake if it does fully develop its oil reserves. Former UK special representative for climate change John Ashton has said that a country's ability to contribute to global efforts to tackle climate change depends on the credibility of its domestic policies.

Venezuela's national development plan (2013-19) includes measures to limit emissions, which include the oil industry and would create a world movement to confront climate change. The Venezuelan government has invested $500m in windfarms and distributed 155m energy-saving lightbulbs.

However, critics suggest that Venezuela has little interest and commitment in tackling climate change, and that the plan's objectives are unlikely to be implemented. According to ClimateScope, which ranks a country's ability to attract capital for low-carbon energy sources and efforts to build a green economy, Venezuela is currently 24th out of 26 countries.

In the UN climate negotiations, Venezuela is part of the Bolivarian Alliance for the Peoples of Our Americas (ALBA) with Ecuador, Bolivia, Cuba and Nicaragua, which is praised by many citizens' groups for fighting for climate justice. Venezuela is also a member of the Like-Minded group alongside China, India, Saudi Arabia and its ALBA partners.

Venezuela will understandably not stop oil production at the expense of its social programmes, nor its loan repayments to China. Partial or full compensation for loss of revenue from keeping the oil in the ground is unlikely. Venezuela could consider backing Ecuador's fascinating plan to be proposed at the next Opec meeting to create a 3-5% 'Daly-Correa' tax on every barrel of oil exported to rich countries to raid billions for poor countries to adapt to climate change.

With the death of its great leader, Venezuela has a choice on climate change. It can rebrand itself as a proactive actor at home by working towards a low-carbon economy while joining with its ambitious neighbors at the UN climate negotiations. With the largest known oil reserves, Venezuela's position on climate change is pivotal. En route to 2015, it remains to be seen whether it will be regarded as an engineer of an ambitious and equitable global treaty, or as a saboteur.

#### And, the plan’s key –

#### 1. It improves the US image in the region and makes regional coalitions possible.

**Griffin, 13** – Harvard editorial writer (John, “Engage with Venezuela,” The Harvard Crimson, 3 April 2013, http://www.thecrimson.com/article/2013/4/3/Harvard-Venezuela-Chavez-death/)

Diplomatically, positive engagement with Venezuela would be a major step toward building American credibility in the world at large, especially in Latin America. Chávez (along with his friends the Castros in Cuba) was able to bolster regional support for his regime by pointing out the United States’ attempts to forcibly intervene in Venezuelan politics. Soon, a number of populist governments in Latin America had rallied around Chávez and his anti-American policies. In 2004, Bolivia, Ecuador, Nicaragua, and three Caribbean nations joined with Venezuela and Cuba to form the Bolivarian Alliance for the Peoples of our America, an organization in direct opposition to the Free Trade Area in the Americas proposed (but never realized) by the Bush administration. Chávez galvanized these nations—many of whom have experienced American interventionist tactics—by vilifying America as a common, imperial enemy. Unfortunately for the United States, its general strategy regarding Venezuela has often strengthened Chávez’s position. Every time Washington chastises Venezuela for opposing American interests or attempts to bring sanctions against the Latin American country, the leader in Caracas (whether it be Chávez or Maduro) simply gains more evidence toward his claim that Washington is a neo-colonialist meddler. This weakens the United States’ diplomatic position, while simultaneously strengthening Venezuela’s. If Washington wants Latin America to stop its current trend of electing leftist, Chavista governments, its first step should be to adopt a less astringent tone in dealing with Venezuela. Caracas will be unable to paint Washington as an aggressor, and Washington will in turn gain a better image in Latin America. Beyond leading to more amicable, cooperative relationships with Latin American nations, engagement with Venezuela would also be economically advisable. With the world’s largest oil reserves, countless other valuable resources, and stunning natural beauty to attract scores of tourists, Venezuela has quite a bit to offer economically. Even now, America can see the possible benefits of economic engagement with Caracas by looking at one of the few extant cases of such cooperation: Each year, thousands of needy Americans are able to keep their homes heated because of the cooperation between Venezuela and a Boston-area oil company. Engagement with Venezuela would also lead to stronger economic cooperation with the entirety of Latin America. It was mostly through Venezuela’s efforts that the United States was unable to create a “Free Trade Area of the Americas,” an endeavor that would have eliminated most trade barriers among participant nations, thereby leading to more lucrative trade. In a world where the United States and Venezuela were to enjoy normalized relations, all nations involved would benefit from such agreements. For both diplomatic and economic reasons, then, positive engagement is the best course of action for the United States. As it stands, the negative relationship between the countries has created an atmosphere of animosity in the hemisphere, hindering dialogue and making economic cooperation nearly impossible. While there is much for which the Venezuelan government can rightly be criticized—authoritarian rule, abuse of human rights, lack of market-friendly policies—nothing that the United States is doing to counter those drawbacks is having any effect. The United States should stop playing “tough guy” with Venezuela, bite the bullet, and work toward stability and prosperity for the entire hemisphere. We aren’t catching any flies with our vinegar—it’s high time we started trying to catch them with honey.

2. Develops **information sharing and communication channels.**

**Welsh and Schneider 13**—Nancy Welsh is the William Trickett Faculty Scholar and Professor of Law at Penn State Law and Andrea Kupfer Schneider is a Professor Of Law at Marquette University Law School (“The Thoughtful Integration of Mediation into Bilateral Investment Treaty Arbitration”, Spring) EL

3. Recommended “Default” Model of Mediation for the¶ Investor-State Context¶ Arguably, at least, the aim of mediation in the investment context¶ should be enhancing parties’ ability to communicate, inform, and¶ negotiate directly with each other. After all, it will be important for¶ the parties to maintain or improve ongoing relationships, collaborate¶ on the implementation of any agreement, and acknowledge volatile¶ political situations (often accompanied by difficult emotions) to enable¶ representatives (and their constituencies) to embrace good solutions,¶ even if they are not everyone’s preferred solutions. All of these¶ factors suggest the value of a “default” model of mediation that begins¶ with facilitative or elicitive interventions and a focus on interests.¶ Such a model should be preceded by careful preparation.¶ Importantly, however, this model of mediation should also be supplemented¶ as necessary with evaluative or directive interventions and¶ consideration of legal rights and norms. As we have discussed supra,¶ it is the combination of these interventions that is the hallmark of¶ effective mediators. A process that begins facilitatively should enable¶ the parties’ “mutual consideration”165 of each other’s perspectives¶ and underlying needs. In other words, it should facilitate the parties’¶ ability to engage in a procedurally just process with each other. Investors¶ and states will need sufficient opportunity to speak and be¶ heard, but also to listen to each other, reflect upon what was said,¶ demonstrate that they have listened to each other, and also make¶ meaningful movement toward resolution.166¶ This recommendation assumes that states and investors need access¶ to mediation because they currently have only three other procedures¶ available to them—negotiation, conciliation, and arbitration—¶ to resolve their disputes.167 The “default” mediation model that is¶ presumptively facilitative and interest-based therefore offers something¶ new and useful. First, of course, it provides a third party to¶ assist the parties’ negotiations; this differentiates it from negotiation.¶ Second, its focus is on facilitating the parties’ communication, information-¶ sharing and negotiation, thus placing it within the “facilitated”¶ category of processes, while conciliation and binding¶ arbitration fit into the “advisory” and “imposed” categories, respectively.¶ Finally, this model of mediation provides an explicit opportunity¶ to identify and focus on the discussion of interests, while¶ conciliation and arbitration presumptively focus on rights. As a “default,”¶ parties may elect to depart from this model, but they must do¶ so explicitly and agree upon such a departure.

**3. US leadership and resources are key.**

Maykranz 7/10—Research Asssociate at Global Solutions (Alisondra, 2013, “Climate Change: An Opportunity for a 'New Era of Relations'”, http://globalsolutions.org/blog/2013/07/Climate-Change-Opportunity-New-Era-Relations) EL

U.S. relations with Latin America have not always been exemplary, but climate change is an issue that presents an opportunity for the U.S. to cooperate with its southern neighbors and to provide the leadership that such a global threat requires. According to the Pew Research Center data cited in Harrison’s blog, Latin America as a whole is a region very concerned with climate change. In each of the seven Latin American countries polled, climate change was the most widely recognized threat. Sixty-five percent of Latin Americans identify climate change as a threat to their respective countries, compared to 40 percent of people in the United States. In Brazil the percentage is as high as 76, and Argentina is not far behind at 71 percent. Furthermore, not a single Latin American country reported numbers below 50 percent. Even in the oil-rich country of Venezuela, 53 percent of the public recognizes climate change as a threat. This is significant considering that oil-exporting countries generally resist the implications of climate change. A 2012 study by the World Bank shows that Latin America is at greater risk to the dangers of climate change than most of the world. To make matters worse, many regions within Latin America have insufficient capability to cope with these potentially devastating effects of climate change. The Amazon rainforest, one of the most delicate regions of Latin America, is already experiencing negative effects from climate change. The indigenous peoples who depend on the rainforest are also among the most vulnerable populations in the world, according to a 2010 World Bank study. Climate change in the Amazon not only affects Brazil’s population, but also has a far reaching impact on many other parts of Latin America, as explained by Amazon Watch: “The Amazon Basin’s hydrological system plays a critical function in regulating the global and regional climate…Among the regions directly linked to the Amazon by a complex weather system is the Rio de la Plata basin of southeastern South America, one of the most important agricultural zones on the planet.” The success of the region’s agriculture rests largely on the conditions in the Amazon. Environmental economists S. Niggol Seo and Robert Mendelsohn, through a project with the World Bank, found that climate change could lead to as much as a 62 percent loss in farm earnings in Latin America, with the Amazon and Equatorial regions likely losing the most. Given this information, it is no surprise that Brazil and Argentina reported the highest percentages of people who recognize climate change as a threat. As the Obama Administration turns its focus toward domestic policies on climate change, it should also put climate change on its international agenda. At the end of May, Vice President Biden traveled to Rio de Janeiro as part of the effort to strengthen U.S.-Brazil relations. He spoke in Rio about a “new era of relations” between the U.S. and Brazil, as well as Latin America more generally, but the focus was on increasing economic ties. Not once was the subject of climate change even mentioned, let alone given the attention it deserves. With 76 percent of Brazilians and 65 percent of Latin Americans concerned about climate change, it would truly signal a “new era of relations” between the U.S. and Latin America if the Administration were to demonstrate their own concern for what is taking place in the Western Hemisphere by taking the lead in multilateral climate change initiatives. This really is an opportunity that I can only hope the Obama Administration will consider as important as the economic opportunities it is currently pursuing in Brazil and Latin America.

# Contention 2 – SPS

#### CONTENTION 2 IS SPS –

#### Venezuela really really really really wants SPS – only the plan solves.

Veronica Magan as of August 23 8/23, Veronica, 8/23/13, “Venezuela: Latin America’s Next Space Pioneer?,” <http://www.satellitetoday.com/publications/2013/08/23/venezuela-latin-americas-next-space-pioneer-2/)//DR>. H

As Latin America continues to shape up as a hotbed for the satellite industry, Venezuela is looking to become a more relevant player in this market. With two satellites already launched, and more ambitious space projects in the pipeline, the country is quickly becoming a pioneer for developing a space-based capability in Latin America.

In 10 years, the country has already launched two satellites, trained more than 200 people with satellite technology skills, and is in the process of building its own satellite manufacturing facility, according to Victor Cano, president of Venezuela’s space agency the Bolivarian Agency for Space Activities (ABAE for its acronym in Spanish). It all started in 2002 when the government made space exploration a priority and began creating a legal and institutional framework to make this possible, Cano says. Thus, the ABAE was created and the goals were set, but the key to success was the country’s stellar diplomatic ties with the People’s Republic of China.

“Thanks to China, in less than 10 years, Venezuela has two satellites in orbit controlled, monitored and used by Venezuelans – something that not many countries in the world can say,” Cano says.

Communications

At the start of the last decade, Venezuela began its journey to building and launching its first satellite (Venesat 1) dubbed Simon Bolivar, the name of its most iconic founding father. For this communications satellite, more than 70 Venezuelans travelled to China to receive training in satellite operations and witness the manufacturing process.

Just six years after the country’s curiosity for the satellite industry sparked, Venezuela already had its first satellite in orbit. Venesat 1 was launched on October 29, 2008.

Based on the DFH 4 satellite platform, the satellite is equipped with 28 transponders: 14 C-band, 12 Ku-band and 2 Ka-band, and has a service life span of 15 years, according to its manufacturer China Great Wall Industry Corporation.

Cano says the satellite was conceived as a solution to provide connectivity to remote regions of the country where terrestrial communication is not available. And in its five years of activity, it has provided connectivity to more than 4 million people in Venezuela, he added. “The Simon Bolivar satellite has enabled us to provide communication services to remote sites in our country, and has also helped lower service costs for the Venezuelan government.”

Cano says that the government has been using the Venesat 1 capacity to provide satellite communications to its state-owned oil industry, its military, and to government research institutions.

In its mission to provide communications to remote locations of the country, Venesat 1 capacity has been used to offer satellite broadband and television services to these communities that have no access to fiber or regular over-the-air television signal. While the ABAE controls, manages and monitors the health and orbit of the satellite, CANTV, the state-owned telco, administers the payload of the satellite and provides the communication services offered through it, according to Cano. “More than 7,000 antennas have been distributed nationwide and this has directly benefited more than 4 million Venezuelans in different areas such as satellite television and radio or tele-education services, for example. These are all connected through the Simon Bolivar satellite,” he says.

Earth Observation

As the country continued to explore possible applications of the Venesat 1, its second satellite was already being prepared, but this time Venezuela would dive into the Earth observation arena. The process repeated itself with more than 50 Venezuelans travelling to China to witness the manufacturing process and get training in operating an observation spacecraft, according to Cano.

The Venezuelan Remote Sensing Satellite (VRSS 1), also known as the Miranda satellite after another Venezuelan founding father, was launched on September 29, 2012. Based on the CAST2000 platform, the satellite is also controlled by the ABAE through local ground stations built for it in Venezuela.

“We have almost 4,000 images with cloud cover less than 20 percent. In total, we have gathered a little more than 10,000 images but unfortunately, since we are a tropical country, the cloud cover is an important challenge. However, of those 10,000 images, 4,000 are useful for research in different areas of knowledge,” Cano says.

VRSS 1 carries two cameras with a resolution of 2.5 meters in panchromatic mode (PAN) and 10 meters in multispectral mode (MS), and two cameras with a combined resolution of 16 meters. The higher resolution cameras cover the whole Venezuelan territory in 57 days and the lower resolution cameras in 12 days, according to ABAE.

Cano says the satellite is used for monitoring agricultural activities and crops, the study of geological hazards, monitoring national security and borders, coastal protection, as well as for the search of new lands for government housing projects.

Manufacturing

While Venezuela is still getting comfortable with its new satellite capabilities, the country is eager for more. Its ambitious future plans are mainly focusing on one objective: having the capability to build their own satellites. With this goal in mind, Venezuela is working on opening its own satellite manufacturing facility within the next year. “This is our main objective to achieve over the next 12 months. We expect that by July or August of next year, this center will be fully operational,” Cano said.

The factory, as he calls it, will be focused on building small satellites of up to 1 ton in weight. Thus, for its next satellite, the country’s space ambitions will go to the next level, relying less on Chinese expertise, and more on Venezuelans involved in all parts of the process from conceptionto launch.

“We wanted to start the factory with low-orbit, small satellites because they are a bit more manageable in the design and requirements. Although we have not decided on what will be the next Venezuelan satellite, the idea is that it will be designed, assembled, and manufactured here in Venezuela,” Cano said adding that the ABAE has explored the possibility of having a satellite to study the physical properties of the Earth.

A Plan for Space Activities

As the ABAE is building the first Venezuelan satellite manufacturing facility, the agency is also working on its strategic plan for the next six years, equivalent to the presidential period that began this year in the country. Cano expects the plan to be finalized and approved before the end of 2013.

“This plan is a roadmap showing where we need to direct all our efforts to; it outlines our goals for this presidential term. … Since we are developing this plan, we have nothing definite yet but hopefully before the end of the year, the plan will be approved,” he said.

What Cano is sure of, however is that an important guideline for this strategic plan will be the consolidation of not just Venezuela as a player in the satellite industry, but of Latin America as a whole.

“As it is our government’s policy, the goal is to position ourselves as a regional bloc with the Latin America and the Caribbean region in different areas of knowledge and one of them, of course, is space activity,” Cano says. “Our idea is to strengthen ourselves as a nation in the space industry but also rely on other countries within the region, such as Argentina and Brazil, which have already built several satellites and have more years of experience than us. In addition, we also support other countries, such as Bolivia, that are starting to delve in the space industry. We seek to establish a relationship both to obtain new knowledge, as well as to provide new knowledge to the region.”

Cano believes that strengthening Venezuela’s position and expanding its reach within the space industry is a fundamental move toward the country’s development as well as the region as a whole. He even envisions a launch center that would serve and be managed by the Latin American countries as a bloc; “but it is not definite,” he said.

Pay-TV

While the Venezuelan government’s participation in the satellite industry is still quite new, the country is no stranger to satellite. In 1996 DirecTV entered the Venezuelan market as the first DTH satellite provider and has remained one of the top options for satellite television in the country since its launch. However, the television giant is now facing competition as new companies have entered the market over the past two years.

“The pay TV market in Latin America is very dynamic, with a strong growth trend led by DTH technology, and Venezuela is no exception,” says Rodolfo Carrano, marketing director, DirecTV Venezuela. “In each market there must be supply and demand, the final decision is taken by the Venezuelan consumers who decide which company they will allow in their homes.”

Spanish company Telefónica, through Movistar, its brand in Venezuela, first launched its DTH service in 2008. But in October 2012, the company relaunched the service with more channels than before. Movistar TV now offers 150 channels with 23 of them in HD using capacity on Hispasat’s Amazonas 1 and 2 satellites, according to Agatha Coello, general manager, Movistar TV.

In 2005 Movistar entered the Venezuelan market offering mobile telephony services. Since then, the company has grown to offer fixed telephony and mobile Internet services as well. Now, Movistar is leveraging its customer base to grow its satellite TV service penetration by offering bundles and discounts to its current users. “This is our competitive advantage in the market and that translates into a great alternative for users looking to access these services at a lower cost,” Coello says.

Another company that has dived into satellite television is Inter, a Venezuelan cable television provider. But unlike Movistar, Inter is not looking to capitalize on its current customers, but to expand its reach to those that can’t access it.

“Inter serves more than 2 million homes in Venezuela with a triple play offer. However, these represent only 29 percent of homes around the country. Due to the socio-geographical characteristics of Latin America, it was impossible to reach all homes with our fiber optics network. This is why we saw the opportunity to serve these households that still have very low penetration of pay-TV services with a satellite service,” says Eduardo Stigol, CEO of Inter Venezuela.

With its satellite television services launched in August 2012, the company is expanding to all the approximately 5 million homes its optic fiber network cannot reach. The service is offered under a pre-paid model to attract lower income families in Venezuela, Stigol says. Inter’s basic plan offers 78 channels with two of them in HD, with the option to purchase access to more HD channels in their premium plans. Stigol believes this offer is what sets Inter apart from its competition.

While the company is dipping is toes in the satellite television market, Stigol says Inter’s strategy for satellite television will continue to target those households where fiber optics is not available.

The entrance of Movistar TV and Inter’s satellite service to the Venezuelan market could indicate an important shift in the country’s attitude toward pay-TV and a growing demand for these services. This, combined with the government’s growing interest in developing its space expertise, is making Venezuela – a country of close to 30 million people – an exciting newcomer to the satellite industry.

#### Scenario 1 is Cooperation –

#### Leadership in SPS development is key to space coop and exploration – agenda setting, interest groups, and consensus building – spills over to other US space infrastructure and spurs cooperative projects – USFG key. **NSSO 07** (National Security Space Office, Report to the Director, “Space-Based Solar Power As an Opportunity for Strategic Security; Phase 0 Architecture Feasibility Study” October 10, 2007, <http://www.nss.org/settlement/ssp/library/final-sbsp-interim-assessment-release-01.pdf)//DR>. H

Competitiveness r that the United States boldly pioneer new frontiers in aerospace technology, commerce and exploration. They explicitly recommended that the United States create a space imperative and that NASA and DoD need to make the investments - 15 - necessary for developing and supporting future launch capabilities to revitalize U.S. space launch infrastructure, as well as provide Incentives to Commercial Space. The report called on government and the investment community must become more sensitive to commercial opportunities and problems in space. Recognizing the new realities of a highly dynamic, competitive and global marketplace, the report noted that the federal government is dysfunctional when addressing 21st century issues from a long term, national and global perspective. It suggested an increase in public funding for long term research and supporting infrastructure and an acceleration of transition of government research to the aerospace sector, recognizing that government must assist industry by providing insight into its long‐term research programs, and industry needs to provide to government on its research priorities. It urged the federal government must remove unnecessary barriers to international sales of defense products, and implement other initiatives that strengthen transnational partnerships to enhance national security, noting that U.S. national security and procurement policies represent some of the most burdensome restrictions affecting U.S. industry competitiveness. Private‐public partnerships were also to be encouraged. It also noted that without constant vigilance and investment, vital capabilities in our defense industrial base will be lost, and so recommended a fenced amount of research and development budget, and significantly increase in the investment in basic aerospace research to increase opportunities to gain experience in the workforce by enabling breakthrough aerospace capabilities through continuous development of new experimental systems with or without a requirement for production. Such experimentation was deemed to be essential to sustain the critical skills to conceive, develop, manufacture and maintain advanced systems and potentially provide expanded capability to the warfighter. A top priority was increased investment in basic aerospace research which fosters an efficient, secure, and safe aerospace transportation system, and suggested the establishment of national technology demonstration goals, which included reducing the cost and time to space by 50%. It concluded that, “America must exploit and explore space to assure national and planetary security, economic benefit and scientific discovery. At the same time, the United States must overcome the obstacles that jeopardize its ability to sustain leadership in space**.” An SBSP program would be a powerful expression of this imperative.** FINDING: The SBSP Study Group found that SBSP directly supports the articulated goals of the U.S. National Space Policy and Vision for Space Exploration which seeks to promote international and commercial participation in exploration that furthers U.S. scientific, security, and economic interests, and extends human presence across the solar system. No other opportunity so clearly offers a path to realize the Vision as articulated by Dr. Marburger, Science Advisor to the President: “As I see it, questions about the vision boil down to whether we want to incorporate the Solar System in our economic sphere, or not. Our national policy, declared by President Bush and endorsed by Congress last December in the NASA authorization act, affirms that, ‘The fundamental goal of this vision is to advance U.S. scientific, security, and economic interests through a robust space exploration program.’ So at least for now the question has been decided in the affirmative.” No other opportunity is likely to tap a multi‐trillion dollar market that could provide an engine to emplace infrastructure that could truly extend human presence across the solar system and enable the use of lunar and other space resources as called for in the Vision. FINDING: The SBSP Study Group found that SBSP offers significant opportunities for positive international leadership and partnership, at once providing a positive agenda for energy, development, climate, and space. If the United States is interested in energy, sustainable development, climate change, and the peaceful use of space, the international community is even hungrier for solutions to these - 16 - issues. While the US may be able to afford increased energy prices, the very availability and stability of energy is a threat to other countries’ internal stability and ability for development. SBSP offers a way to bypass much terrestrial electrical distribution infrastructure investment and to purchase energy from a reliable source at receiver stations that can be built by available domestic labor pools without significant adverse environmental effects, including greenhouse gas emissions. Finding: The SBSP Study Group found that one immediate application of space‐based solar power would be to broadcast power directly to energy‐deprived areas and to persons performing disaster relief, nation‐building, and other humanitarian missions often associated with the United Nations and related non‐governmental organizations. o Recommendation: The SBSP Study Group recommends that during subsequent phases of the SBSP feasibility study opportunities for broad international partnerships with non‐state and trans‐state actors should be explored. In particular, cooperation with the United Nations and related organizations to employ SBSP in support of various humanitarian relief efforts support consistent with the U.N. Millennium Objectives must be assessed with the help of affiliated professionals. FINDING: The SBSP Study Group found that SBSP is an idea that appears to generate significant interest and support across a broad variety of sectors

#### Unilateral action is key to start the cooperation **Stone 11** – space policy analyst and strategist near Washington, DC (3/14/11, Christopher, “American leadership in space: leadership through capability,” www.thespacereview.com/article/1797/1)//DR. H

Recently, Lou Friedman wrote a piece where he articulated his view on what American leadership in space means to many and what it means to him (see “American leadership”, The Space Review, February 14, 2011). I would like to respond by providing some context that I think is lacking from the discussion. The United States’ goal should be leadership through spacefaring capabilities, in all sectors. First, let me start by saying that I agree with Mr. Friedman’s assertion that “American leadership is a phrase we hear bandied about a lot in political circles in the United States, as well as in many space policy discussions.” I have been at many space forums in my career where I’ve heard the phrase used by speakers of various backgrounds, political ideologies, and nation. Like Mr. Friedman states, “it has many different meanings, most derived from cultural or political biases, some of them contradictory”. This is true: many nations, as well as organizations and individuals worldwide, have different preferences and views as to what American leadership in space is, and/or what it should be. He also concludes that paragraph by stating that American leadership in space could also be viewed as “synonymous with American… hegemony”. I again will agree that some people within the United States and elsewhere have this view toward American leadership. However, just because people believe certain viewpoints regarding American leadership does not mean that those views are accurate assessments or definitions of what actions demonstrate US leadership in the space medium. When it comes to space exploration and development, including national security space and commercial, I would disagree somewhat with Mr. Friedman’s assertion that space is “often” overlooked in “foreign relations and geopolitical strategies”. My contention is that while space is indeed overlooked in national grand geopolitical strategies by many in national leadership, space is used as a tool for foreign policy and relations more often than not. In fact, I will say that the US space program has become less of an effort for the advancement of US space power and exploration, and is used more as a foreign policy tool to “shape” the strategic environment to what President Obama referred to in his National Security Strategy as “The World We Seek”. Using space to shape the strategic environment is not a bad thing in and of itself. What concerns me with this form of “shaping” is that we appear to have changed the definition of American leadership as a nation away from the traditional sense of the word. Some seem to want to base our future national foundations in space using the important international collaboration piece as the starting point. Traditional national leadership would start by advancing United States’ space power capabilities and strategies first, then proceed toward shaping the international environment through allied **cooperation** efforts. The United States’ goal should be leadership through spacefaring capabilities, in all sectors. Achieving and maintaining such leadership through capability will allow for increased space security and opportunities for all and for America to lead the international space community by both technological and political example. As other nations pursue excellence in space, we should take our responsibilities seriously, both from a national capability standpoint, and as country who desires expanded international engagement in space. The world has recognized America as the leaders in space because it demonstrated technological advancement by the Apollo lunar landings, our deep space exploration probes to the outer planets, and deploying national security space missions. We did not become the recognized leaders in astronautics and space technology because we decided to fund billions into research programs with no firm budgetary commitment or attainable goals. We did it because we made a national level decision to do each of them, stuck with it, and achieved exceptional things in manned and unmanned spaceflight. We have allowed ourselves to drift from this traditional strategic definition of leadership in space exploration, rapidly becoming participants in spaceflight rather than the leader of the global space community. One example is shutting down the space shuttle program without a viable domestic spacecraft chosen and funded to commence operations upon retirement of the fleet. We are paying millions to rely on Russia to ferry our astronauts to an International Space Station that US taxpayers paid the lion’s share of the cost of construction. Why would we, as United States citizens and space advocates, settle for this? The current debate on commercial crew and cargo as the stopgap between shuttle and whatever comes next could and hopefully will provide some new and exciting solutions to this particular issue. However, we **need** to made a decision sooner rather than later. Finally, one other issue that concerns me is the view of the world “hegemony” or “superiority” as dirty words. Some seem to view these words used in policy statements or speeches as a direct threat. In my view, each nation (should they desire) should have freedom of access to space for the purpose of advancing their “security, prestige and wealth” through exploration like we do. However, to maintain leadership in the space environment, space superiority is a worthy and necessary byproduct of the traditional leadership model. If your nation is the leader in space, it would pursue and maintain superiority in their mission sets and capabilities. In my opinion, space superiority does not imply a wall of orbital weapons preventing other nations from access to space, nor does it preclude international cooperation among friendly nations. Rather, it indicates a desire as a country to achieve its goals for national security, prestige, and economic prosperity for its people, and to be known as the best in the world with regards to space technology and astronautics. I can assure you that many other nations with aggressive space programs, like ours traditionally has been, desire the same prestige of being the best at some, if not all, parts of the space pie. Space has been characterized recently as “congested, contested, and competitive”; the quest for excellence is just one part of international space competition that, in my view, is a good and healthy thing. As other nations pursue excellence in space, we should take our responsibilities seriously, both from a national capability standpoint, and as country who desires expanded international engagement in space. If America wants to retain its true leadership in space, it must approach its space programs as the advancement of its national “security, prestige and wealth” by maintaining its edge in spaceflight capabilities and use those demonstrated talents to advance international prestige and influence in the space community. These energies and influence can be channeled to create the international space coalitions of the future that many desire and benefit mankind as well as America. Leadership will require sound, long-range exploration strategies with national and international political will behind it. American leadership in space is not a choice. It is a requirement if we are to truly lead the world into space with programs and objectives “worthy of a great nation”.

#### That solves debris.

MacDonald 09 (Brian - Senior Director of the Congressional Commission on the Strategic Posture of the United States. He is based at the United States Institute of Peace, Washington, DC. “Steps to strategic security and stability in space: a view from the United States” http://www.unidir.org/pdf/articles/pdf-art2907.pdf)//DR. H

Although the United States has been a spacefaring nation for over 50 years, the essential and growing role that space plays as a fundamental enabling feature of conventional and strategic military posture and the strength of advanced civilian economies around the world is too little understood. The rivers of information and other services that space assets provide allow economies to function more efficiently and provide ever increasing benefits to people around the world, as satellite navigation systems and international cellphones, to name but a few applications, attest. These space information services are also key to the verification of arms control agreements, and they permit military systems, and military decision-making, to be far more effective than in the past—vital advantages across the spectrum of national security concerns. It is no wonder that current US space policy for the first time calls US space assets “vital” to its national interests. More serious than this lack of public understanding about space is the serious shortfall in understanding the larger implications of the importance of space. Threats to the world’s space assets, and hence to the world’s vital national interests, come in many forms—some hostile, some not. One of the biggest threats is what we just do not know: about objects in space, the intentions of those who put the objects there, and the strategic landscape of space itself—how it operates, where it poses strategic dangers, and what needs to be monitored and managed. We need to understand how China, the Russian Federation, the United States and others see space stability. How will this shape their space doctrine, acquisition, strategies and diplomacy? There is much we should know and understand, but do not, about this new space-enabled military era the world has recently entered. The strategic problem Given the vital and growing role that space plays in modern life, the world has an overriding interest in maintaining the safety, survival and function of space assets so that the profound civilian, commercial, and military benefits they enable can continue to be available. These vital space assets face three forms of threat, all of them worrisome and growing. First, the proliferation of space and other technologies, and specifically the anti-satellite (ASAT) capabilities demonstrated within the past three years, call attention to the risk that an advanced country could exploit this fast-growing world dependence on space in a war. 1 Second, space “traffic” is heavier than it has ever been and getting heavier still, in terms of both vehicles and communications, but there is no space traffic control authority. The current level of simply monitoring space objects is widely regarded as far below what is needed: there is a substantial and growing need for space traffic management capabilities, including enforceable rules of the road and codes of conduct, and space situational awareness to inform a space traffic management capability. Third, space debris poses an insidious and growing threat to all space assets. Debris in space does not quickly fall to the ground: at all but the lowest orbits, debris can stay aloft for centuries and more. In addition to the 19,000 orbiting objects the United States Air Force is tracking, there are hundreds of thousands of potentially lethal objects in orbit, and millions of smaller objects that pose at least some risk. 2 If current space debris trends continue, there will be almost 1000% more debris than today within 25 years. 3 This would greatly increase the risk of satellite collisions and force satellite operators into making frequent, costly and satellite-lifetime shortening manoeuvres. The collision earlier this year between a US Iridium satellite and an older Russian Cosmos dramatically illustrates the problem. 4 The core of the space security problem is that the substantial economic and national security benefits that space assets provide is accompanied by their substantial vulnerability to both natural and man-made threats. In addition to the increasingly worrisome threats of orbital debris, as well as physical and electromagnetic traffic in space, military writings in several countries make clear that developing offensive capabilities against space assets has significant appeal to some military planners. 5 Global space policy needs to address key space stability issues In 2006, the Bush Administration issued a revised space policy that declared for the first time that US space assets are “vital to its national interests”, in recognition of the extraordinary and growing US military and economic dependence on them. 6 This phrase carries much heavier national security implications than have ever before been attributed to space

#### Debris causes a US-Russian nuclear war.

Lewis 04 - postdoctoral fellow in the Advanced Metods of Cooperative Study Program; worked in the office of the Undersecretary of Defense for Policy (Jeffrey, Center for Defense Information, "What if Space were Weaponized?" July 2004, http://www.cdi.org/PDFs/scenarios.pdf)

This is the second of two scenarios that consider how U.S. space weapons might create incentives for America's opponents to behave in dangerous ways. The previous scenario looked at the systemic risk of accidents that could arise from keeping nuclear weapons on high alert to guard against a space weapons attack. This section focuses on the risk that a single accident in space, such as a piece of space debris striking a Russian early-warning satellite, might be the catalyst for an accidental nuclear war. As we have noted in an earlier section, the United States canceled its own ASAT program in the 1980s over concerns that the deployment of these weapons might be deeply destabiliz- ing. For all the talk about a "new relationship" between the United States and Russia both sides retain thousands of nuclear forces on alert and con\* gured to ♦ ght a nuclear War. When briefed about the size and status of U.S. nuclear forces, President George W. Bush reportedly asked "What do we need all these weapons for?"43 The answer, as it was during the Cold War, is that the forces remain on alert to conduct a number of possible contingencies, including a nuclear strike against Russia. This fact, of course, is not lost on the Rus- sian leadership, which has been increasing its reliance on nuclear weapons to compensate for the country's declining military might. In the mid-1990s, Russia dropped its pledge to refrain from the "\*rst use" of nuclear weapons and conducted a series of exercises in which Russian nuclear forces prepared to use nuclear weapons to repel a NATO invasion. In October 2003, Russian Defense Minister Sergei Ivanov reiter- ated that Moscow might use nuclear weapons "preemptively" in any number of contingencies, including a NATO attack.44 So, it remains business as usual with U.S. and Russian nuclear forces. And business as usual includes the occasional false alarm of a nuclear attack. There have been several of these incidents over the years. In September 1983, as a relatively new Soviet early-warning satellite moved into position to monitor U.S. missile \*elds in North Dakota, the sun lined up in just such a way as to fool the Russian satellite into reporting that half a dozen U.S. missiles had been launched at the Soviet Union. Perhaps mindful that a brand new satel- lite might malfunction, the of\*cer in charge of the command center that monitored data from the early-warning satellites refused to pass the alert to his superiors. He reportedly explained his caution by saying: "When people start a war, they don't start it with only \* ve missiles. You can do little damage with just \* ve missiles."45 In January 1995, Norwegian scientists launched a sounding rocket on a trajectory similar to one that a U.S. Trident missile might take if it were launched to blind Russian radars with a high altitude nuclear detonation. The incident was apparently serious enough that, the next day, Russian President Boris Yeltsin stated that he had activated his "nuclear football" , - a device that allows the Russian president to communicate with his military advisors and review his options for launching his arsenal. In this case, the Russian early-warning satellites could clearly see that no attack was under way and the crisis passed without incident.46 In both cases, Russian observers were con\* -dent that what appeared to be a "small" attack was not a fragmentary picture of a much larger one. In the case of the Norwegian sounding rocket, space-based sensors played a crucial role in assuring the Russian leadership that it was not under attack. The Russian command sys-tem, however, is no longer able to provide such reliable, early warning. The dissolution of the Soviet Union cost Moscow several radar stations in newly independent states, creating "attack cor-ridors" through which Moscow could not see an attack launched by U.S. nuclear submarines.47 Further, Russia's constellation of early-warn-ing satellites has been allowed to decline - only one or two of the six satellites remain operational, leaving Russia with early warning for only six hours a day. Russia is attempting to reconstitute its constellation of early-warning satellites, with several launches planned in the next few years. But Russia will still have limited warning and will depend heavily on its space-based systems to provide warning of an American attack.48 As the previous section explained, the Penta- gon is contemplating military missions in space that will improve U.S. ability to cripple Russian nuclear forces in a crisis before they can execute an attack on the United States. Anti-satellite weapons, in this scenario, would blind Russian reconnaissance and warning satellites and knock out communications satellites. Such strikes might be the prelude to a full-scale attack, or a limited ef- fort, as attempted in a war game at Schriever Air Force Base, to conduct "early deterrence strikes" to signal U.S. resolve and control escalation.49 By 2010, the United States may, in fact, have an arsenal of ASATs (perhaps even on orbit 24/7) ready to conduct these kinds of missions - to coerce opponents and, if necessary, support preemptive attacks. Moscow would certainly have to worry that these ASATs could be used in conjunction with other space-enabled systems - for example, long-range strike systems that could attack targets in less than 90 minutes - to disable Russia's nuclear deterrent before the Rus- sian leadership understood what was going on. What would happen if a piece of space debris were to disable a Russian early-warning satel-lite under these conditions? Could the Russian military distinguish between an accident in space and the \*rst phase of a U.S. attack? Most Russian early-warning satellites are in elliptical Molniya orbits (a few are in GEO) and thus dif\*cult to attack from the ground or air. At a minimum, Moscow would probably have some tactical warn-ing of such a suspicious launch, but given the sorry state of Russia's warning, optical imaging and signals intelligence satellites there is reason to ask the question. Further, the advent of U.S. on-orbit ASATs, as now envisioned50 could make both the more dif\* cult orbital plane and any warning systems moot. The unpleasant truth is that the Russians likely would have to make a judgment call. No state has the ability to de\* nitively deter-mine the cause of the satellite's failure. Even the United States does not maintain (nor is it likely to have in place by 2010) a sophisticated space surveillance system that would allow it to distin- guish between a satellite malfunction, a debris strike or a deliberate attack - and Russian space surveillance capabilities are much more limited by comparison. Even the risk assessments for col-lision with debris are speculative, particularly for the unique orbits in which Russian early-warning satellites operate. During peacetime, it is easy to imagine that the Russians would conclude that the loss of a satellite was either a malfunction or a debris strike. But how con\* dent could U.S. planners be that the Russians would be so calm if the accident in space occurred in tandem with a second false alarm, or occurred during the middle of a crisis? What might happen if the debris strike oc-curred shortly after a false alarm showing a mis-sile launch? False alarms are appallingly common - according to information obtained under the Freedom of Information Act, the U.S.-Canadian North American Aerospace Defense Command (NORAD) experienced 1,172 "moderately seri-ous" false alarms between 1977 and 1983 - an average of almost three false alarms per week. Comparable information is not available about the Russian system, but there is no reason to believe that it is any more reliable.51 Assessing the likelihood of these sorts of co- incidences is dif\* cult because Russia has never provided data about the frequency or duration of false alarms; nor indicated how seriously early- warning data is taken by Russian leaders. More- over, there is no reliable estimate of the debris risk for Russian satellites in highly elliptical orbits.52 The important point, however, is that such a coincidence would only appear suspicious if the United States were in the business of disabling satellites - in other words, there is much less risk if Washington does not develop ASATs. The loss of an early-warning satellite could look rather ominous if it occurred during a pe- riod of major tension in the relationship. While NATO no longer sees Russia as much of a threat, the same cannot be said of the converse. Despite the warm talk, Russian leaders remain wary of NATO expansion, particularly the effect expan- sion may have on the Baltic port of Kaliningrad. Although part of Russia, Kaliningrad is separated from the rest of Russia by Lithuania and Poland. Russia has already complained about its decreas- ing lack of access to the port, particularly the uncooperative attitude of the Lithuanian govern- ment.53 News reports suggest that an edgy Russia may have moved tactical nuclear weapons into the enclave.54 If the Lithuanian government were to close access to Kaliningrad in a \*t of pique, this would trigger a major crisis between NATO and Russia. Under these circumstances, the loss of an early-warning satellite would be extremely suspi-cious. It is any military's nature during a crisis to interpret events in their worst-case light. For ex- ample, consider the coincidences that occurred in early September 1956, during the extraordinarily tense period in international relations marked by the Suez Crisis and Hungarian uprising.55 On one evening the White House received messages indicating: 1. the Turkish Air Force had gone on alert in response to unidentied aircraft penetrating its airspace; 2. one hundred Soviet MiG-15s were \*ying over Syria; 3. a British Canberra bomber had been shot down over Syria, most likely by a MiG; and 4. The Russian \*eet was moving through the Dardanelles. Gen. Andrew Good paster was reported to have worried that the con\* uence of events "might trigger off ... the NATO operations plan" that called for a nuclear strike on the Soviet Union. Yet, all of these reports were false. The "jets" over Turkey were a \*ock of swans; the Soviet MiGs over Syria were a smaller, routine escort returning the president from a state visit to Mos- cow; the bomber crashed due to mechanical dif\*culties; and the Soviet \*eet was beginning long-scheduled exercises. In an important sense, these were not "coincidences" but rather different manifestations of a common failure - human er- ror resulting from extreme tension of an interna- tional crisis. As one author noted, "The detection and misinterpretation of these events, against the context of world tensions from Hungary and Suez, was the \*rst major example of how the size and complexity of worldwide electronic warning systems could, at certain critical times, create momentum of its own." Perhaps most worrisome, the United States might be blithely unaware of the degree to which the Russians were concerned about its actions and inadvertently escalate a crisis. During the early 1980s, the Soviet Union suffered a major "war scare" during which time its leadership concluded that bilateral relations were rapidly declining. This war scare was driven in part by the rhetoric of the Reagan administration, fortied by the selective reading of intelligence. During this period, NATO conducted a major command post exercise, Able Archer, that caused some elements of the Soviet military to raise their alert status. American officials were stunned to learn, after the fact, that the Kremlin had been acutely nervous about an American \* rst strike during this period.56 All of these incidents have a common theme - that con\* dense is often the difference between war and peace. In times of crisis, false alarms can have a momentum of their own. As in the second scenario in this monograph, the lesson is that commanders rely on the steady \* ow of reli-able information. When that information \* ow is disrupted - whether by a deliberate attack or an accident - condense collapses and the result is panic and escalation. Introducing ASAT weapons into this mix is all the more dangerous, because such weapons target the elements of the command system that keep leaders aware, informed and in control. As a result, the mere presence of such weapons is corrosive to the con\*dence that allows national nuclear forces to operate safely.

#### Scenario 2 is Aerospace –

#### Federal investment in SPS is key to the industry.

-US losing space leadership now

-only a federal investment solves the innovation vacuum – invigorates science education and a strong aersospace workforce

-counterplans that rely on previous goals won’t cut it – a groundbreaking new science and tech focus is key

Mankins 9 – Former NASA Scientist, managed numerous advanced space technology programs during his 25 years at NASA Headquarters and the Jet Propulsion Laboratory, and is widely known as an expert in space solar power

John, “To boldly go: the urgent need for a revitalized investment in space technology,” 5-18-2009, http://www.thespacereview.com/article/1377/1

Unfortunately, the US investment in advanced research and technology for space exploration and development has been reduced to historically low levels, and concurrently has been focused more narrowly than ever before on immediate system designs and development projects. In many respects, the current budget is little more than an “advanced development” program with minimal opportunity for innovation and essentially no possibility that an invention arising from civil space research and technology programs could influence system design decisions, inform budget estimates or inspire new, more ambitious space program goals. The challenge today Space has never been more important to our national security than it is today. The opportunities for truly profound scientific discoveries through space exploration have never been greater. And the pace of international development of new capabilities for space operations has never been faster. Federal budgets for advanced research and technology to enable future space exploration and development have been reduced in scope and focused on near-term system developments to the point that **US preeminence in space** activities **is in question**. NASA’s advanced space research and technology budget was over $2 billion in fiscal year (FY) 2005, with a focus on objectives five to ten years in the future and with the purpose of informing program and design decisions, while retiring both technical and budget risks of those future programs. The President’s FY 2007 budget for NASA exploration technology declined to less than $700 million, and of that only a small fraction (perhaps less than $200 million) still addressed longer-term objectives. The corresponding budgets in 2008 and 2009 were further reduced. Little to none of the remaining investment deals with enabling fundamentally new goals or objectives, or dramatically reducing expected costs. With these funding levels and program goals, it is unlikely that the US will maintain leadership in space exploration beyond the current generation of projects—all of which are founded on the “seed corn” harvested from past investments in innovative new space capabilities. Further, **declining support for space research and technology** is creating an innovation vacuum in the US as small **business opportunities evaporate**, and **funding for universities and students vanishes**. This trend jeopardizes America’s long-term leadership in space exploration and development, and damages our ability to achieve important national security goals. History Since the conclusion of the Apollo program in the early 1970s, the US space program has experienced varying levels of support from national leaders in the White House and the US Congress. Moreover, during most of that time human exploration beyond low Earth orbit has been “off the agenda”, with the exception of the short-lived Space Exploration Initiative (SEI) of 1989–1993. During the same period, US robotic exploration has had a number of tremendous successes, primarily involving the outer planets (e.g., Voyager spacecraft, Galileo, and more recently, Cassini), but also the inner solar system (e.g., Viking on Mars, Magellan at Venus), and the recent series of Mars missions (e.g., Pathfinder/Sojourner, Mars Observer, Spirit and Opportunity). However, these programs have tended to reflect one-of-a-kind successes with a minimal number of spacecraft and missions using common systems or technologies, resulting in continuing very high costs. Various attempts to create a foundation of common technologies and modular spacecraft have failed. Similarly, attempts to bridge the gap between robotic mission systems technologies and human space flight technologies (e.g., “Platform Z” from the early Space Station Freedom program) have failed. The most notable successes in this vein arose from the in-space assembly and spacecraft servicing capabilities of the Space Shuttle, first in the early 1980s with the Solar Max servicing mission, then with the series of hugely successful Hubble Space Telescope servicing missions, and finally with the assembly of the International Space Station. However, these achievements were far more the exception than the rule. For the most part human and robotic exploration systems and technologies became increasingly isolated beginning in the 1970s. More recently Following the Columbia tragedy in 2003, the direction of the US space program was again the subject of intense discussion (led by the White House) and including various agencies and organizations. The result, announced in January 2004, was the “Vision for Space Exploration” (VSE). The VSE as formulated originally was much more than a new justification for human space flight. Rather, the Vision addressed the full range of human and robotic exploration, as well as a revitalization of advanced space research and technology with far-reaching implications. The original VSE strategy placed strong emphasis on studies, research, and technology developments that would in time inform decisions regarding architectures and systems for (1) a Space Shuttle replacement; (2) annual robotic technology missions to the Moon; (3) a human return to the Moon to establish a permanent presence; (4) new space observatories to explore the universe beyond our solar system; (5) a campaign of robotic missions to Mars and beyond; and more. With current funding levels and program goals, it is unlikely that the US will maintain leadership in space exploration beyond the current generation of projects—all of which are founded on the “seed corn” harvested from past investments in innovative new space capabilities. However, in 2005 NASA shifted to a dramatically different approach to exploration and related technology developments with the results of the Exploration Systems Architecture Study. ESAS results placed exclusive emphasis on a US human lunar return and in an attempt to accelerate the first operational capability for the “crew exploration vehicle”—a capsule-based Space Shuttle replacement. To achieve this focus, numerous strategic changes were necessary. References to other aspects of space science and exploration were dropped, as was integrated planning of human and robotic exploration missions. For example, the initially planned annual campaign of robotic technology missions to the Moon was reduced to a single orbiter and one lunar lander mission, and these retained little or no role in guiding design decisions for human lunar systems. Also, to avoid technology-related risks, a range of lifecycle cost-related architectural options were eliminated from consideration, including in-space assembly of lunar transportation systems, in-space fueling and servicing, reusable lunar transportation systems, and others. The result was a family of systems for low Earth orbit access and a return to the Moon that involved a re-sized, Apollo-like architectural approach, with a heavy-lift launch vehicle and expendable transportation system elements. Significant shifts in agency budgets followed these new strategic directions, including drastic reductions in advanced space research and technology development, and a redefinition of remaining investments as “technology development”, focused on already-made design decisions. This shift in strategy was epitomized by NASA’s elimination of the NASA Institute of Advanced Concepts (NIAC) on the grounds of budget constraints, despite that fact that NIAC represented less than one third of one percent of the agency’s annual budget. The real point was that NIAC no longer had a legitimate role given NASA’s new approach to innovation: low engineering risk designs, and modest technology developments focused on those designs. Unfortunately, the elimination of design-to-cost and investments in longer-term innovation have come with a price. By recent estimates, the transportation-related cost of a single human mission to the Moon using the present, low-technology design solution will exceed $5 billion; transportation for two crewed lunar missions per year would require approximately 60% of NASA’s annual budget. Moreover, in-house agency subject matter expertise has been severely affected, as has the Agency’s contribution to US space technology leadership. Overall, the ambitious goals that were articulated by the White House in 2004 have been pushed into the indefinite future. A permanent human outpost of the Moon, development of lunar resources, deployment of large space observatories, and ambitious missions to the outer planets: all of these have been pushed out into the future by 20 years or more. Moreover, it is difficult to envision how such goals could ever be achieved using current systems concepts and concomitant prohibitively high costs. Only new systems concepts, enabled by focused space research and technology developments, can change this assessment. At the same time, real progress continues to be made by the international space community, grounded in steady investments in new technologies and systems—and resulting in regular accomplishments in space systems. The international flotilla of robotic space missions to the Moon illustrates this point: the US contribution of a single orbiter and a future lander are largely indistinguishable from the missions of other countries. Without an adequate strategy for, and more robust investment in, advanced space research and technology, long-term US preeminence in space exploration and development is doubtful. The Office of Naval Research (ONR) of the US Department of Defense (DOD) provides a useful example for how long-term but focused government research and technology advancement may be pursued. In particular, the ONR uses four complementary program strategies: a foundation of in-house subject matter expertise, sustained basic research and technology investments, development and demonstration of prototypes, and a focus on future capabilities. The concept of “Future Naval Capabilities” (FNCs) is used by the ONR to focus advanced research and technology (R&T) efforts around novel systems and concepts of operations. FNCs allow a range of R&T investments to be coordinated around specific new capabilities—even though the details of those systems designs have not yet been finalized, nor development programs approved. Also, the ONR uses the concept of “Innovative Naval Prototypes” (INPs) to orchestrate a range of ongoing R&T and draw the results of those efforts into nearer-term demonstrations of working prototypes and test-beds. INPs are characterized by ambitious technical objectives, and their potential to truly transform future naval operations. In addition, the ONR has preserved for over 60 years a commitment to long lead, discipline-oriented research and technology development. These investments have been responsible for advances in areas as diverse as materials, electronics, communications, power, and others—but all leading toward naval preeminence. And finally, DOD investments have maintained a foundation of in-house subject matter expertise at the Naval Research Laboratory (NRL) and other installations. Over the years, these in-house experts have enabled more effective technology investment decisions and, working with civilian and uniformed leaders better system acquisition decisions. Novel technologies and systems concepts must be matured and validated before decisions are made regarding the detailed designs of future space systems. There are a variety of business models that might be considered for space research and technology development. However, the strategies used by the ONR for its investments seem especially appropriate to the long-term character of the challenge of space exploration and development. For civil space exploration and development, these would be: (1) maintenance of in-house NASA subject matter expertise in relevant technologies; (2) sustained, discipline-oriented investment in basic research and technology at NASA centers, universities, and small businesses; (3) development and demonstration of transformational systems prototypes in partnerships involving NASA, major industry and others; and (4) a sustained focus on future space capabilities. And the results of these investments must be harvested before designs are finalized and system acquisition programs started. Assessment It is hardly consistent with the aspirations of Americans to “go where everyone has been before…” However, it is fantasy to suppose that the civil space program can affordably accomplish ambitious goals and objectives in space using systems concepts and technologies of the last century. Novel technologies and systems concepts must be matured and validated before decisions are made regarding the detailed designs of future space systems. In fact, numerous reports over a period of decades have established the criticality of a robust and focused investment in advanced research and technology, including the findings of several National Commissions, committees of the National Academy of Sciences, and others. ***Stable, robust*, *long-term* *federal investments*** in advanced research and technology for future civil space capabilities—funded at a level sufficient to assure US preeminence in space science, exploration, and utilization—**are critical** if we are to meet the challenges of this century: achieving ambitious goals in science and exploration, delivering on the promise of space to contribute to a strong national economy, maintaining a skilled aerospace workforce, and providing the **foundations for future national security**. It is time for the Congress and the White House—recognizing the challenges facing this nation’s space sector—to articulate and implement a strategy to revitalize advanced space research and technology and to make a sustained commitment to the implementation of that strategy. The recently chartered national study on the future of human space exploration, chaired by Norm Augustine, should take up this task. What should be done? The following actions are needed now: The federal government should revitalize its investment to invent and develop innovative new technologies for space science, exploration, and development, consistent with assuring US preeminence in space activities and industry’s ability to adopt these innovations for application in future space missions and markets. A balanced distribution should be created in the allocation of revitalized advanced space research and technology funding among more basic research efforts, technology maturation, and demonstrations of new technologies. These investments should be guided by the goal of creating ambitious new “future space capabilities”—well-enough defined to inform technology investments, but flexible enough to allow the results of those investments to influence designs, reduce costs, and enable new and more ambitious science goals. In establishing these investments, NASA must seek and embrace inputs from outside the agency (including other agencies, industry, academia) to develop, review, and recommend NASA advanced space research and technology plans, programs, and strategies. NASA in-house space research and technology (performed by engineers and technical specialists) should be restored, in balance with increased external research (by industry and academia). Funding for university research should also be targeted toward producing graduates with advanced degrees to support the follow-on work that will be undertaken by industry. We need to reconsider what makes an ambitious space program worth a substantial investment of public dollars—and consider again the historical and future importance of advancing space technology and developing truly new and valuable space capabilities for the public, the nation, and the world. To achieve the purposes for which it was created, NASA must maintain the excellence of its workforce and their expertise in a wide array of cutting-edge new technologies. As they enter the workforce, it will be **impossible to attract** the “best and the brightest” to federal service without a foundation of cutting-edge research and technology program opportunities. Moreover, a healthy NASA workforce, armed with appropriate skills and secure in its future, will provide better oversight for technical system procurement and program management. This competence will result in better performing systems, better ability to meet schedule, more productive interactions with other stakeholders in the aerospace enterprise, and more efficient use of taxpayer dollars. Although NASA must accommodate changing priorities and budgets, it must also ensure that it does not lose the important skills and knowledge currently possessed by its workers. NASA also must continue to ensure that the NASA workforce gains the new competencies needed in the aerospace industry of the future. In order accelerate the transition of novel technologies into transformational future space capabilities **NASA must invest in demonstrations of innovative space prototypes** on the ground and in space. Innovative space prototypes should be implemented in coordination with the DoD, academia, and industry; and wherever possible with co-funding with the private sector in order to speed the application of these new capabilities in creating new space industries. To implement these recommendations effectively, focused and timely near term action is essential: The National Academy of Sciences (National Research Council) should be chartered to conduct an independent, visionary study to identify 6–12 transformational “future space capabilities” that would—if developed—enable a wide range of new, ambitious, and affordable space exploration and development. These future space capabilities would in turn drive planning for government and industry research and technology investments. The Administration should develop—in consultation with the US Congress, and using NASA as its executive agent—a strategic research and technology development roadmap that establishes a baseline for achieving these goals, including objectives, schedules, milestones and budgets. This roadmap should be used to provide the basis for future US investments in advanced space research and technology development and demonstrations. The US space program needs more than a national discussion of what human exploration should do next: International Space Station research versus lunar outposts versus asteroid sorties versus human Mars missions, and so on. These are important questions. Even more, however, we need to set in place basic policies that can endure from one administration to the next. We need to reconsider what makes an ambitious space program worth a substantial investment of public dollars—and consider again the historical and future importance of advancing space technology and developing truly new and valuable space capabilities for the public, the nation, and the world.

#### Even if they say no, we still solve – the commitment is enough.

Nansen, 95- led the Boeing team of engineers in the Satellite Power System Concept Development and Evaluation Program for the Department of Energy and NASA, andPresident Solar Space Industries (Ralph, Sun Power, http://www.nss.org/settlement/ssp/sunpower/sunpower09.html)

The Case for Developing Solar Power Satellites Some of the very reasons for not developing the solar power satellite concept are also the best reasons to develop it. First of all, if we were to commit to its development it would give us national purpose. We would no longer be wondering what to do the next time we run short of oil or a megalomaniac threatens to take control of a major oil-producing nation. We would be concentrating on a single common goal—not a generalized wish for energy independence, but a specific solution. It would be a greater task than going to the moon in the 1960s, but it would focus the nation’s talents, its energies, and its imagination in much the same way as did that lofty accomplishment. It would challenge our young people to take their place in history building a future for themselves and their children. They would become known as a generation of visionaries who stood at the crossroads of history and chose the pathway of growth rather than stagnation. It would utilize the talents of scientists, engineers, and companies who have been working on military hardware, which is no longer a number one priority with the ending of the cold war. It would develop a new high-level technological base, which is so important to a highly developed nation like the United States in order to maintain our competitive place in the world economy. It would create a massive number of jobs that would bring growth to our economy.

#### Aerospace is key to heg.

Walker et al 2 – Chairman of the USAI

Robert Walker, et cal, Chair of the Commission on the Future of the United States Aerospace Industry Commissioners, 2002, “Final Report of the Commission on the Future of the United States Aerospace Industry Commissioners,” http://www.trade.gov/td/aerospace/aerospacecommission/AeroCommissionFinalReport.pdf

Defending our nation against its enemies is the first and fundamental commitment of the federal govern-ment.2 This translates into two broad missions—Defend America and Project Power—when and where needed. In order to defend America and project power, the nation needs the ability to move manpower, materiel, intelligence information and precision weaponry swiftly to any point around the globe, when needed. This has been, and will continue to be, a mainstay of our national security strategy. The events of September 11, 2001 dramatically demonstrated the extent of our national reliance on aerospace capabilities and related military contribu-tions to homeland security. Combat air patrols swept the skies; satellites supported real-time communica-tions for emergency responders, imagery for recov- ery, and intelligence on terrorist activities; and the security and protection of key government officials was enabled by timely air transport. As recent events in Afghanistan and Kosovo show, the power generated by our nation’s aerospace capa-bilities is an—and perhaps the—essential ingredient in force projection and expeditionary operations. In both places, at the outset of the crisis, satellites and reconnaissance aircraft, some unmanned, provided critical strategic and tactical intelligence to our national leadership. Space-borne intelligence, com-mand, control and communications assets permitted the rapid targeting of key enemy positions and facil-ities. Airlifters and tankers brought personnel, materiel, and aircraft to critical locations. And aerial bombardment, with precision weapons and cruise missiles, often aided by the Global Positioning System (GPS) and the Predator unmanned vehicle, destroyed enemy forces. Aircraft carriers and their aircraft also played key roles in both conflicts. Today’s military aerospace capabilities are indeed robust, but at significant risk. They rely on platforms and an industrial base—measured in both human capital and physical facilities—that are aging and increasingly inadequate. Consider just a few of the issues: • Much of our capability to defend America and project power depends on satellites. Assured reli-able access to space is a critical enabler of this capa-bility. As recently as 1998, the key to near- and mid-term space access was the Evolved Expendable Launch Vehicle (EELV), a development project of Boeing, Lockheed Martin and the U. S. Air Force. EELV drew primarily on commercial demand to close the business case for two new launchers, with the U.S. government essentially buying launches at the margin. In this model, each company partner made significant investments of corporate funds in vehicle development and infrastructure, reducing the overall need for government investment. Today, however, worldwide demand for commer-cial satellite launch has dropped essentially to nothing—and is not expected to rise for a decade or more—while the number of available launch platforms worldwide has proliferated. Today, therefore, the business case for EELV simply does not close, and reliance on the economics of a com-mercially-driven market is unsustainable. A new strategy for assured access to space must be found. • The U.S. needs unrestricted access to space for civil, commercial, and military applications. Our satellite systems will become increasingly impor- tant to military operations as today’s information revolution, the so-called “revolution in military affairs,” continues, while at the same time satellites will become increasingly vulnerable to attack as the century proceeds. To preserve critical satellite net-works, the nation will almost certainly need the capability to launch replacement satellites quickly after an attack. One of the key enablers for “launch on demand” is reusable space launch, and yet within the last year all work has been stopped on the X-33 and X-34 reusable launch programs • The challenge for the defense industrial base is to have the capability to build the base force struc-ture, support contingency-related surges, provide production capacity that can increase faster than any new emerging global threat can build up its capacity, and provide an “appropriate” return to shareholders. But the motivation of government and industry are different. This is a prime detrac-tion for wanting to form government-industry partnerships. Industry prioritizes investments toward near-term, high-return, and high-dollar programs that make for a sound business case for them. Government, on the other hand, wants to prioritize investment to ensure a continuing capa-bility to meet any new threat to the nation. This need is cyclical and difficult for businesses to sus-tain during periods of government inactiv-ity. Based on the cyclic nature of demand, the increasing cost/complexity of new systems, and the slow pace of defense modernization, aerospace companies are losing market advantages and the sector is contracting. Twenty-two years ago, today’s “Big 5” in aerospace were 75 separate companies, as depicted by the historical chart of industry con-solidation shown in Chapter 7. • Tactical combat aircraft have been a key compo-nent of America’s air forces. Today, three tactical aircraft programs continue: the F/A-18E/F (in production), the F/A-22 (in a late stage of test and evaluation), and the F-35 Joint Strike Fighter (just moving into system design and development). Because of the recentness of these programs, there are robust design teams in existence. But all of the initial design work on all three programs will be completed by 2008. If the nation were to con- clude, as it very well may, that a new manned tac- tical aircraft needs to be fielded in the middle of this century, where will we find the experienced design teams required to design and build it, if the design process is in fact gapped for 20 years or more? • More than half of the aerospace workforce is over the age of 404, and the average age of aerospace defense workers is over 50.5Inside the Department of Defense (DoD), a large percent of all scientists and engineers will be retirement eligible by 2005. Given these demographics, there will be an exodus of “corporate knowledge” in the next decade that will be difficult and costly to rebuild once it is lost. There will be a critical need for new engineers, but little new work to mature their practical skill over the next several decades. Further, enrollment in aerospace engineering programs has dropped by 47 percent in the past nine years6, and the interest and national skills in mathematics and science are down. Defense spending on cutting-edge work is at best stable, and commercial aircraft programs are struggling and laying workers off. As the DoD’s recent Space Research and Development (R&D) Industrial Base Study7 concluded, “[s]ustaining a talented workforce of sufficient size and experience remains a long-term issue and is likely to get worse.” In short, the nation needs a plan to attract, train and maintain a skilled, world-class aerospace workforce, but none currently exists. • The current U.S. research, development, test and evaluation (RDT&E) infrastructure has a legacy dating back to either World War II or the expan- sion during the Space Age in the 1960s. It is now suffering significantly from a lack of resources required for modernization. In some cases, our nation’s capabilities have atrophied and we have lost the lead, as with our outdated wind tunnels, where European facilities are now more modern and efficient. In the current climate, there is inad- equate funding to modernize aging government infrastructure or build facilities that would support the development of new transformational capabil- ities, such as wind tunnels needed to design and test new hypersonic vehicles. The aerospace indus-try must have access to appropriate, modern facil- ities to develop, test and evaluate new systems. Throughout this dynamic and challenging environ-ment, one message remains clear: a healthy U.S. aerospace industry is more than a hedge against an uncertain future. It is one of the primary national instruments through which DoD will develop and obtain the superior technologies and capabilities essential to the on-going transformation of the armed forces, thus maintaining our position as the world’s preeminent military power.

#### The impact is global conflict

Khalilzad 11 – Former US ambassador, former Professor @ Columbia Zalmay Khalilzad, PhD, United States ambassador to Afghanistan, Iraq, and the United Nations during the presidency of George W. Bush and the director of policy planning at the Defense Department from 1990 to 1992 (2/8/11, National Review, “The Economy and National Security; If we don’t get our economic house in order, we risk a new era of multi-polarity,” <http://www.nationalreview.com/articles/259024/economy-and-national-security-zalmay-khalilzad>

We face this domestic challenge while other major powers are experiencing rapid economic growth. Even though countries such as China, India, and Brazil have profound political, social, demographic, and economic problems, their economies are growing faster than ours, and this could alter the global distribution of power. These trends could in the long term produce a multi-polar world. If U.S. policymakers fail to act and other powers continue to grow, it is not a question of whether but when a new international order will emerge. The closing of the gap between the United States and its rivals could intensify geopolitical competition among major powers, increase incentives for local powers to play major powers against one another, and undercut our will to preclude or respond to international crises because of the higher risk of escalation. The stakes are high. In modern history, the longest period of peace among the great powers has been the era of U.S. leadership. By contrast, multi-polar systems have been unstable, with their competitive dynamics resulting in frequent crises and major wars among the great powers. Failures of multi-polar international systems produced both world wars. American retrenchment could have devastating consequences. Without an American security blanket, regional powers could rearm in an attempt to balance against emerging threats. Under this scenario, there would be a heightened possibility of arms races, miscalculation, or other crises spiraling into all-out conflict**.** Alternatively, in seeking to accommodate the stronger powers, weaker powers may shift their geopolitical posture away from the United States. Either way, hostile states would be emboldened to make aggressive moves in their regions. As rival powers rise, Asia in particular is likely to emerge as a zone of great-power competition. Beijing’s economic rise has enabled a dramatic military buildup focused on acquisitions of naval, cruise, and ballistic missiles, long-range stealth aircraft, and anti-satellite capabilities. China’s strategic modernization is aimed, ultimately, at denying the United States access to the seas around China. Even as cooperative economic ties in the region have grown, China’s expansive territorial claims — and provocative statements and actions following crises in Korea and incidents at sea — have roiled its relations with South Korea, Japan, India, and Southeast Asian states. Still, the United States is the most significant barrier facing Chinese hegemony and aggression.

#### Aerospace is key to the economy.

Hernnstadt 8 – Director of Trade and Globalization @ IAMAW

Owen, director of the Trade and Globalization Department, International Association of Machinists and Aerospace Workers, “Offsets and the lack of a comprehensive U.S. policy,” Economic Policy Institute, http://www.sharedprosperity.org/bp201.html

Aerospace is an especially important industry for a nation's economic and physical security, and perhaps no other country has benefited more from the aerospace industry than the United States.9 The Final Report of the Commission on the Future of the United States Aerospace Industry states that the industry "contributes over 15 percent to our Gross Domestic Product and supports over 15 million high quality American jobs" (Aerospace Industry Commission 2002, 1-2). U.S. aerospace has been identified as a major source of "technical innovation with substantial spillovers to other industrial and commercial sectors" and "high-wage employment, which spreads the benefits of rising productivity throughout the U.S. economy.…" The Aerospace Commission also noted the industry's contribution to the nation's "economic growth, quality of life, and scientific achievements…." (Aerospace Industry Commission 2002, 1-2). Despite the importance of aerospace, the deterioration of the industry at home has continued at a dramatic rate. Nearly 500,000 jobs have been lost in the U.S. aerospace industry since 1990 (Aerospace Industry Commission 2002, 8-12; see also AIA 2007), and several hundred thousand more workers have lost their jobs in related industries. Sadly, the fact of these enormous job losses comes as no surprise. More than 10 years ago, in Jobs on the Wing, authors Randy Barber and Robert Scott predicted that "up to 469,000" jobs in the aerospace and related industries "could be eliminated by 2013 because of offset policies and increased foreign competition" (Barber and Scott 1995, 2). In a later study, Scott predicted that by 2013 the industry would suffer a loss of over 25% "of the total jobs in aircraft production in 1995" (Scott 1998). These gloomy predictions are apparently reinforced by U.S. government reports. According to the Department of Labor, the outlook for employment in the U.S. aerospace industry is not rosy: between 2002 and 2012 aerospace employment in the United States will "decrease by 18 percent" (U.S. Department of Labor 2004). The future health of the industry depends in large part on its ability to attract new workers, but the crisis in employment and the prediction that the crisis will deepen does not bode well for attracting new workers. In its final report, the Aerospace Commission summarized this concern: The U.S. aerospace sector, once the employer of choice for the "best and brightest" technically trained workers, now finds it presents a negative image to potential employees. Surveys indicate a feeling of disillusionment about the aerospace industry among its personnel, whether they are production/technical workers, scientists or engineers. The majority of newly dislocated workers say they will not return to aerospace. In a recent survey of nearly 500 U.S. aerospace engineers, managers, production workers, and technical specialists, 80 percent of respondents said they would not recommend aerospace careers to their children. (Aerospace Industries Commission 2002, 8-5) While the Aerospace Commission found that "U.S. policy toward domestic aerospace employment must reaffirm the goal of stabilizing and increasing the number of good and decent jobs in the industry," this policy has yet to be embraced, let alone implemented (Aerospace Industries Commission 2002, 8-12). Far from embracing any sort of effective industrial policy when it comes to aerospace, the U.S. government continues to relegate policy development in this area to private parties, just as it does with offsets in general. The inherent weakness to this approach is obvious—private U.S. companies must compete with foreign companies that have the full support of their governments. If a sale means transferring production and/or technology, private companies are in a difficult position. Given that their interests do not always align with the national interest, they can be expected to maximize corporate returns, even though the use of offsets, which can deeply affect an industry as essential to the nation's economy and security as aerospace, can be detrimental to U.S. national interests. Should there be any doubt about the seriousness of the competition from foreign entities and governments, one has only to look at the success of companies like EADS. What were once fledgling industries are now U.S. competitors who benefit from a sophisticated approach to offsets that moves jobs and technology their way.10 As succinctly stated by the Aerospace Commission, "…foreign nations clearly recognize the potential benefits from aerospace and are attempting to wrest global leadership away from us" (Aerospace Industries Commission 2002, 1-2). A country that truly understands the importance of adopting a comprehensive aerospace policy based on offsets is China. As reported in the 2005 Report to Congress of the of U.S.-China Economic and Security Review Commission, "…Chinese firms have used their leverage to extract offsets—agreements to transfer some of the aircraft production along with related expertise and technology—as part of the deals"; the report further concludes, "China nurtures its domestic aviation and aerospace industry by exploiting the international competition already in the industry" (U.S.-China Review Commission 2005, 30). Indeed, as summarized in one U.S. government report: China is likely to be the largest customer—and possibly an emerging competitor—of the U.S. aerospace industry in the future. China's aerospace manufacturing base is enormous. U.S. companies (and European companies to a lesser extent) have successfully partnered with Chinese companies that provide components or parts for a number of commercial aerospace programs. However, China also is seeking to become a world-class prime commercial aerospace manufacturing industrial base, both through indigenous development programs and joint ventures with non-Chinese companies. (U.S. Department of Commerce 2005b, xii) In testimony in 2001, the International Association of Machinists and Aerospace Workers (IAM) singled out China for developing an effective industrial policy in an effort to create its own aerospace industry. It noted in its testimony that the U.S. International Trade Commission had already found with respect to China, "…the nation's aviation sector intends to pursue a principal role in commercial aircraft manufacturing."11 During a 1998 visit to China to tour aerospace facilities, IAM participants observed the country's enormous aerospace capacity.12 China's aviation industry "consists of more than 200 enterprises that produce and manufacture products such as aircraft, turboprop engines, aircraft components and subsystems, helicopters, industrial gas turbines, and various electromechanical products" (U.S. Department of Commerce 2005b, 58). China's huge industrial capacity has been noted by other observers as well.13 For example, one research group notes that in China there are six companies devoted to "airframe assembly," eight "engine" companies, 28 entities involved with "components," and 20 "research institutes."14 The two leading aircraft companies in China (China Aviation Industry Corporation I [AVIC I] and Aviation Industry Corporation II [AVIC II]) "and their subsidiaries have about 491,000 employees" (U.S. Department of Commerce 2005b, 5815). How did China develop such a huge capacity for aerospace production? While there are many different and related methods China uses, a significant one is offsets.16 As globalization critic Jeff Faux said in testimony to Congress, "China is one of the most aggressive countries in pursuing offsets agreements and, with its market potential and minimal labor standards, it has substantial leverage in negotiating these agreements" (Faux 2002). And as a business person told the Wall Street Journal, "they're interested in having total access to technology…."17 Of particular concern to the United States is the huge involvement of Boeing in China, an involvement the company acknowledges. According to its Web site: "Boeing procurement from China is significantly greater than other aviation companies" (Boeing 2007). According to company summaries: Since the 1980s, Boeing has purchased more than $1 billion in aviation hardware and services from China. Approximately 4,500 Boeing airplanes with parts and assemblies built by China are flying throughout the world today. Boeing and Boeing supplier partners have active supplier contracts with China's aviation industry valued at well over $2.5 billion (Boeing 2007). A detailed listing illustrating Boeing's extensive procurement activities, production work, and supplier involvement in China appears in the appendix. According to a news report, "Boeing is expanding its relationship with China through plans to double its annual purchases from Chinese companies over the next six years to more than $1 billion per year by 2010" (U.S. Department of Commerce 2005b, 59, citing Business Daily Update, "Boeing Seeks Higher-Level Cooperation With Chinese Suppliers"). Boeing is, of course, just one of many aerospace companies investing in China's aerospace industry; another is Boeing's chief rival, Airbus. As quoted in The Australian ("Airbus Enlists China," June 14, 2004), Airbus Chief Executive Noel Forgeard explained his company's philosophy with respect to China: "Airbus is not only selling aircraft in China but is also committed to the long-term development of China's aviation industry." The Australian also reported that parts of the A380 will be produced in China: European aircraft maker Airbus has subcontracted a state-owned Chinese manufacturer to make parts for its super-jumbo A380 plane, in a deal worth about $170 million. China Aviation Corp. I (AVIC I) will make panels for A380 nose-landing gear….China's Shenyang Aircraft Corp., affiliated with AVIC I, would also be subcontracted to make A330/A340 forward-cargo door projects….Five Chinese companies are now making parts for Airbus. The New York Times reported that Airbus is committed "to buy at least $60 million yearly in parts from China by 2007, rising to $120 million yearly by 2010."18 According to other news reports, China will "build wing boxes for Airbus" in a $500 million deal,19 and Airbus and China have agreed on "a $9 billion order…for 150 narrow-body A320 aircraft, and said they would study the possibility of building a final assembly line for the aircraft in China."20 That study apparently produced positive results; as stated in an Airbus press release ("Joint Venture Contract Signed for the A320 Family Final Assembly Line in Tianjin," June 28, 2007): "The FAL [final assembly line] in Tianjin will be based on the latest state-of-the-art Airbus single-aisle final assembly line in Hamburg, Germany. The aircraft will be assembled and delivered in China to the same standards as those assembled and delivered in Europe." The significance of such a development cannot be overstated: "the memorandum of understanding between China's National Development and Reform Commission and Airbus…meant that China was likely to become only the third country assembling Airbus aircraft, after France and Germany."21 Brazil's aerospace industry is also teaming up with China. "In order to supply its domestic market while continuing to learn how to assemble a modern, complete aircraft to Western standards, two AVIC-II companies teamed with Embraer…in 2002 for co-production of their regional jet (ERJ-145) in Harbin" (Andersen 2008). Eurocopter, a subsidy of EADS, is also involved with China's aerospace industry. "France's Eurocopter and Singapore Technologies Aerospace have signed with Hafei Aviation, a listed arm of one of China's top military contractors, to make helicopters for domestic civil use."22 China's aerospace industry is apparently not content to maintain its current level of success. According to news reports, "China is likely to start developing its own large aircraft rather than rely solely on foreign giants Boeing and Airbus…."23 The country recently announced that it would be entering the large civil aircraft industry in the next 20 years,24 and, according to news reports, much of the success of this effort depends on the transfer of production and technology from other countries, presumably in the form of outsourcing and offsets from U.S. and other aerospace companies. And according to a report in Jane's Defence Weekly, "China is developing a new stealthy fighter jet aircraft and many of the design concepts and components have already been created….This new aircraft is the first Eastern rival to the West's F/A-22 Raptor and F-35 Joint Strike Fighter to be put into development…."25 China's aerospace industry may even be expanding to space. In an article headlined "The Next Space Race: China Heads to the Stars," the New York Times (January 22, 2004) raises the possibility of a space race with China, noting: The Chinese plan to send more astronauts into space next year, to launch a Moon probe within three years, and are aiming to land an unmanned vehicle on the Moon by 2010…. Will the U.S. aerospace industry remain the strongest in the world? As other countries implement industrial policies based on outsourcing and offsets, the question becomes more urgent. Moves by countries like China to implement industrial policies targeting U.S. leadership in such essential industries as aerospace call for a response by U.S. policy makers. Even if China's aerospace industry remains behind that of the United States, it is poised to contribute to growing global competition. It has the capacity, skilled workforce, and the will to make this a reality. The virtually unregulated world of offsets only exacerbates this situation. While the U.S. government continues a hands-off approach to this market-distorting scheme, other countries are giving their companies significant backing based on well-developed industrial policies.

#### Economic decline causes global instability and nuclear war.

Mead, 09 – Senior Fellow in U.S. Foreign Policy at the Council on Foreign Relations (2/4, Walter Russell, The New Republic, “Only Makes You Stronger”, http://www.tnr.com/politics/story.html?id=571cbbb9-2887-4d81-8542-92e83915f5f8&p=2)

If current market turmoil seriously damaged the performance and prospects of India and China, the current crisis could join the Great Depression in the list of economic events that changed history, even if the recessions in the West are relatively short and mild. The United States should stand ready to assist Chinese and Indian financial authorities on an emergency basis--and work very hard to help both countries escape or at least weather any economic downturn. It may test the political will of the Obama administration, but the United States must avoid a protectionist response to the economic slowdown. U.S. moves to limit market access for Chinese and Indian producers could poison relations for years. For billions of people in nuclear-armed countries to emerge from this crisis believingeither that the United States was indifferent to their well-being or that it had profited from their distress could damage U.S. foreign policy far more severely than any mistake made by George W. Bush. It's not just the great powers whose trajectories have been affected by the crash. Lesser powers like Saudi Arabia and Iran also face new constraints. The crisis has strengthened the U.S. position in the Middle East as falling oil prices reduce Iranian influence and increase the dependence of the oil sheikdoms on U.S. protection. Success in Iraq--however late, however undeserved, however limited--had already improved the Obama administration's prospects for addressing regional crises. Now, the collapse in oil prices has put the Iranian regime on the defensive. The annual inflation rate rose above 29 percent last September, up from about 17 percent in 2007, according to Iran's Bank Markazi. Economists forecast that Iran's real GDP growth will drop markedly in the coming months as stagnating oil revenues and the continued global economic downturn force the government to rein in its expansionary fiscal policy. All this has weakened Ahmadinejad at home and Iran abroad. Iranian officials must balance the relative merits of support for allies like Hamas, Hezbollah, and Syria against domestic needs, while international sanctions and other diplomatic sticks have been made more painful and Western carrots (like trade opportunities) have become more attractive. Meanwhile, Saudi Arabia and other oil states have become more dependent on the United States for protection against Iran, and they have fewer resources to fund religious extremism as they use diminished oil revenues to support basic domestic spending and development goals. None of this makes the Middle East an easy target for U.S. diplomacy, but thanks in part to the economic crisis, the incoming administration has the chance to try some new ideas and to enter negotiations with Iran (and Syria) from a position of enhanced strength.Every crisis is different, but there seem to be reasons why, over time, financial crises on balance reinforce rather than undermine the world position of the leading capitalist countries. Since capitalism first emerged in early modern Europe, the ability to exploit the advantages of rapid economic development has been a key factor in international competition. Countries that can encourage--or at least allow and sustain--the change, dislocation, upheaval, and pain that capitalism often involves, while providing their tumultuous market societies with appropriate regulatory and legal frameworks, grow swiftly. They produce cutting-edge technologies that translate into military and economic power. They are able to invest in education, making their workforces ever more productive. They typically develop liberal political institutions and cultural norms that value, or at least tolerate, dissent and that allow people of different political and religious viewpoints to collaborate on a vast social project of modernization--and to maintain political stability in the face of accelerating social and economic change. The vast productive capacity of leading capitalist powers gives them the ability to project influence around the world and, to some degree, to remake the world to suit their own interests and preferences. This is what the United Kingdom and the United States have done in past centuries, and what other capitalist powers like France, Germany, and Japan have done to a lesser extent. In these countries, the social forces that support the idea of a competitive market economy within an appropriately liberal legal and political framework are relatively strong.But, in many other countries where capitalism rubs people the wrong way, this is not the case. On either side of the Atlantic, for example, the Latin world is often drawn to anti-capitalist movements and rulers on both the right and the left. Russia, too, has never really taken to capitalism and liberal society--whether during the time of the czars, the commissars, or the post-cold war leaders who so signally failed to build a stable, open system of liberal democratic capitalism even as many former Warsaw Pact nations were making rapid transitions. Partly as a result of these internal cultural pressures, and partly because, in much of the world, capitalism has appeared as an unwelcome interloper, imposed by foreign forces and shaped to fit foreign rather than domestic interests and preferences, many countries are only half-heartedly capitalist. When crisis strikes, they are quick to decide that capitalism is a failure and look for alternatives.So far, such half-hearted experiments not only have failed to work; they have left the societies that have tried them in a progressively worse position, farther behind the front-runners as time goes by. Argentina has lost ground to Chile; Russian development has fallen farther behind that of the Baltic states and Central Europe. Frequently, the crisis has weakened the power of the merchants, industrialists, financiers, and professionals who want to develop a liberal capitalist society integrated into the world. Crisis can also strengthen the hand of religious extremists, populist radicals, or authoritarian traditionalists who are determined to resist liberal capitalist society for a variety of reasons. Meanwhile, the companies and banks based in these societies are often less established and more vulnerable to the consequences of a financial crisis than more established firms in wealthier societies.As a result, developing countries and countries where capitalism has relatively recent and shallow roots tend to suffer greater economic and political damage when crisis strikes--as, inevitably, it does. And, consequently, financial crises often reinforce rather than challenge the global distribution of power and wealth. This may be happening yet again.None of which means that we can just sit back and enjoy the recession. History may suggest that financial crises actually help capitalist great powers maintain their leads--but it has other, less reassuring messages as well. If financial crises have been a normal part of life during the 300-year rise of the liberal capitalist system under the Anglophone powers, so has war. The wars of the League of Augsburg and the Spanish Succession; the Seven Years War; the American Revolution; the Napoleonic Wars; the two World Wars; the cold war: The list of wars is almost as long as the list of financial crises.Bad economic times can breed wars. Europe was a pretty peaceful place in 1928, but the Depression poisoned German public opinion and helped bring Adolf Hitler to power. If the current crisis turns into a depression, what rough beasts might start slouching toward Moscow, Karachi, Beijing, or New Delhi to be born?The United States may not, yet, decline, but, if we can't get the world economy back on track, we may still have to fight.

#### Scenario 3 is **Space BMD –**

#### SPS is key to it.

Ramos 2k US Air Force Major, Thesis submitted for the AIR COMMAND AND STAFF COLL MAXWELL Air Force Base (Kim, “Solar Power Constellations: Implications for the United States Air Force,” April, http://handle.dtic.mil/100.2/ADA394928)

In addition to the terrestrial implications of solar power satellites for the Air Force, there are also implications for space operations. The power required for spacecraft operations is increasing. In order to meet this increase, engineers are looking at standardized solar cells, new gallium/aluminum solar cells and paying close attention to solar power satellite developments.17 The problems associated with increasing the size of solar arrays on satellites to meet the increasing power demands are deterioration of structure dynamic performance, complications of orientation and stabilization, placing solar arrays under the launcher fairing, deploying solar arrays in orbit, buffer elements for periods without sunlight and discrepancies between the orientation of devices and solar arrays.18 Engineers from the Ukraine recommend solving these problems with solar power satellites using wireless power transmission or a cable.19 The authors of New World Vistas also recommended this approach. They advocated using space solar power satellites to power other satellites in space and predicted that “power beaming will become a major element of spacecraft operations.”20 Solar power satellites would provide improvements in the areas of reconstitution, maneuver, force application, space-based radar, and communication satellites which produce power as well as transfer data. Reconstitution As outlined in Air University study Spacecast 2020, **the rapid launch and deployment of satellites is required to comply with the United States National Military Strategy concept of reconstitution.** Reconstitution for space is the ability to launch satellites for “unanticipated system failures … [due to hostile actions] and multiple area coverage requirements, [which] … require the immediate placement of satellites into orbit.”21 Solar power satellites enable reconstitution with unmanned aerial vehicles performing the same functions as satellites, as mentioned previously, and through enabling smaller satellites. One of the difficulties in achieving small satellites is the fact that power generation takes up about 25% of the weight of a satellite.22 Satellites launched without onboard power generation would be smaller and receive power on orbit from a solar power satellite. Solar power satellites enable reconstitution with unmanned aerial vehicles with unlimited loiter time for immediate deployment for a warfighter, and by reducing the size of satellites which facilitates rapid launches. Small Satellites Small satellites not only fulfill the reconstitution requirement but also meet other requirements for smaller, faster, and cheaper satellites. Typically weighing less than 250 kg, and designed for one mission, “quick checkout and rapid launch,” small satellites offer advantages over larger satellites, which are more expensive, cost more to put in orbit, and take longer to build.23 Small satellites are good candidates for imagery, and some types of communications.24 Constellations of small satellites serve another purpose. They have reduced vulnerability and increased survivability compared to single satellites. **Powering small satellites with energy beamed from a solar power satellite further reduces their size, cost, and launch requirements.** Maneuver One of the vulnerabilities of satellites is that they lack maneuverability. Orbit changes are possible but the amount of station keeping fuel limits these maneuvers. Unscheduled orbital maneuvers for, supported warfighters, on-orbit station keeping, or avoiding an anti-satellite weapon, reduce the life expectancy of satellites. The New World Vistas study concluded, “technologies to substantially enhance survivability are …maneuvering technologies…enabled by the technologies of high generation power in space.”25 Moreover, the report stated that electrical propulsion and solar power satellites would enable maneuvering for survivability, station keeping, and repositioning to meet warfighter requirements.26 Force Application United States Space Command developed four operational concepts to guide their vision. One of those operational concepts is global engagement. The USSPACECOM Long Range Plan defines global engagement as an “integrated focused surveillance and missile defense with a potential ability to apply force from space.”27 This application of force from space involves holding at risk earth targets with force from space.28 New World Vistas identifies several force application technologies. One of the technological issues associated with developing these space force application technologies is that they all require large amounts of power generation. A solar power satellite can supply the required power. Two technologies in particular would benefit from integration with a solar power satellite, directed energy weapons, such as lasers, and jamming devices. The space-based lasers currently under study accomplish ground moving target indication, and air moving target indication, which would be part of missile defense.29 The main difficulty with the laser is designing a power plant, which can produce the required energy in space without the enormous solar arrays required. By using a solar power satellite to beam power to the laser, this eliminates the problem. Another project, which would benefit from integration with a solar power satellite, is a device, which would beam RF power to a particular geographic location to blind or disable any unprotected ground communications, radar, optical, and infrared sensors.30 As with the laser and other directed energy applications, the limiting factor right now is generating enough power in space to energize the RF beam.

#### Space BMD solves conflict in North Korea, nuclear and biological terrorism, Syria strikes, and Saudi Arabian prolif.

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The Threat Twenty-first century threats to the United States, its de­ployed forces, and its friends and allies differ fundamental­ly from those of the Cold War. An unprecedented number of international actors have now acquired – or are seeking to acquire – missiles. These include not only states, but also non-state groups interested in obtaining missiles with nucle­ar or other payloads. The spectrum encompasses the missile arsenals already in the hands of Russia and China, as well as the emerging arsenals of a number of hostile states. The character of this threat has also changed. Unlike the Soviet Union, these newer missile possessors do not attempt to match U.S. systems, either in quality or in quantity. In­stead, their missiles are designed to inflict major devasta­tion without necessarily possessing the accuracy associated with the U.S. and Soviet nuclear arsenals of the Cold War.1 The warning time that the United States might have be­fore the deployment of such capabilities by a hostile state, or even a terrorist actor, is eroding as a result of several fac­tors, including the continued proliferation and widespread availability of technologies to build missiles and the result­ing possibility that an entire system might be purchased out­right. Would-be possessors do not have to engage in the pro­tracted process of designing and building a missile. They could purchase and assemble components, reverse-engineer a missile after having purchased a prototype, or immediately acquire a number of assembled missiles. Even missiles that are primitive by U.S. standards might suffice for a rogue state or terrorist organization seeking to inflict extensive damage upon the United States. As the Rumsfeld Commission point­ed out in its 1998 report: Rogue States *North Korea* In the years since the surprise launch of its three-stage *Tae­po Dong* 1 missile over Japan in August 1998, North Korea has made substantial advances in its ballistic missile capabilities and now possesses the largest ballistic missile force in the developing world, according to Jane’s Information Group.3 Pyongyang has engaged in extensive efforts to conceal the size and scope of its ballistic missile programs, though es­timates suggest that it may have deployed as many as 1000 ballistic missiles, including some 600-800 *Scud*-type short-range rockets, between 150 and 200 medium-range *No Dong* missiles, and 50 other longer-range missiles.4 In 2003, North Korea lifted its self-imposed 1999 mora­torium on long-range missile testing.5 In July 2006, the Kim Jong-il regime fired a *Taepo Dong* 2 long-range missile as part of a series of missile tests.6 While the 2006 test failed 40 seconds after launch, it signified a considerable advance in the development of North Korea’s extended-range missile capability. The Congressional Research Service has indicat­ed that the *Taepo Dong* 2’s design would allow it to deliver a 1,500-kilogram warhead to targets as far as 8,000 kilometers away.7 According to 2005 testimony by Vice Admiral Low­ell Jacoby, USN (Ret.), former director of the U.S. Defense Intelligence Agency (DIA), Pyongyang’s *Taepo Dong* 2 mis­sile “could deliver a nuclear warhead to parts of the United States in a two-stage variant and target all of North Ameri­ca with a three-stage variant.”8 He also stated that North Ko­rea had achieved the ability to arm a missile with a nuclear device.North Korea has had a declared nuclear capability since 2005.10 In 2008, North Korean officials admitted that 37 ki­lograms of plutonium had been produced at the Yongbyon reactor, enough for as many as nine nuclear weapons.11 American assessments suggest that the actual amount of plutonium produced is likely much higher and that as much as 60 kilograms could have been extracted.12 Based upon this judgment, North Korea may have as many as 15 nucle­ar weapons, though most estimates in the U.S. intelligence community place the number at around ten.13 The extent of North Korea’s uranium enrichment program is not well known, but Pakistani nuclear scientist Abdul Qadeer (A.Q.) Khan stated that he had provided uranium enrichment equipment to Pyongyang.14 In 2002, DPRK First Vice For­eign Minister Kang Sok-ju admitted that North Korea was pursuing a uranium-enrichment program, the clear impli­cation being that the program was meant for weapons pro­duction.15 An operational North Korean uranium program could have the capability to add as many as six additional nuclear weapons a year to Pyongyang’s arsenal.16 A resolu­tion to the North Korean nuclear weapons dilemma has yet to be achieved, despite the various efforts to use the six-par­ty talks and other efforts for this purpose.17 *Iran* With the benefit of assistance from abroad, including North Korea and Pakistan, the Islamic Republic of Iran has moved forward with its ballistic missile program. Iran has had a demonstrated tactical ballistic missile capability since the 1980s, but in June 2003 it marked a major milestone when it deployed its 1,300-kilometer-range Shahab-3, capable of targeting Israel and Turkey, as well as U.S. forces in the Per­sian Gulf.18 Since then, Iran has begun “mass production” of This work has yielded impor­tant dividends: in September 2007, Iran publicly unveiled a “new” medium-range ballistic missile, the *Ghadr-*1, at a mil­itary parade in Tehran. This missile, which Iran claims has a range of 1,800 kilometers, appears to be an extended-range variant of the *Shahab-*3.21 Subsequently, in November 2007, Iran carried out a test of its *Ashoura* missile, a 2,000-kilo­meter-range solid fuel variant of the *Shahab*.22 These steps are part of what U.S. officials believe is a growing emphasis in Tehran on the development of an inter­continental ballistic missile capability. As John Rood, then-acting assistant secretary of state for international security and nonproliferation, told Congress in May 2007, “The In­lah, Hamas, and the Palestinian Islamic Jihad. The transfer of the *Shahab* 3 into the *Pasdaran*, in lieu of the *Artesh*, suggests that Ira­nian missile technologies could find their way into terrorist hands as part of Tehran’s ongoing sponsorship of terrorist activities. Intelligence Community assesses that Iran would be able to develop an ICBM capable of reaching the United States and all regions of Europe before 2015 if it chose to do so. And, I would point out that Iran has acquired ballistic missiles from North Korea in the past and note the possibility that it could do so again in the future, potentially acquiring mis­siles with even longer ranges.”23 As a result of these advanc­es, it is likely that Iran could field an intercontinental ballis­tic missile by the middle of the next decade.24 Iran may have conducted tests to determine whether its ballistic missiles, notably the *Shahab-*3 or the *Scud*, could be detonated by re­mote control while still in flight. The significance of such a capability lies in its potential to launch an electromagnetic pulse (EMP) attack, discussed later in this section. This effort is closely linked to Iran’s growing interest in space. In October 2005, Iran became the first space nation in the Muslim world when it launched a surveillance satellite on a Russian rocket from Russia’s missile base at Plesetsk.25 Since then, Iran has made great strides toward development of an indigenous space launch capability. In February 2007, it successfully carried out an initial test of a “space rocket” built in Iran.26 A year later unveiled its first space center, with Tehran claiming that it had now “joined the world’s top 11 countries possessing space technology to build satel­lites and launch rockets into space.”27 These advances ampli­fy and expand Iran’s ballistic missile program, since a space-launch vehicle (SLV) is similar in technology and function to the booster on an intercontinental ballistic missile. The threat posed by Iran’s ballistic missile program is closely linked to Tehran’s nuclear effort. Since it was pub­licly exposed by an Iranian opposition group in August 2002, Since December 2007 Iran has built a stockpile of low-enriched uranium hexafloride. According to the IAEA, Iran’s stockpile had reached more than 1000 pounds by August 31, 2008, with monthly production rates of more than 100 pounds. In 2009 this could give Iran at least 1,500 pounds that could be recirculated through its centrifuges to pro­duce the 35 pounds of weapon-grade uranium sufficient for one bomb.31 In April 2008, Iranian president Mahmoud Ah­madinejad disclosed that his government had begun to in­stall another 6,000 centrifuges at the Natanz facility.32 Ira­nian leaders have taken this to be a critical milestone. “The nuclear issue (of Iran) is the most important political devel­opment in contemporary history,” Ahmadinejad announced to supporters at that time. “Iran’s victory in this biggest po­litical battle will lead to new international developments.”33 Thus all indicators point toward the development of an Ira­nian nuclear capability with varying estimates not about *whether* Iran is doing so, but instead *when* it will have such weapons. There have also been reports that Iran as well as North Korea, and even terrorist groups, could have benefited from information from the notorious A.Q. Khan proliferation network. In 2006 drawings were discovered on computers owned by Swiss businessmen that included how to build a warhead that could be fitted on an Iranian ballistic missile. Whether these drawings were earlier passed on to Iran is not certain. The nuclear-related documents allegedly included hundreds of pages of specifications for a compact nuclear device that could have been designed for Iran.34 Other states already possess or are developing weapons of mass destruction and ballistic missiles. They include: **Pakistan•** , which has had a nuclear capability at least since 1998 and has extensive ballistic and cruise missile pro­grams. Pakistan possessed as many as 100 nuclear war­heads and continues to upgrade its missile forces. The country has made major advances in missile technology, especially considering that it presently lacks the domestic science and technology base for developing such weap­ons, which suggests that it has been very successful in acquiring technologies from abroad. At the moment, Pak­istan’s longest-range ballistic missile is the *Hatf-*6, which has a range of 2,000 kilometers. At that range, the *Hatf*-6 is nearing the 2,500 kilometer threshold which the Rums­feld Commission indicated would mark the existence of the technical base necessary for the development of long-range missile systems. While Pakistan’s nuclear arsenal and ballistic missiles are • ostensibly intended to deter Indian aggression, Pakistan’s domestic political situation is so turbulent that there is no guarantee that these weapons will be used strictly for that purpose. For example, under a radicalized regime such missiles could be used against U.S. forces and mili­tary installations in Afghanistan and Iraq. Despite Paki­stan’s cooperation in the War on Terror, serious questions exist as to whether elements in the Pakistani security services, in particular the Directorate for Inter-Services Intelligence (ISI), are actively working against U.S. inter­ests by supporting Afghan and Pakistani Taliban fighters in the Pakistani tribal areas. The fact that such powerful elements could be operating outside official Pakistani policy channels is frightening, even though ISI does not directly supervise the nuclear arsenal. Pakistan’s nuclear forces are overseen by the National Command Author­ 34 ity (NCA), and underwent a thorough security upgrade in 2003. Nevertheless, concerns remain about the com­mand and control of Pakistan’s nuclear forces. Particu­larly troubling is the level of sympathy for al-Qaeda and the Taliban within the junior and mid-level cadres of the Pakistani military as a result of fighting side-by-side with Islamists against Indian forces in Jammu and Kashmir. It is precisely these officers who are most likely to be pro­moted to sensitive positions in the years ahead. **Syria•** , which maintains biological and chemical weapons capabilities and possesses a large inventory of surface-to-surface ballistic missile systems, could deliver con­ventional and unconventional warheads to neighboring countries in the Middle East.35 Syria has also shown more than a passing interest in acquiring a nuclear weapons capability, as evidenced by the construction the Al-Kibar reactor site, which was subsequently destroyed by an Is­raeli Air Force strike in September 2007. The Central In­telligence Agency (CIA) has estimated that Damascus possesses hundreds of free-rocket-over-ground (FROG) missiles, *Scud* missiles, and SS-21 short-range ballistic missiles (SRBMs).36 Syria also maintains the indigenous capability to manufacture liquid-fuel *Scud*s.37 In Septem­ber 2003 testimony before the House of Representatives Subcommittee on the Middle East and South Asia, then-Under Secretary of State John Bolton outlined that Syria “is fully committed to expanding and improving its CW [chemical weapons] program” and “is continuing to de­velop an offensive biological weapons capability.”38 Syr­ia’s mobile missile force is capable of targeting much of Israel, as well as parts of Iraq, Jordan, and Turkey, and it has “developed a longer-range missile – the *Scud*-D – with assistance from North Korea” while simultane­ously pursuing “both solid- and liquid-propellant mis­sile programs.”39 Egypt• , which is engaged in a clandestine effort to acquire WMD and ballistic missile technologies. Egypt has been a primary destination for North Korea’s ballistic missile exports and has received shipments of *Scud* B and C mis­ 35 siles, as well as *No Dong* missiles.40 Inspections by the IAEA have uncovered plutonium traces at Egyptian nu­clear facilities, increasing international concern about clandestine nuclear development efforts on the part of the Mubarak regime.41 The IAEA has also criticized Cairo for failing to declare certain nuclear materials and sites, one of which was a facility for separating plutonium that could be used in an atomic weapon.42 **Saudi Arabia•** , which will undoubtedly find a nuclear weapons program a more attractive option if Iran achieves nuclear status and may already be pursuing a nuclear hedging strategy. Under an agreement signed during the October 2003 visit to Islamabad by Saudi Crown Prince Abdullah, Riyadh reportedly gained access to Pakistani nuclear technologies in exchange for stepped-up energy cooperation and improved strategic relations with Pak­istan.43 While Saudi Arabia has denied that it is devel­oping a nuclear weapons capability, it has been granted “small quantities protocol” status from the IAEA, which removes strict oversight of its nuclear reactor and could potentially facilitate the clandestine pursuit of nuclear weapons.44 Riyadh, meanwhile, was reported to be seek­ing modern replacements from China for its aging arse­nal of CSS-2 missiles originally purchased from China more than a generation ago.45 **Strategic Competitors** *People’s Republic of China* According to the Defense Department, “China has the most active ballistic missile program in the world. It is develop­ing and testing offensive missiles, forming additional missile units, qualitatively upgrading certain missile systems, and developing methods to counter ballistic missile defenses.”46 PRC missile modernization efforts build upon current capa­bilities that encompass ballistic missiles able to target the United States as well as Japan and other regional U.S. allies. For example, China has over 46 *Dong-feng* 4, *Dong-feng* 5, and *Dong-feng* 31 intercontinental ballistic missiles, approx­imately 35 intermediate-range (*Dong-feng* 3, and *Dong-feng* 21) missiles, and hundreds of short-range rockets currently deployed.47 Between 990 and 1,070 SRBMs are deployed op­posite Taiwan, and the People’s Liberation Army is increasing this force by more than 100 missiles each year.48 At the same time, China is in the midst of a massive, multi-year strategic-military modernization program, encompassing air power, naval, and land force capabilities, air defense, and electron­ic-, information- and space-warfare technologies.49 As part of this effort, China is upgrading its existing bal­listic missile arsenal. This includes the deployment of its *Dong-feng* 31 and *Dong-feng* 31A ICBMs with multiple inde­pendently targetable re-entry vehicle (MIRV) warhead tech­nology designed to defeat primitive anti-missile systems, priority solid-fuel propellant research intended to provide Beijing with immediate “launch on command” capabili­ties, and the transformation of its strategic offensive forc­es from large, stationary missiles to more versatile road- and rail-mobile variants. Notably, a successful flight test of China’s new submarine-launched version of the *Dong-feng* 31, the *Julang* 2, was conducted in June 2005.50 The *Julang* 2 has a range of up to 9,600 kilometers and, according to the U.S. Air Force’s National Air Intelligence Center, “will, for the first time, allow Chinese [missile submarines] to target portions of the United States from operating areas located near the Chinese coast.”51 These capabilities are even more troubling in light of remarks made by Chinese Major Gener­al Zhu Chenghu, who declared that nuclear weapons would have to be used if the United States intervened militarily in a conflict over Taiwan.52 In addition, China has also begun to undermine Ameri­can space dominance and is developing asymmetrical op­tions to exploit perceived U.S. vulnerabilities in space. These include a variety of space-denial capabilities, as well as space assets and launch systems that will significantly augment Beijing’s space operations. For example, in the wake of its successful October 2003 launch of the *Shenzhou* V space­craft, China is developing advanced military capabilities as part of an exo-atmospheric “deterrent” force even while Bei­jing warns against any U.S. weaponization of space. In Jan­uary 2007, China successfully destroyed a Chinese weather satellite using a direct-ascent, anti-satellite weapon, indi­cating its ability to attack satellites operating in low-earth orbit. Beyond the hit-to-kill technology demonstrated in this operation, the PRC is also developing technologies to “jam, blind, or otherwise disable satellites.”53 China has also developed a range of “nano-satellite” technologies for space warfare, apparently for the purpose of crippling American space assets.54 Other Chinese advances in space include the *Ziyuan* 1 and *Ziyuan* 2 remote-sensing satellites and the develop­ment, through a joint venture between China’s Tsinghua University and the United Kingdom’s University of Surrey, of a constellation of seven mini-satellites (weighing between 101 and 500 kilograms) with 50-meter-resolution remote-sensing payloads.55 Furthermore, there is growing evidence that China is increasingly interested in developing an EMP capability, both as a theater weapon for use in a potential Taiwan conflict and as a strategic asset to counter the Unit­ed States.56 Beijing’s space achievements also include the *Shenzhou* VII, the third Chinese manned spaceflight, together with China’s first spacewalk in September 2008.57 In addition, China is working on in-orbit rendezvous and docking pro­cedures (which also have direct applications for ASAT and space-denial missions), and exploring the prospects for a manned space station. The *Shenzhou* VII mission and space­walk will provide China with docking techniques required for the construction of a space station that will reportedly be accomplished by joining two *Shenzhou* vehicles togeth­er. Moreover, the PRC has an elaborate lunar exploration program that includes an unmanned moon lander, a sam­ple return mission, and an eventual human mission to the moon. For these missions, Beijing is developing a new *Long March* V booster. The timetables for the Chinese unmanned moon landing, a sample return mission, and a manned lunar mission are believed to be 2012, 2015, and 2017, respectively. China’s manned moon mission is approximately three years ahead of the U.S. target date for returning to the moon. Another extremely troubling development is the PRC’s increasing efforts in the realm of cyber warfare, particular­ly as a means to attack U.S. infrastructure, computers, and associated networks. Such asymmetrical efforts underscore Beijing’s understanding of the increasing role played in U.S. military operations by command, control, communication, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems. The objective of the PRC is to establish elec­tronic dominance early in any conflict scenario in order to disrupt and downgrade the utility of such assets, while si­multaneously taking steps to ensure that an adversary can­not deny China access to its own information systems.58 The inescapable conclusion is that Chinese strategic force mod­ernization, space denial and anti-access capabilities, and cyber warfare activities provide clear evidence of a strategy aimed at degrading the ability of the United States to proj­ect power and support its allies in the region and thus un­dermining the credibility of the U.S. extended deterrent. To address these challenges, the United States must ensure that it remains the preeminent space power. *Russian Federation* With the collapse of the Union of Soviet Socialist Repub­lics (USSR), the Russian Federation inherited the sprawling Soviet ballistic missile apparatus, which includes medium- and long-range solid- and liquid-fueled missiles. Presently, Moscow retains a formidable offensive strategic arsenal – the cornerstone of which is the SS-18 *Satan* ICBM, slated to remain in combat service for the next ten or fifteen years.59 However, Russia’s principal ballistic missile of the future is the *Topol* ICBM, which has recently been deployed.60 The Russian military has created a highly maneuverable variant of this missile, the *Topol* M, which has MIRV warhead tech­nology. Beyond the *Topol* M, Russia appears to be continu­ing with the development of the RS-24, which is capable of being equipped with as many as 10 warheads.61 The RS-24 has been successfully tested on several occasions.62 The Rus­sian navy has also continued flight tests of its *Bulava* sea-launched strategic missile system, which has a range of at least 8,000 kilometers and can carry ten or more MIRV war­heads, with varying degrees of success.63 Over the past several years, Russia has substantially al­tered its strategic posture. In late 2003, Russia unveiled a new military doctrine lowering the bar on the use of nu­clear force to protect Russian interests in its “near abroad” of Central Asia and the Caucasus.64 Then-President Vladi­mir Putin announced the end of Russian force reductions and launched massive exercises of the country’s strategic forces.65 Russia has also announced that it will discontin­ue missile-launch notifications to other signatories of the Hague Code of Conduct on missile proliferation. Moscow and Beijing have held joint military exercises on one anoth­er’s territory and continue to strengthen military ties with other countries in the region, by way of the Shanghai Coop­eration Organization.66 These steps are seen by Moscow as a hedge against Western encroachment into countries on its periphery and a means to blunt the emerging American missile defense system. These trends are likely to continue under the Medvedev administration, as power in Russia ap­pears to have shifted to the prime minister’s office, now oc­cupied by Putin. *The Dangers* This itemized list of advances in ballistic missile capabil­ities in recent years, if viewed individually, might still un­derstate the dangers to the United States and its allies. The proliferation of ballistic missile capabilities by potential enemies, both states and non-state actors, must be viewed more broadly. It carries with it the implication that America and its allies may face coalitions of missile powers as addi­tional states acquire such capabilities. For example, Russia or China could decide to back North Korea in a confronta­tion with South Korea, Japan, and the United States. Like­wise, U.S. allies may drop out in the face of such a combined threat stemming from enemy coalitions whose members are armed with ballistic missiles, thus possibly confronting the United States with the larger missile threat presented by such a combination of missile possessors. Furthermore, in an emerging multi-polar world where ballistic missile and nuclear proliferation create an increasingly complex coali­tion dynamic, the unpredictability factor increases dramat­ically and must be addressed. The analogy of two scorpions in a bottle that characterized the U.S.-Soviet confrontation in the Cold War is giving way to multiple scorpions in a bot­tle, with all the complexity, unpredictability, and danger that this possibility implies. **Asymmetric Threats** Asymmetric threats by rogue states and strategic compet­itors pose growing and compounding dangers to the Unit­ed States and its allies. *WMD Terrorism* An increasing number of terrorist groups are making con­certed efforts to acquire WMD.67 As long ago as 1994, ists affiliated with Iran’s Islamic Jihad Organization made a serious bid to buy an atomic bomb or fissile material from one of Russia’s crumbling “nuclear cities.”68 More recently, the 9/11 Commission explicitly warned that “Al-Qaeda remains extremely interested in conducting chemical, biological, ra­diological, or nuclear attacks.”69 After the March 2003 arrest of 9/11 mastermind Khaled Sheikh Mohammed, investiga­tions revealed that terrorists had obtained materials for pro­ducing botulinum and salmonella toxins and cyanide.70 Lebanon’s Hezbollah has also acquired menacing capa­bilities that were put on display during the 34-day war be­tween the Shiite militia and the Israeli Defense Forces in 2006 days of the war, when Hezbollah should have been weakened by Israel’s sustained military operations, mi­litiamen launched more rockets into Israel than at any oth­er. During the course of the conflict, Hezbollah man­aged to launch over 4,000 of its estimated 13,000 rockets into northern Israel.71 Particularly troubling is the fact that in the final time during the conflict, striking as deep into Israeli ter­ritory as Haifa. Since the 2006 war, Hezbollah has rearmed both quan­titatively and qualitatively, and Hezbollah Secretary Gen­eral Hassan Nasrallah has claimed that the group’s arsenal now includes rockets that can target anywhere in Israel. A 2007 United Nations report concludes that Hezbollah may now have as many as 10,000 long-range rockets and 20,000 short-range rockets.72 United Nations Secretary General Ban Ki-moon has suggested that Hezbollah is now capable of striking Israel’s main metropolis, Tel Aviv, and that the mi­litia has tripled its stockpile of C-802 land-to-sea missiles. The addition of longer-range missiles significantly challeng­es efforts to counter Hezbollah’s capabilities. As part of the ceasefire agreement that ended the hostilities in 2006, the Lebanese army and the United Nations Interim Force in Leb­ anon (UNIFIL) have assumed much greater responsibilities in disrupting Hezbollah activities south of the Litani River. In response, Hezbollah has simply moved many of its long-range missile launchers north of the Litani into areas of the Bekaa Valley where neither the Lebanese army nor UNIFIL patrol. Even in southern Lebanon, where the Lebanese Army and UNIFIL are ostensibly providing security, Hezbollah has been successful in rearming with anti-tank missiles and *Katyusha* rockets hidden in villages and camouflaged bun­kers, according to the Israel Defense Force (IDF).73 *The Ship-borne Scud Threat* Among the threats outlined in the 1998 Rumsfeld Commis­sion Report is the one posed by ballistic missiles launched from vessels such as freighters, tankers, or container ships close to the American coastline. Such a danger has only in­creased in the past decade. In August 2004, then Secretary of Defense Rumsfeld emphasized that “One of the nations in the Middle East had launched a ballistic missile from a cargo vessel. They had taken a short-range, probably *Scud* missile, put it on a transporter-erector launcher, lowered it in, tak­en the vessel out into the water, peeled back the top, erect­ed it, fired it, lowered it, covered it up. And the ship that they used was using a radar and electronic equipment that was no different than 50, 60, 100 other ships operating in the im­mediate area.”74 U.S. officials have suggested that Rumsfeld was referring to Iran, which tested a ship-launched missile in the late 1990s.75 This ship-borne ballistic capability could be used to launch EMP attacks from locations off the U.S. coastline with devastating effects (more below). *Asymmetric Proliferation* In 2002, writing in the *Financial Times*, Defense Science Board chairman William Schneider described the mechan­ics by which North Korea has managed to acquire nuclear capabilities as the quintessential “twenty-first century tem­plate for proliferation.” The rapid, clandestine acquisition of critical mass in Pyongyang’s nuclear program, according to Schneider, reflects the existence of a vibrant, and self-sus­taining, proliferation architecture in today’s internation­al system.76 Schneider was referring to what has now been deemed “second-tier proliferation,” whereby “states in the developing world with varying technical capabilities trade among themselves to bolster one another’s nuclear and stra­tegic weapons efforts.”77 North Korea is a prime example of this trend. The devel­opment of the Al-Kibar reactor in Syria, destroyed by an Is­raeli airstrike in September 2007, is believed to have been greatly aided by North Korea. In fact, North Korea went so far as to send personnel to help construct the reactor. Be­yond its nuclear proliferation efforts, the Kim Jong-Il regime has become a principal supplier of ballistic missile compo­nents and associated technologies to the Middle East. The Nuclear Threat Initiative (NTI) estimates that North Korea has exported more than 1,000 *Scud* missiles along with mis­sile-related parts to the Middle East region. Missile exports, which net North Korea around $1.5 billion a year, constitute one of its largest sources of revenue. North Korea has since expanded this trade, and is now believed to be offering tech­nologies associated with its advanced *Taepo Dong* 2 ICBM to a number of regional client states, including Syria and Iran.78 Moreover, North Korea has sold missiles to Pakistan in exchange for nuclear technologies,a trade facilitated in large part by A.Q. Khan’s proliferation network (see below for more on A.Q. Khan).79 China has also used the transfer of nuclear and ballistic missile technologies as a tool of global influence and a mon­ey-making enterprise. Extensive Chinese assistance has been instrumental to North Korea’s development of the *Taepo Dong* 2, and it has played a central role in Pakistan’s development of nuclear capabilities. This cooperation has led to a trilater­al “proliferation axis” that has given Pakistan access to North Korean ballistic missiles and allowed Pakistani nuclear know-how to flow to North Korea.80 Chinese defense companies have also been complicit in aiding Iran’s progress on ballistic missile technology. The United States responded by impos­ing penalties on these companies for exporting to Iran highperformance metals and other components that can be used to extend the range of Tehran’s missile arsenal.81 Furthermore, such activities are not confined to state ac­tors. In late 2003, the discovery of the clandestine nucle­ar cartel headed by Pakistani scientist A.Q. Khan exposed an alarming web of WMD and ballistic missile prolifera­tion. Khan confessed that he had provided Libya, Iran, and North Korea with technical assistance and components for manufacturing high-speed centrifuges.82 The government of Pakistan also revealed that he “gave some centrifuges to Iran,” and U.S. intelligence officials believe that North Ko­rea purchased high-speed centrifuges from the Khan net­work.83 Perhaps most troubling was the discovery of a nu­clear weapon design in 2008 on the computer hard drives of several members of Khan’s network.84 The bomb design is a miniaturized implosion device cable of fitting on North Korea’s *No Dong* missiles, as well as Iran’s *Shahab* and Pak­istan’s *Hatf*-5 (*Ghauri*) missiles. Depending on how much the design allows for warhead size reduction, these coun­tries may be able to make significant advances in their MIRV warhead programs. *The EMP Threat* According to the 2004 report of the EMP Commission,85 the United States faces a threat from EMP that could have cata­strophic consequences based on even a single nuclear war­head. EMP is generated by any nuclear weapon burst at any altitude above a few dozen kilometers, with the height of burst being significant in determining the area exposed to EMP. The EMP threat arises from the ability, whether by ter­rorists or states, to launch relatively unsophisticated mis­siles with nuclear warheads to detonate at altitudes from 40 to 400 kilometers above the earth’s surface. The rationale for such action would be the high political-military payoff in the form of devastating consequences. An EMP attack would constitute a highly successful asymmetric strategy against a society as heavily dependent as the United States is on electronics, energy, telecommunications networks, transportation systems, the movement of inventories in its manufacturing sector, and food processing and distribution capabilities. As noted in the EMP Commission report, EMP was an unintended result of a nuclear detonation at an al­titude of about 400 kilometers during the Starfish nuclear weapons tests above Johnstone Island in the Central Pacif­ic in 1962. The effects, felt some 1400 kilometers away in Ha­waii, included “the failure of street lighting systems, tripping of circuit breakers, triggering of burglar alarms, and damage to a telecommunications relay facility.” Nuclear tests con­ducted by the Soviet Union, also in 1962, produced damage to overhead and underground buried cables at distances as far away as 600 kilometers, together with surge arrest­er burnout, spark-gap breakdown, blown fuses, and power-supply breakdown.86 The destruction and mayhem caused by an EMP explosion would be far more substantial today given the ubiquity of electronics and society’s increased re­liance on them to run critical infrastructures. Several potential enemies either already have, or could soon acquire, the capability to attack the United States with a high-altitude nuclear explosion EMP that would cover a wide geographic region. Such a weapon need not be deto­nated directly over the United States itself to produce ma­jor damage to America’s critical infrastructures such as telecommunications, banking and finance, fuel/energy, transportation, food and water supply, emergency servic­es, government activities, and space systems. U.S. satellites, both civilian and military, are vulnerable to a range of at­tacks that include EMP, especially in low-earth orbits. Again, as the EMP Commission concluded, “The national security and homeland security communities use commercial satel­lites for critical activities, including direct and backup com­munications, emergency response services, and continuity of operations during emergencies.”87 Such satellites couldbe disabled by collateral radiation effects from an EMP at­tack on ground targets. Thus it is obvious that an interdependence exists between the objects of a potential EMP attack. Disabling one of the infrastructures, such as telecommunications or electricity, would have severe consequences for others, with cascading effects from which an advanced, technologically dependent society such as the United States might not easily recover. An EMP attack mounted against the United States would have far broader international consequences, given the in­terdependence of America and other economies in an era of globalization. An EMP attack against other economies, such as Japan or a European nation, would have major effects in the United States, and on other countries if the attack was on the United States. The services that would be essential to cope with the consequences of a terrorist attack, such as hospitals and emergency services, themselves might be dis­abled and therefore would not be available when and where they were most needed. As Senator John Kyl has pointed out, “A terrorist organization might have trouble putting a nu­clear warhead ‘on target’ with a *Scud*, but it would be much easier to simply launch and detonate in the atmosphere. No need for the risk and difficulty trying to smuggle a nuclear weapon over the border or hit a particular city. Just launch a cheap missile from a freighter in international waters – al-Qaeda is believed to own about eighty such vessels – and make sure to get it a few miles in the air.”88 Notably, Russia has considered attack options that in­clude EMP. During the May 1999 NATO air campaign against Serbia, members of the Russian Duma, meeting with U.S. congressional counterparts, reportedly speculated about the paralyzing effects of an EMP attack on the United States.89 To amplify on the Rumsfeld statement cited under “Ship-borne *Scud* Threat,” above, Iran is reported to have tested whether its ballistic missiles, such as the *Shahab*-3 or the *Scud*, could be detonated by remote control while still in high-altitude flight. The most plausible explanation for such tests is that Iran is developing the capability to explode a high-altitude nuclear weapon that could destroy critical electronic and technological infrastructures.90 Without an effective missile defense the United States will remain vul­nerable to the EMP threat given its extensive dependence on high-tech, electronic infrastructure that cannot easily be hardened to withstand such an attack. The ability to launch an incapacitating EMP strike against the United States pro­vides enemies with an asymmetric threat that would not only inhibit U.S. military action but would also strike a se­vere economic and psychological blow. **The Response** Given this multiplicity of ballistic missile threats, the Unit­ed States must deploy a missile defense that deters hostile states from developing or acquiring missile capabilities that could threaten the United States, its allies and coalition part­ners, and its forces deployed abroad. Furthermore, America’s missile defense R&D programs, together with planned de­ployments, must be sufficiently robust to dissuade would-be missile possessors from attempting to challenge the United States. Washington must deter future enemies from acquir­ing ballistic missiles, just as in the past it dissuaded them from developing strategic bombers because of America’s abil­ity to overwhelm such systems. Finally, U.S. missile defense must be capable of defeating those ballistic missiles, what­ever their range and type, that could be launched against the United States. U.S. and allied ballistic missile defense capabilities are an essential element of a broader damage limitation strat­egy. The purpose of this strategy is to protect and defend the people, territory, infrastructure, and institutions of the United States and its allies to the greatest extent possible. This strategy is a marked departure from the retaliation-based deterrence strategy of the Cold War. It is a strategy specifically tailored to meeting the security demands result­ing from the emerging multi-polar world, which has been brought about, at least in part, by the proliferation of bal­listic missiles and nuclear weapons. A mix of offensive and defensive strategic forces, which are modernized to meet the new and challenging requirements of this strategy, will be necessary. Thus, a global and layered ballistic missile de­fense system must be intricately linked to other strategic forces, where the broader strategic posture of the U.S. and its allies results in security benefits that are greater than the sum of its parts. As the United States dissuades future potential possess­ors, it must recognize that threats are increasing at a pace that no longer allows the luxury of long lead times within which a missile defense could be developed and deployed. Therefore, the United States must develop and rapidly field a missile defense with global reach, capable of coping with threats against the United States and its forces and allies *from any direction*. At the same time, America must attempt to dissuade hostile actors from acquiring missiles by render­ing such investments a poor use of limited resources. Ad­ditionally, given the uncertainty in predicting where, when, and by whom missiles might be launched – and what their targets may be – constant defenses are called for that are capable of intercepting missiles irrespective of their geo­graphic origin. Other things being equal, it is preferable to intercept threatening ballistic missiles as far away from their intend­ed targets and as early in their flight trajectory as possible. Best of all would be to have the capability to destroy an at­tacking missile shortly after it is launched, while its rockets still burn and any perturbation will lead to its destruction – with, in many cases, the debris falling back onto the area from which the attack was launched in the first place. The ca­pability to interdict a missile and its warheads in any phases of their flight (boost, midcourse, and terminal) requires an ability to detect and intercept the attack within a very few minutes and to track and destroy the attacking missile and its warheads during their longer midcourse traverse through space before they reenter the atmosphere. Finally, the last-ditch defense would be to destroy the attacking missiles as they reenter and pass through the atmosphere – and as ac­companying debris and decoys burn up on reentry – in the terminal phase en route to their targets. The best defense ca­ pability would be layered so that it could provide opportuni­ties for destruction in all three phases of flight**. Only space-based defenses inherently have this global capability and permanence.** While sea-based defenses can move freely through the two-thirds of the earth’s surface that are oceans, their capability is limited by geography and by the specific operations of the fleet – including where the sea-based missile defense happens to be deployed at any given time, and how quickly it could be redeployed to meet a crisis situation. Air-based and ground-based defenses, meanwhile, can have global capabilities, but frequently take considerable time to deploy when and where needed and are also depen­dent on the cooperation of U.S. friends and allies in permit­ting the necessary supporting activities on their territories. Thus, only a space-based missile defense will possess both constancy and global availability, irrespective of allied sup­port and agreement. As such, space-based missile defense constitutes the only truly global system, with all the rest be­ing either regional or local.91 In the case of sea-based systems, namely the *Aegis* pro­gram discussed in section 2, we have a regional system ca­pable of boost-phase, midcourse, and terminal intercept de­pending on where and how it is positioned, or vectored. It has a near-global application for *regional* operations, be­cause it is sea-based and theoretically it can be deployed over any portion of the earth’s surface covered by oceans. A land-based system can theoretically be deployed anywhere over about one-third of the world’s surface and, depending on how it is vectored, under some limited conditions would also be capable of boost-phase, midcourse, and terminal in­terception. Yet space-based missile defense alone is truly global in reach because of the medium in which it oper­ates, unconstrained by overflight or territorial restrictions. It also offers inherent interdiction advantages, described in greater detail below.

**North Korean nukes cause extinction**

Hayes & Hamel-Green 10 – \*Executive Director of the Nautilus Institute for Security and Sustainable Development, AND \*\* Executive Dean of the Faculty of Arts, Education and Human Development act Victoria University (1/5/10, Executive Dean at Victoria, “The Path Not Taken, the Way Still Open: Denuclearizing the Korean Peninsula and Northeast Asia,” http://www.nautilus.org/fora/security/10001HayesHamalGreen.pdf)

The international community is increasingly aware that cooperative diplomacy is the most productive way to tackle the multiple, interconnected global challenges facing humanity, not least of which is the increasing proliferation of nuclear and other weapons of mass destruction. Korea and Northeast Asia are instances where risks of nuclear proliferation and actual nuclear use arguably have increased in recent years. This negative trend is a product of continued US nuclear threat projection against the DPRK as part of a general program of coercive diplomacy in this region, North Korea’s nuclear weapons programme, the breakdown in the Chinese-hosted Six Party Talks towards the end of the Bush Administration, regional concerns over China’s increasing military power, and concerns within some quarters in regional states (Japan, South Korea, Taiwan) about whether US extended deterrence (“nuclear umbrella”) afforded under bilateral security treaties can be relied upon for protection. The consequences of failing to address the proliferation threat posed by the North Korea developments, and related political and economic issues, are serious, not only for the Northeast Asian region but for the whole international community. At worst, there is the possibility of nuclear attack1, whether by intention, miscalculation, or merely accident, leading to the resumption of Korean War hostilities. On the Korean Peninsula itself, key population centres are well within short or medium range missiles. The whole of Japan is likely to come within North Korean missile range. Pyongyang has a population of over 2 million, Seoul (close to the North Korean border) 11 million, and Tokyo over 20 million. Even a limited nuclear exchange would result in a holocaust of unprecedented proportions. But the catastrophe within the region would not be the only outcome. New research indicates that even a limited nuclear war in the region would rearrange our global climate far more quickly than global warming. Westberg draws attention to new studies modelling the effects of even a limited nuclear exchange involving approximately 100 Hiroshima-sized 15 kt bombs2 (by comparison it should be noted that the United States currently deploys warheads in the range 100 to 477 kt, that is, individual warheads equivalent in yield to a range of 6 to 32 Hiroshimas).The studies indicate that the soot from the fires produced would lead to a decrease in global temperature by 1.25 degrees Celsius for a period of 6-8 years.3 In Westberg’s view: That is not global winter, but the nuclear darkness will cause a deeper drop in temperature than at any time during the last 1000 years. The temperature over the continents would decrease substantially more than the global average. A decrease in rainfall over the continents would also follow…The period of nuclear darkness will cause much greater decrease in grain production than 5% and it will continue for many years...hundreds of millions of people will die from hunger…To make matters even worse, such amounts of smoke injected into the stratosphere would cause a huge reduction in the Earth’s protective ozone.4 These, of course, are not the only consequences. Reactors might also be targeted, causing further mayhem and downwind radiation effects, superimposed on a smoking, radiating ruin left by nuclear next-use. Millions of refugees would flee the affected regions. The direct impacts, and the follow-on impacts on the global economy via ecological and food insecurity, could make the present global financial crisis pale by comparison. How the great powers, especially the nuclear weapons states respond to such a crisis, and in particular, whether nuclear weapons are used in response to nuclear first-use, could make or break the global non proliferation and disarmament regimes. There could be many unanticipated impacts on regional and global security relationships5, with subsequent nuclear breakout and geopolitical turbulence, including possible loss-of-control over fissile material or warheads in the chaos of nuclear war, and aftermath chain-reaction affects involving other potential proliferant states. The Korean nuclear proliferation issue is not just a regional threat but a global one that warrants priority consideration from the international community.

**Bioweapons cause extinction**

Ochs 2 former president of the Aberdeen Proving Ground Superfund Citizens Coalition, member of the Depleted Uranium Task force of the Military Toxics Project, member of the Chemical Weapons Working Group [Richard Ochs, , June 9, 2002, “Biological Weapons Must Be Abolished Immediately,” http://www.freefromterror.net/other\_articles/abolish.html]

Of all the weapons of mass destruction, the genetically engineered biological weapons, many without a known cure or vaccine, are an extreme danger to the continued survival of life on earth. Any perceived military value or deterrence pales in comparison to the great risk these weapons pose just sitting in vials in laboratories. While a “nuclear winter,” resulting from a massive exchange of nuclear weapons, could also kill off most of life on earth and severely compromise the health of future generations, they are easier to control. Biological weapons, on the other hand, can get out of control very easily, as the recent anthrax attacks has demonstrated. There is no way to guarantee the security of these doomsday weapons because very tiny amounts can be stolen or accidentally released and then grow or be grown to horrendous proportions. The Black Death of the Middle Ages would be small in comparison to the potential damage bioweapons could cause. Abolition of chemical weapons is less of a priority because, while they can also kill millions of people outright, their persistence in the environment would be less than nuclear or biological agents or more localized. Hence, chemical weapons would have a lesser effect on future generations of innocent people and the natural environment. Like the Holocaust, once a localized chemical extermination is over, it is over. With nuclear and biological weapons, the killing will probably never end. Radioactive elements last tens of thousands of years and will keep causing cancers virtually forever. Potentially worse than that, bio-engineered agents by the hundreds with no known cure could wreck even greater calamity on the human race than could persistent radiation. AIDS and ebola viruses are just a small example of recently emerging plagues with no known cure or vaccine. Can we imagine hundreds of such plagues? HUMAN EXTINCTION IS NOW POSSIBLE. Ironically, the Bush administration has just changed the U.S. nuclear doctrine to allow nuclear retaliation against threats upon allies by conventional weapons. The past doctrine allowed such use only as a last resort when our nation’s survival was at stake. Will the new policy also allow easier use of US bioweapons? How slippery is this slope?

**Saudi prolif spills over and escalates rapidly, causes global nuclear war**

**Edelman et al. 11** \*ERIC S. EDELMAN is a Distinguished Fellow at the Center for Strategic and Budgetary Assessments; he was U.S. Undersecretary of Defense for Policy in 2005-9 \*\*ANDREW F. KREPINEVICH is President of the Center for Strategic and Budgetary Assessments. \*\*\*EVAN BRADEN MONTGOMERY is a Research Fellow at the Center for Strategic and Budgetary Assessments [http://www.foreignaffairs.com/articles/67162/eric-s-edelman-andrew-f-krepinevich-jr-and-evan-braden-montgomer/the-dangers-of-a-nuclear-iran, “The Dangers of a Nuclear Iran” January-February 2011]

There is, however, at least one state that could receive significant outside support: Saudi Arabia. And if it did, proliferation could accelerate throughout the region. Iran and Saudi Arabia have long been geopolitical and ideological rivals. Riyadh would face tremendous pressure to respond in some form to a nuclear-armed Iran, not only to deter Iranian coercion and subversion but also to preserve its sense that Saudi Arabia is the leading nation in the Muslim world. The Saudi government is already pursuing a nuclear power capability, which could be the first step along a slow road to nuclear weapons development. And concerns persist that it might be able to accelerate its progress by exploiting its close ties to Pakistan. During the 1980s, in response to the use of missiles during the Iran-Iraq War and their growing proliferation throughout the region, Saudi Arabia acquired several dozen css-2 intermediate-range ballistic missiles from China. The Pakistani government reportedly brokered the deal, and it may have also offered to sell Saudi Arabia nuclear warheads for the css-2s, which are not accurate enough to deliver conventional warheads effectively. There are still rumors that Riyadh and Islamabad have had discussions involving nuclear weapons, nuclear technology, or security guarantees. This "Islamabad option" could develop in one of several different ways. Pakistan could sell operational nuclear weapons and delivery systems to Saudi Arabia, or it could provide the Saudis with the infrastructure, material, and technical support they need to produce nuclear weapons themselves within a matter of years, as opposed to a decade or longer. Not only has Pakistan provided such support in the past, but it is currently building two more heavy-water reactors for plutonium production and a second chemical reprocessing facility to extract plutonium from spent nuclear fuel. In other words, it might accumulate more fissile material than it needs to maintain even a substantially expanded arsenal of its own. Alternatively, Pakistan might offer an extended deterrent guarantee to Saudi Arabia and deploy nuclear weapons, delivery systems, and troops on Saudi territory, a practice that the United States has employed for decades with its allies. This arrangement could be particularly appealing to both Saudi Arabia and Pakistan. It would allow the Saudis to argue that they are not violating the npt since they would not be acquiring their own nuclear weapons. And an extended deterrent from Pakistan might be preferable to one from the United States because stationing foreign Muslim forces on Saudi territory would not trigger the kind of popular opposition that would accompany the deployment of U.S. troops. Pakistan, for its part, would gain financial benefits and international clout by deploying nuclear weapons in Saudi Arabia, as well as strategic depth against its chief rival, India. The Islamabad option raises a host of difficult issues, perhaps the most worrisome being how India would respond. Would it target Pakistan's weapons in Saudi Arabia with its own conventional or nuclear weapons? How would this expanded nuclear competition influence stability during a crisis in either the Middle East or South Asia? Regardless of India's reaction, any decision by the Saudi government to seek out nuclear weapons, by whatever means, would be highly destabilizing. It would increase the incentives of other nations in the Middle East to pursue nuclear weapons of their own. And it could increase their ability to do so by eroding the remaining barriers to nuclear proliferation: each additional state that acquires nuclear weapons weakens the nonproliferation regime, even if its particular method of acquisition only circumvents, rather than violates, the npt. Were Saudi Arabia to acquire nuclear weapons, the Middle East would count three nuclear-armed states, and perhaps more before long. It is unclear how such national player competition would unfold because most analyses of nuclear deterrence are based on the U.S.- Soviet rivalry during the Cold War. It seems likely, however, that the interaction among three or **more nuclear-armed powers would be more prone to miscalculation and escalation** than a bipolar competition. During the Cold War, the United States and the Soviet Union only needed to concern themselves with an attack from the other. Multipolar systems are generally considered to be less stable than bipolar systems because coalitions can shift quickly, upsetting the balance of power and creating incentives for an attack. More important, emerging nuclear powers in the Middle East might not take the costly steps necessary to preserve regional stability and avoid a nuclear exchange. For nuclear-armed states, the bedrock of deterrence is the knowledge that each side has a secure second-strike capability, so that no state can launch an attack with the expectation that it can wipe out its opponents' forces and avoid a devastating retaliation. However, emerging nuclear powers might not invest in expensive but survivable capabilities such as hardened missile silos or submarinebased nuclear forces. Given this likely vulnerability, the close proximity of states in the Middle East, and the very short flight times of ballistic missiles in the region, any new nuclear powers might be compelled to "launch on warning" of an attack or even, during a crisis, to use their nuclear forces preemptively. Their governments might also delegate launch authority to lower-level commanders, heightening the possibility of miscalculation and escalation. Moreover, if early warning systems were not integrated into robust command-and-control systems, the risk of an unauthorized or accidental launch would increase further still. And without sophisticated early warning systems, a nuclear attack might be unattributable or attributed incorrectly. That is, assuming that the leadership of a targeted state survived a first strike, it might not be able to accurately determine which nation was responsible. And this uncertainty, when combined with the pressure to respond quickly, would create a significant risk that it would retaliate against the wrong party, potentially triggering a regional nuclear war. Most existing nuclear powers have taken steps to protect their nuclear weapons from unauthorized use: from closely screening key personnel to developing technical safety measures, such as permissive action links, which require special codes before the weapons can be armed. Yet there is no guarantee that emerging nuclear powers would be willing or able to implement these measures, creating a significant risk that their governments might lose control over the weapons or nuclear material and that nonstate actors could gain access to these items. Some states might seek to mitigate threats to their nuclear arsenals; for instance, they might hide their weapons. In that case, however, a single intelligence compromise could leave their weapons vulnerable to attack or theft. Meanwhile, states outside the Middle East could also be a source of instability. Throughout the Cold War, the United States and the Soviet Union were engaged in a nuclear arms race that other nations were essentially powerless to influence. In a multipolar nuclear Middle East, other nuclear powers and states with advanced military technology could influence-for good or ill-the military competition within the region by selling or transferring technologies that most local actors lack today: solid-fuel rocket motors, enhanced missile-guidance systems, warhead miniaturization technology, early warning systems, air and missile defenses. Such transfers could stabilize a fragile nuclear balance if the emerging nuclear powers acquired more survivable arsenals as a result. But they could also be highly destabilizing. If, for example, an outside power sought to curry favor with a potential client state or gain influence with a prospective ally, it might share with that state the technology it needed to enhance the accuracy of its missiles and thereby increase its ability to launch a disarming first strike against any adversary. The ability of existing nuclear powers and other technically advanced military states to shape the emerging nuclear competition in the Middle East could lead to a new Great Game, with unpredictable consequences.

**We solve the impact to any of your disads – Space-Based missile defense renders nuclear war obsolete**

**Lambakis, 07** (Steven, national security and international affairs analyst specializing in space power and policy studies, Managing Editor of Comparative Strategy, a leading international journal of global affairs and strategic studies, fellow at the National Institute for Public Policy. “Missile Defense From Space” 2-17-07.

Over the long term, will the currently configured and planned terrestrial-based missile defense system be sufficient to deal with increasingly sophisticated countermeasures and shifting threats? The answer, I believe, is no. The system being deployed today is fixed firmly to Earth. Whether they are sea-based or land-based weapons, or even the boost-engagement Airborne Laser, we are essentially talking about terrestrial platforms for basing weapons. As we move into the future, there are plans to make those platforms, the sensors and interceptors, more mobile. Why? Because greater mobility can provide greater flexibility for dealing with unpredicted threats. Mobility also allows a commander to concentrate his forces or disperse them as the requirements of the battlefield demand. It matters where we locate sensors and interceptors. It is important to put sensors close to the threat, because they will be in position to provide critical cueing and tracking data early in a ballistic missile’s flight. These data can help enlarge the engagement battle space. To perform boost-phase intercept from the ground or sea, the weapons platforms must be very near the target launch site. These terrestrial boost-phase weapons can defend many targets around the globe by covering a single launch site. The disadvantage of such basing, a disadvantage that is mitigated somewhat with a mobile platform like the Airborne Laser, is that the threat launch site or region must be predicted. Terrestrial-based weapons that engage in space, in the middle or midcourse of a missile’s or warhead’s flight, offer perhaps the greatest flexibility in terms of addressing possible flight azimuths, trajectories, and launch points. While ground-based midcourse interceptors may have to be oriented to large threat regions, they can defend against multiple launch points. Conversely, ground interceptors that are near the target can defend only a small area, but they can potentially protect that point from launches anywhere in the world. Yet it is simply unaffordable to do a point defense for every place you want to defend in the United States, every place that U.S. forces go, or everywhere that our allies are. The ability to do area defense — to defend against multiple launch points as opposed to doing point defense of a very limited area — is fundamental to successful missile defense. Political, strategic, and technological uncertainties could change the missile defense scenario by causing a shift in the threat from one region to another. Given that it takes years to field, test, and make operational new fixed interceptor and sensor sites, a shift in the threat could leave the nation vulnerable. Because many of the interceptors and sensors in the current system are fixed to geographic points, we are limited in our ability to defend the homeland, for example, against missiles launched from surprise locations such as a ship off our shoreline. We also might face an adversary tomorrow that deploys tens or even hundreds of ballistic missiles or one that has more sophisticated countermeasure and reentry technologies. Those, too, would be expected to stress the current system, which is designed at the moment to deal with more limited threats. Planned transportable land-based and mobile sea-based and airborne systems also suffer limitations. The need to base sensors and interceptors forward, closer to threat launch sites, in order to enlarge the engagement battle space makes our security dependent on political decisions by foreign governments. Projected boost defense systems, which may be deployed to the periphery or littoral of an adversary, would have very limited or no utility against a ballistic missile launched from several hundred miles inside a threat country’s border. The inability to engage a missile in boost means we would be left with only midcourse or terminal intercept possibilities, if those are available, and this removes a layer from the effectiveness calculations. It’s all about position Today we base missile-defense weapons on Earth, yet most engagements actually take place high above the Earth’s surface, in space — unless, of course, those engagements occur very early in boost or late in terminal. Putting interceptors in space to engage ballistic missiles could offer efficiencies that go a long way towards improving national defense, protecting more areas around the world, and reacting more effectively to threat surprises. The Exoatmospheric Kill Vehicle (ekv), deployed on top of a long-range ground-based interceptor in Alaska and California, is really a euphemism for “space weapon.” Space is the only environment in which the ekv will operate. In order to perform the missile defense mission, it must be boosted into space where it is “based” for a short time and operates semi-autonomously to put itself onto a collision path with a hostile warhead. In other words, the ekv is a “space weapon” that just happens to spend most of its time on the ground. The Standard Missile–3 interceptor, while it is carried on Aegis ballistic missile defense ships, also executes the intercept endgame in space against short- to medium-range ballistic missiles using a sensor-propulsion package designed to collide with the target. Thus, despite the fact that space is the recognized battleground in many missile defense engagements, we are deploying “space weapons” that are restricted to terrestrial launching just prior to operation. They must fight a space war from Earth. So, in a sense, these terrestrial-based interceptors are out of position before the battle even begins. At the very least, they are not in the most advantageous position to accomplish the mission for which they were designed. Before we can even begin the launch sequence, battle managers must wait for the attacker to make his move. The attacker has a head start and the ability to pre-position before the defender can get to the point where he must engage, especially if we are talking about engagement in the midcourse phase of flight. These engagements take place over a matter of minutes, of course, so any time wasted getting into position could lead to a failed intercept and possibly devastation for a city. By not basing interceptors in space, by not pre-positioning assets in the environment where we know intercepts will take place, the defense is surrendering a fundamental positional advantage. On this point, there is relevance in Carl von Clausewitz’s observation that a “benefit [of defensive action], one that arises solely from the nature of war, derives from the advantage of position, which tends to favor the defense.”[9](http://www.hoover.org/publications/policyreview/5516446.html" \l "n9%23n9" \t "_blank) To give up this advantage is detrimental to the cause. While space assets generally follow predictable orbital paths, they do provide a unique form of mobility — they can be present and persistent over many places on the globe. Indeed, in 2007, the Missile Defense Agency will begin demonstrations with two satellites hosting sensors designed to provide very fine surveillance and tracking data on in-flight ballistic missiles and payloads. A constellation of these satellites would become the sensor backbone of a global missile defense capability and would make possible the global mission endorsed by the Bush administration: the protection of the United States, its deployed forces, and allies and friends. Similarly, a space-based interceptor layer would enable a global on-call missile defense capability and a timely response to rapidly evolving threats, even threats emanating from unpredicted locations with very different azimuths from those we plan to be able to defeat today.[10](http://www.hoover.org/publications/policyreview/5516446.html" \l "n10%23n10" \t "_blank) A space-defense capability also would allow the country to engage longer-range threats originating from deep within the interior of a threat country. It is also known that enemies of the United States can put a nuclear weapon over U.S. territory using a ballistic missile. The detonation of this weapon at a high altitude could unleash an electromagnetic pulse that would wipe out satellite and airborne navigation, intelligence, and communications systems and impede any U.S. military response to the aggression. Such a pulse of energy would disable or destroy the unprotected technological infrastructure of a region or the nation. According to the emp Commission, “a regional or national recovery would be long and difficult and would seriously degrade the safety and overall viability of our nation. . . . [A]t some point the degradation of infrastructure could have irreversible effects on the country’s ability to support its population.” Space-based interceptors may be the only effective way to counter this threat and mitigate the effects of an electromagnetic pulse resulting from the intercept. Engaging the missile close to its launch point would release the resulting explosion of gamma rays closer to the attacker’s territory. Relying on an intercept in space, in the midcourse of a missile’s flight, risks damaging unprotected satellites (i.e., just about all commercial and civilian satellites), regardless of who owns them. Because the missile defense system is “layered” and will have multiple elements working togethersynergistically, sharing information, sharing existing sensors, communicating as a single system worldwide, even a small constellation of space-based interceptor platforms would allow the entire system to work more efficiently. The massive constellations projected back in the heady days of the Strategic Defense Initiative, in other words, do not seem to be necessary, especially when the targeted adversaries have very limited ballistic missile inventories. By attacking even just a portion of the threat missiles in boost and midcourse, the space layer has the effect of thinning out the number of attacking missiles so that the other elements of the system, which are based on the ground or at sea (midcourse and terminal systems), can be more effective. International law and arms control National indecision over how to regard the space environment has paralyzed successive administrations over what to do in space. The United States has conducted research and development in the space-weapon area for more than 40 years without a strategic vision. As progress in this area unfolds, U.S. leaders find it challenging just to talk about the use of space for combat purposes in a public forum. In August 2006, the Bush Administration issued a major, high-profile pronouncement about space arms control. The administration rightfully reminds us that arms control is not an end in itself, but rather a tool to help the nation realize its national security strategy. Officials believed the 1972 Anti-Ballistic Missile Treaty posed a danger to security, impeding the development, testing, and deployment of effective missile defenses to defend the country and U.S. troops, allies, and friends. When Washington withdrew from the treaty in June 2002, the restrictions on deployment of missile defenses in the air, sea, and space environments went away. We effectively got rid of the single greatest obstacle to the deployment of non-nuclear space arms, although this was not the reason cited by officials for withdrawal. It is plain that the U.S. government believes there is no need today for new outer-space arms-control agreements. There are a number of standing agreements that already sufficiently regulate military activities in outer space. And so Washington supports the existing space law regime and the development of the rule of law in that environment. Unhindered access to space and freedom to navigate are accepted ideas in most countries today. Customary practice and international treaties and conventions have supported and promoted the idea that space is a great “commons,” analogous to the high seas, and ought not to be subject to national restrictions or governance. The United States has always considered the space systems of any nation to be national property with the right of passage through and operation in space without interference, so long as those systems do not threaten U.S. security. Washington supports exploration and use of outer space by all nations for peaceful purposes. “Peaceful purposes,” states U.S. policy, allow defense and intelligence-related activities in pursuit of national security and other goals. Determining peaceful purposes, in other words, is done not by looking at whether an activity is military or nonmilitary. The determining factor, rather, is more directly tied to aggressive intent. The 1967 Outer Space Treaty enshrines the principle that outer space shall be free for exploration and use by all states in accordance with international law. The United States has consistently endorsed and abided by this treaty. Washington was among the first to endorse plans for a treaty banning weapons of mass destruction in space. This treaty puts celestial bodies off-limits to nuclear weapons and other weapons of mass destruction, and it prohibits the stationing of such systems in orbit. The United States also sponsored in 1963 a treaty to ban nuclear testing in space, the Limited Test Ban Treaty. Nuclear tests in space simply posed too many risks to our own communications and reconnaissance satellites, so it made sense to ban them. Space debris can create hazardous conditions for astronauts and hinder access to space, so Washington also has been an advocate of establishing responsible practices that minimize the impact of debris, although we must balance this too with the obligation to ensure national security. Our love of freedom, in other words, does not mean we have a love of anarchy. The United States has long recognized that freedom of action in space is not without limitation. Yet there are some who believe that the current space law regime is insufficient — insufficient, that is, for constraining U.S. arms development in that arena.[11](http://www.hoover.org/publications/policyreview/5516446.html" \l "n11%23n11" \t "_blank) The bottom line is this: There are currently no legal restrictions on developing and deploying space-based interceptors that rely on hit-to-kill technologies to execute the missile defense mission. Policy consequences The policy benefits of a space-based missile defense layer are straightforward. A more effective missile defense system that fully leverages space would provide a true on-call global defensive capability, and this could lead to increased stability in the world. Defenses deter attacks by reducing confidence in the success of any attack. The more effective the missile defense system is, the greater will be its deterrence value, and the less likely will we be to have to use it at all. At some point, when the system is seen by other governments as highly effective, they could recognize a diminishing marginal rate of return in their own ballistic missile investments. As more allies invest in missile defense, U.S. space-basing activities could build on current missile defense cooperative activities and open up new avenues for international collaboration, both to develop elements of the space-based layer and to participate in operations. Moreover, because no state can have sovereignty over the space above its territory, we could operate up there free of political constraints. The need for negotiating basing rights to locate sensors or interceptor fields would become less pressing.

#### Saudi prolif causes nuclear war.

Edelman ’11 (Eric –Distinguished Fellow at the Center for Strategic and Budgetary Assessments & Former U.S. Undersecretary of Defense for Policy, Foreign Affairs, Jan/Feb, <http://www.foreignaffairs.com/articles/67162/eric-s-edelman-andrew-f-krepinevich-jr-and-evan-braden-montgomer/the-dangers-of-a-nuclear-iran>)

There is, however, at least one state that could receive significant outside support: Saudi Arabia. And if it did, proliferation could accelerate throughout the region. Iran and Saudi Arabia have long been geopolitical and ideological rivals. Riyadh would face tremendous pressure to respond in some form to a nuclear-armed Iran, not only to deter Iranian coercion and subversion but also to preserve its sense that Saudi Arabia is the leading nation in the Muslim world. The Saudi government is already pursuing a nuclear power capability, which could be the first step along a slow road to nuclear weapons development. And concerns persist that it might be able to accelerate its progress by exploiting its close ties to Pakistan. During the 1980s, in response to the use of missiles during the Iran-Iraq War and their growing proliferation throughout the region, Saudi Arabia acquired several dozen css-2 intermediate-range ballistic missiles from China. The Pakistani government reportedly brokered the deal, and it may have also offered to sell Saudi Arabia nuclear warheads for the css-2s, which are not accurate enough to deliver conventional warheads effectively. There are still rumors that Riyadh and Islamabad have had discussions involving nuclear weapons, nuclear technology, or security guarantees. This “Islamabad option” could develop in one of several different ways. Pakistan could sell operational nuclear weapons and delivery systems to Saudi Arabia, or it could provide the Saudis with the infrastructure, material, and technical support they need to produce nuclear weapons themselves within a matter of years, as opposed to a decade or longer. Not only has Pakistan provided such support in the past, but it is currently building two more heavy-water reactors for plutonium production and a second chemical reprocessing facility to extract plutonium from spent nuclear fuel. In other words, it might accumulate more fissile material than it needs to maintain even a substantially expanded arsenal of its own. Alternatively, Pakistan might offer an extended deterrent guarantee to Saudi Arabia and deploy nuclear weapons, delivery systems, and troops on Saudi territory, a practice that the United States has employed for decades with its allies. This arrangement could be particularly appealing to both Saudi Arabia and Pakistan. It would allow the Saudis to argue that they are not violating the NPT since they would not be acquiring their own nuclear weapons. And an extended deterrent from Pakistan might be preferable to one from the United States because stationing foreign Muslim forces on Saudi territory would not trigger the kind of popular opposition that would accompany the deployment of U.S. troops. Pakistan, for its part, would gain financial benefits and international clout by deploying nuclear weapons in Saudi Arabia, as well as strategic depth against its chief rival, India. The Islamabad option raises a host of difficult issues, perhaps the most worrisome being how India would respond. Would it target Pakistan’s weapons in Saudi Arabia with its own conventional or nuclear weapons? How would this expanded nuclear competition influence stability during a crisis in either the Middle East or South Asia? Regardless of India’s reaction, any decision by the Saudi government to seek out nuclear weapons, by whatever means, would be highly destabilizing. It would increase the incentives of other nations in the Middle East to pursue nuclear weapons of their own. And it could increase their ability to do so by eroding the remaining barriers to nuclear proliferation: each additional state that acquires nuclear weapons weakens the nonproliferation regime, even if its particular method of acquisition only circumvents, rather than violates, the NPT. Were Saudi Arabia to acquire nuclear weapons, the Middle East would count three nuclear-armed states, and perhaps more before long. It is unclear how such an n-player competition would unfold because most analyses of nuclear deterrence are based on the U.S.- Soviet rivalry during the Cold War. It seems likely, however, that the interaction among three or more nuclear-armed powers would be more prone to miscalculation and escalation than a bipolar competition. During the Cold War, the United States and the Soviet Union only needed to concern themselves with an attack from the other. Multi- polar systems are generally considered to be less stable than bipolar systems because coalitions can shift quickly, upsetting the balance of power and creating incentives for an attack. More important, emerging nuclear powers in the Middle East might not take the costly steps necessary to preserve regional stability and avoid a nuclear exchange. For nuclear-armed states, the bedrock of deterrence is the knowledge that each side has a secure second-strike capability, so that no state can launch an attack with the expectation that it can wipe out its opponents’ forces and avoid a devastating retaliation. However, emerging nuclear powers might not invest in expensive but survivable capabilities such as hardened missile silos or submarine- based nuclear forces. Given this likely vulnerability, the close proximity of states in the Middle East, and the very short flight times of ballistic missiles in the region, any new nuclear powers might be compelled to “launch on warning” of an attack or even, during a crisis, to use their nuclear forces preemptively. Their governments might also delegate launch authority to lower-level commanders, heightening the possibility of miscalculation and escalation. Moreover, if early warning systems were not integrated into robust command-and-control systems, the risk of an unauthorized or accidental launch would increase further still. And without sophisticated early warning systems, a nuclear attack might be unattributable or attributed incorrectly. That is, assuming that the leadership of a targeted state survived a first strike, it might not be able to accurately determine which nation was responsible. And this uncertainty, when combined with the pressure to respond quickly, would create a significant risk that it would retaliate against the wrong party, potentially triggering a regional nuclear war. Most existing nuclear powers have taken steps to protect their nuclear weapons from unauthorized use: from closely screening key personnel to developing technical safety measures, such as permissive action links, which require special codes before the weapons can be armed. Yet there is no guarantee that emerging nuclear powers would be willing or able to implement these measures, creating a significant risk that their governments might lose control over the weapons or nuclear material and that nonstate actors could gain access to these items. Some states might seek to mitigate threats to their nuclear arsenals; for instance, they might hide their weapons. In that case, however, a single intelligence compromise could leave their weapons vulnerable to attack or theft. Meanwhile, states outside the Middle East could also be a source of instability. Throughout the Cold War, the United States and the Soviet Union were engaged in a nuclear arms race that other nations were essentially powerless to influence. In a multipolar nuclear Middle East, other nuclear powers and states with advanced military technology could influence—for good or ill—the military competition within the region by selling or transferring technologies that most local actors lack today: solid-fuel rocket motors, enhanced missile-guidance systems, war- head miniaturization technology, early warning systems, air and missile defenses. Such transfers could stabilize a fragile nuclear balance if the emerging nuclear powers acquired more survivable arsenals as a result. But they could also be highly destabilizing. If, for example, an outside power sought to curry favor with a potential client state or gain influence with a prospective ally, it might share with that state the technology it needed to enhance the accuracy of its missiles and thereby increase its ability to launch a disarming first strike against any adversary. The ability of existing nuclear powers and other technically advanced military states to shape the emerging nuclear competition in the Middle East could lead to a new Great Game, with unpredictable consequences.

#### Nuclear terrorism escalates to major nuclear war.

Ayson’10 Robert – Professor of Strategic Studies and Director of the Centre for Strategic Studies: New Zealand at the Victoria University of Wellington – “After a Terrorist Nuclear Attack: Envisaging Catalytic Effects,” Studies in Conflict & Terrorism, Volume 33, Issue 7, July, obtained via InformaWorld

A terrorist nuclear attack, and even the use of nuclear weapons in response by the country attacked in the first place, would not necessarily represent the worst of the nuclear worlds imaginable. Indeed, there are reasons to wonder whether nuclear terrorism should ever be regarded as belonging in the category of truly existential threats. A contrast can be drawn here with the global catastrophe that would come from a massive nuclear exchange between two or more of the sovereign states that possess these weapons in significant numbers. Even the worst terrorism that the twenty-first century might bring would fade into insignificance alongside considerations of what a general nuclear war would have wrought in the Cold War period. And it must be admitted that as long as the major nuclear weapons states have hundreds and even thousands of nuclear weapons at their disposal, there is always the possibility of a truly awful nuclear exchange taking place precipitated entirely by state possessors themselves. But these two nuclear worlds—a non-state actor nuclear attack and a catastrophic interstate nuclear exchange—are not necessarily separable. It is just possible that some sort of terrorist attack, and especially an act of nuclear terrorism, could precipitate a chain of events leading to a massive exchange of nuclear weapons between two or more of the states that possess them. In this context, today’s and tomorrow’s terrorist groups might assume the place allotted during the early Cold War years to new state possessors of small nuclear arsenals who were seen as raising the risks of a catalytic nuclear war between the superpowers started by third parties. These risks were considered in the late 1950s and early 1960s as concerns grew about nuclear proliferation, the so-called n+1 problem. It may require a considerable amount of imagination to depict an especially plausible situation where an act of nuclear terrorism could lead to such a massive inter-state nuclear war. For example, in the event of a terrorist nuclear attack on the United States, it might well be wondered just how Russia and/or China could plausibly be brought into the picture, not least because they seem unlikely to be fingered as the most obvious state sponsors or encouragers of terrorist groups. They would seem far too responsible to be involved in supporting that sort of terrorist behavior that could just as easily threaten them as well. Some possibilities, however remote, do suggest themselves. For example, how might the United States react if it was thought or discovered that the fissile material used in the act of nuclear terrorism had come from Russian stocks, FN 40 and if for some reason Moscow denied any responsibility for nuclear laxity? The correct attribution of that nuclear material to a particular country might not be a case of science fiction given the observation by Michael May et al. that while the debris resulting from a nuclear explosion would be “spread over a wide area in tiny fragments, its radioactivity makes it detectable, identifiable and collectable, and a wealth of information can be obtained from its analysis: the efficiency of the explosion, the materials used and, most important … some indication of where the nuclear material came from.”41 Alternatively, if the act of nuclear terrorism came as a complete surprise, and American officials refused to believe that a terrorist group was fully responsible (or responsible at all) suspicion would shift immediately to state possessors. Ruling out Western ally countries like the United Kingdom and France, and probably Israel and India as well, authorities in Washington would be left with a very short list consisting of North Korea, perhaps Iran if its program continues, and possibly Pakistan. But at what stage would Russia and China be definitely ruled out in this high stakes game of nuclear Cluedo? In particular, if the act of nuclear terrorism occurred against a backdrop of existing tension in Washington’s relations with Russia and/or China, and at a time when threats had already been traded between these major powers, would officials and political leaders not be tempted to assume the worst? Of course, the chances of this occurring would only seem to increase if the United States was already involved in some sort of limited armed conflict with Russia and/or China, or if they were confronting each other from a distance in a proxy war, as unlikely as these developments may seem at the present time. The reverse might well apply too: should a nuclear terrorist attack occur in Russia or China during a period of heightened tension or even limited conflict with the United States, could Moscow and Beijing resist the pressures that might rise domestically to consider the United States as a possible perpetrator or encourager of the attack? Washington’s early response to a terrorist nuclear attack on its own soil might also raise the possibility of an unwanted (and nuclear aided) confrontation with Russia and/or China. For example, in the noise and confusion during the immediate aftermath of the terrorist nuclear attack, the U.S. president might be expected to place the country’s armed forces, including its nuclear arsenal, on a higher stage of alert. In such a tense environment, when careful planning runs up against the friction of reality, it is just possible that Moscow and/or China might mistakenly read this as a sign of U.S. intentions to use force (and possibly nuclear force) against them. In that situation, the temptations to preempt such actions might grow, although it must be admitted that any preemption would probably still meet with a devastating response. As part of its initial response to the act of nuclear terrorism (as discussed earlier) Washington might decide to order a significant conventional (or nuclear) retaliatory or disarming attack against the leadership of the terrorist group and/or states seen to support that group. Depending on the identity and especially the location of these targets, Russia and/or China might interpret such action as being far too close for their comfort, and potentially as an infringement on their spheres of influence and even on their sovereignty. One far-fetched but perhaps not impossible scenario might stem from a judgment in Washington that some of the main aiders and abetters of the terrorist action resided somewhere such as Chechnya, perhaps in connection with what Allison claims is the “Chechen insurgents’ … long-standing interest in all things nuclear.”42 American pressure on that part of the world would almost certainly raise alarms in Moscow that might require a degree of advanced consultation from Washington that the latter found itself unable or unwilling to provide.There is also the question of how other nuclear-armed states respond to the act of nuclear terrorism on another member of that special club. It could reasonably be expected that following a nuclear terrorist attack on the United States, both Russia and China would extend immediate sympathy and support to Washington and would work alongside the United States in the Security Council. But there is just a chance, albeit a slim one, where the support of Russia and/or China is less automatic in some cases than in others. For example, what would happen if the United States wished to discuss its right to retaliate against groups based in their territory? If, for some reason, Washington found the responses of Russia and China deeply underwhelming, (neither “for us or against us”) might it also suspect that they secretly were in cahoots with the group, increasing (again perhaps ever so slightly) the chances of a major exchange. If the terrorist group had some connections to groups in Russia and China, or existed in areas of the world over which Russia and China held sway, and if Washington felt that Moscow or Beijing were placing a curiously modest level of pressure on them, what conclusions might it then draw about their culpability? If Washington decided to use, or decided to threaten the use of, nuclear weapons, the responses of Russia and China would be crucial to the chances of avoiding a more serious nuclear exchange. They might surmise, for example, that while the act of nuclear terrorism was especially heinous and demanded a strong response, the response simply had to remain below the nuclear threshold. It would be one thing for a non-state actor to have broken the nuclear use taboo, but an entirely different thing for a state actor, and indeed the leading state in the international system, to do so. If Russia and China felt sufficiently strongly about that prospect, there is then the question of what options would lie open to them to dissuade the United States from such action: and as has been seen over the last several decades, the central dissuader of the use of nuclear weapons by states has been the threat of nuclear retaliation. If some readers find this simply too fanciful, and perhaps even offensive to contemplate, it may be informative to reverse the tables. Russia, which possesses an arsenal of thousands of nuclear warheads and that has been one of the two most important trustees of the non-use taboo, is subjected to an attack of nuclear terrorism. In response, Moscow places its nuclear forces very visibly on a higher state of alert and declares that it is considering the use of nuclear retaliation against the group and any of its state supporters. How would Washington view such a possibility? Would it really be keen to support Russia’s use of nuclear weapons, including outside Russia’s traditional sphere of influence? And if not, which seems quite plausible, what options would Washington have to communicate that displeasure? If China had been the victim of the nuclear terrorism and seemed likely to retaliate in kind, would the United States and Russia be happy to sit back and let this occur? In the charged atmosphere immediately after a nuclear terrorist attack, how would the attacked country respond to pressure from other major nuclear powers not to respond in kind? The phrase “how dare they tell us what to do” immediately springs to mind. Some might even go so far as to interpret this concern as a tacit form of sympathy or support for the terrorists. This might not help the chances of nuclear restraint. FN 40. One way of reducing, but probably not eliminating, such a prospect, is further international cooperation on the control of existing fissile material holdings.

#### Bioweapons spread rapidly, are easy to produce, and cause extinction—9 hour timeframe

Discovery 09 **–** Award-winning source of credible, unbiased, and easy-to-understand explanations of how the world actually works (How Stuff Works, February 19, 2009, “10 Ways the World Might End: A Monster Plague,” http://videos.howstuffworks.com/science/10-ways-the-world-will-end-videos-playlist.htm)//DR. H

[Narrator:] Conventional science holds the deadly viruses that typically originate in other species, and then jump to humans. Some scientists believe the biggest threat from plague could come from outer space.

[Dr. Chandra Wickramisinghe:] Looking at the…the pattern of diseases and the how they extract the earth, I would say that every new strain of virus, new subtype of virus, it has a space connotation to it.

[Narrator:] If Chandra is right, it is possible an asteroid could one day deliver a deadly new strain of plague.

[Dr. Chandra Wickramisinghe:] There is the possibility that sometime in the future, there will be a strain of virus or bacteria that we have not encountered throughout evolution history that could cause absolute devastation.

[Narrator:] A killer plague from outer space isn’t the only concern. Deadly new bioweapons are also being developed in the barges around the world. Fringe cults, and apocalyptic madmen could right now be developing such bioweapons. As deadly as atomic bombs, and far cheaper to produce, infection with a few particles could mean a slow, agonizing death. It might only take one moment of madness from an absent minded buffet to release such a deadly new strain of plague. Once out of the lab, this grotesque killer would quickly begin to spread.

[Guest] Anywhere in the world, infection is on our doorstep, or moving around the world, within nine hours, that virus could arrive here in London, or anywhere else.

[Narrator:] No one will be safe, as the deadly invisible assassin will swiftly bring entire cities to a standstill.

[Guest] There’s two features, of actually meeting your cad. And what we ask is, how long is the incubation period. That’s the time between the time you get infected, and the time you show symptoms. And the other thing we look for is what’s called its reproductive number, and its reproductive number is basically how many people are going to be infected by one person with that virus. If the reproductive number is high, and the incubation period is short, then you’ve got a problem on your hands.

[Narrator:] This monster plague, will bring death on an unprecedented scale, economies will collapse, the medical system will be unable to cope, no one will be spared a terrible, ugly death.

#### US credibility solves South-China war.

Cohen 13

[Eliot. Director of Strategic Studies at Johns Hopkins. “Eliot Cohen: American Withdrawal and Global Disorder” The Wall Street Journal, 3/19/13 ln]

In Mr. Obama's second term the limits of such withdrawal from conventional military commitments abroad will be tested. In East Asia, an assertive China has bullied the Philippines (with which the U.S. has a 61-year-old defense pact) over the Spratly islands, and China has pressed its claims on Japan (a 53-year-old defense pact) over the Senkaku Islands. At stake are territorial waters and mineral resources—symbols of China's drive for hegemony and an outburst of national egotism. Yet when Shinzo Abe, the new prime minister of an understandably anxious Japan, traveled to Washington in February, he didn't get the unambiguous White House backing of Japan's sovereignty that an ally of long standing deserves and needs. In Europe, an oil-rich Russia is rebuilding its conventional arsenal while modernizing (as have China and Pakistan) its nuclear arsenal. Russia has been menacing its East European neighbors, including those, like Poland, that have offered to host elements of a NATO missile-defense system to protect Europe. In 2012, Russia's then-chief of general staff, Gen. Nikolai Makarov, declared: "A decision to use destructive force pre-emptively will be taken if the situation worsens." This would be the same Russia that has attempted to dismember its neighbor Georgia and now has a docile Russophile billionaire, Prime Minister Bidzina Ivanishvili, to supplant the balky, independence-minded government loyal to President Mikhail Saakashvili. In the Persian Gulf, American policy was laid down by Jimmy Carter in his 1980 State of the Union address with what became the Carter Doctrine: "An attempt by any outside force to gain control of the Persian Gulf region will be regarded as an assault on the vital interests of the United States of America, and such an assault will be repelled by any means necessary, including military force." America's Gulf allies may not have treaties to rely upon—but they do have decades of promises and the evidence of two wars that the U.S. would stand by them. Today they wait for the long-promised (by Presidents Obama and George W. Bush) nuclear disarmament of a revolutionary Iranian government that has been relentless in its efforts to intimidate and subvert Iran's neighbors. They may wait in vain. Americans take for granted the world in which they grew up—a world in which, for better or worse, the U.S. was the ultimate security guarantor of scores of states, and in many ways the entire international system. Today we are informed by many politicians and commentators that we are weary of those burdens—though what we should be weary of, given that our children aren't conscripted and our taxes aren't being raised in order to pay for those wars, is unclear. The truth is that defense spending at the rate of 4% of gross domestic product (less than that sustained with ease by Singapore) is eminently affordable. The arguments against far-flung American strategic commitments take many forms. So-called foreign policy realists, particularly in the academic world, believe that the competing interests of states tend automatically toward balance and require no statesmanlike action by the U.S. To them, the old language of force in international politics has become as obsolete as that of the "code duello," which regulated individual honor fights through the early 19th century. We hear that international institutions and agreements can replace national strength. It is also said—covertly but significantly—that the U.S. is too dumb and inept to play the role of security guarantor. Perhaps the clever political scientists, complacent humanists, Spenglerian declinists, right and left neo-isolationists, and simple doubters that the U.S. can do anything right are correct. Perhaps the president should concentrate on nation-building at home while pressing abroad only for climate-change agreements, nuclear disarmament and an unfettered right to pick off bad guys (including Americans) as he sees fit. But if history is any guide, foreign policy as a political-science field experiment or what-me-worryism will yield some ugly results. Syria is a harbinger of things to come. In that case, the dislocation, torture and death have first afflicted the locals. But it will not end there, as incidents on Syria's borders and rumors of the movement of chemical weapons suggest. A world in which the U.S. abnegates its leadership will be a world of unrestricted self-help in which China sets the rules of politics and trade in Asia, mayhem and chaos is the order of the day in the Middle East, and timidity and appeasement paralyze the free European states. A world, in short, where the strong do what they will, the weak suffer what they must, and those with an option hurry up and get nuclear weapons.

#### South China Sea conflict goes nuclear

Wesley ‘12

[Michael Wesley, Non-Resident Senior Fellow at the Brookings Institution and an Adjunct Professor at Griffith University and The University of Sydney, former Executive Director of the Lowy Institute for International Policy, former Professor of International Relations and Director of the Griffith Asia Institute at Griffith University, and Senior Lecturer in International Relations at the University of New South Wales, July 2012, “What’s at stake in the South China Sea?” <http://lowyinstitute.cachefly.net/files/wesley_whats_at_stake_snapshot11.pdf>]

The South China Sea is enclosed by the west coast of mainland Southeast Asia, Borneo and the Philippine archipelago. Rich in hydrocarbons and fish stocks, it is traversed by over one-third of global shipping. Its waters and seabed are subject to six opposing territorial claims – by China, Taiwan, Vietnam, Malaysia, Brunei and the Philippines – but these confrontations are generally not regarded as seriously as the Taiwan Straits and the Korean peninsula standoffs. But the South China Sea is more unpredictable, and certainly warrants much closer and more sustained attention by strategists and policy-makers. It is in the South China Sea that the components of Asia’s changing power dynamics are most concentrated and on display: China’s growing strategic heft and paranoid sense of entitlement; its Southeast Asian neighbours’ hopes and misgivings about China’s regional dominance; and the United States’ compulsion to meet China’s strategic challenge. The South China Sea is a tangle of competing and mutually complicating claims over territory, resources and navigation rights. Geopolitically, it is like the Bermuda triangle, reversing expected alignments and suspending normal rules of the game. It pits Asia’s two most significant Communist countries, China and Vietnam, against each other, unites usually bitter enemies China and Taiwan, and is drawing the United States back to a partnership with Vietnam a generation after the fall of Saigon. The South China Sea is the flashpoint in the Pacific where conflict is most likely to break out through miscalculation. It is a crowded maritime environment contested by some inexperienced maritime forces with underdeveloped naval doctrine, among whom there are no established and accepted rules for managing maritime incidents. And the combination of the claimant states’ power asymmetries, overlapping prerogatives, and growing nationalism mean that incidents, once they occur, are likely to escalate. There are four reasons why finding solutions to the South China Sea disputes should be given the highest priority by strategic policy-makers. 1. For China it’s about security – and respect The South China Sea symbolises Beijing’s larger maritime dilemma. The country’s major population and productive centres cluster along China’s coastline, and are therefore vulnerable to major attack from the sea. Naval strategists see China as hemmed in along its sea coast by a chain of states or territories hostile to Beijing: Japan, Korea, the Ryuku Islands, Taiwan, and the Philippines. The overriding goal of Chinese naval strategy is to establish dominance over the waters within this ‘first island chain’. At the southern end of the first island chain, the South

China Sea is crucial to China’s commercial shipping, energy flows, and the access of its Hainan island-based submarines to the Pacific. But the South China Sea’s southern and western access points – the Sunda, Lombok, Luzon and Malacca Straits – are controlled by allies or partners of the United States. The best way to offset this vulnerability is to control the South China Sea itself – and thereby loosen the American position in Southeast Asia. Influential elites in China view the South China Sea as ‘blue territory’ – that is, as much a part of China’s sovereign territory as Tibet, Xinjiang or Taiwan. To this line of thinking, any surrender of its claims in the South China Sea would signal a weakening of its rights to Tibet, Xinjiang or Taiwan – and is therefore unthinkable. China’s 1992 Territorial Law classified the South China Sea as China’s internal waters, meaning foreign naval vessels and aircraft must first gain Beijing’s permission before transiting, submarines must surface, and that China retains the right to evict other countries’ shipping at any time. Beijing’s willingness to enforce this law has been growing apace with its naval power in the western Pacific. In recent weeks, Beijing has placed the Spratly and Paracel Islands and the Macclesfield Bank under prefectural-level administration, established a 45-member legislature to administer the 1100 people who live on the islands, and approved the deployment of a People’s Liberation Army garrison to the islands. 2. Southeast Asia – avoiding the bad old days If unaddressed, the dynamics in the South China Sea could return Southeast Asia to the bad old days of inter-state divisions, domestic instability and competitive great-power interventions. On no other issue have the disagreements and rivalries between ASEAN member states been so sustained and obvious. The Philippines and Vietnam demand that the organisation supports them in standing up to Beijing. On the other side are Cambodia, Laos and Myanmar, with no direct stake in the conflict and which refuse to endorse the Philippines’ and Vietnam’s confrontational stance. Indonesia, Malaysia and Singapore are concerned about the dispute, but believe that avoiding confrontation with China will improve the prospects for productive negotiations. The stand-off over the South China Sea exposes the hollowness of Asian institutions’ reliance on the principle of unanimity – which means that any member’s objection can keep an issue, no matter how pressing, off the agenda. Beijing’s refusal to discuss the South China Sea in any regional meeting, and its implicit threat to withdraw from any organisation that doesn’t respect this wish, shows Southeast Asia’s confidence that it could ‘socialise’ China by welcoming it into regional institutions was misplaced. Asian institutions allow Beijing to make apparent concessions, such as its 2002 agreement with ASEAN to a Declaration of Conduct on the South China Sea, without actually surrendering any part of its position. As China and the United States increase the stakes in the South China Sea, ASEAN’s

is threatened. The Philippines, Vietnam, Malaysia, Singapore and Indonesia are tightening their strategic relationships with the United States, just as Cambodia, Laos and Thailand deepen their links to China. And there are signs that the disputes have become entangled in domestic politics in the Philippines and Vietnam, making their stances even more uncompromising. In Manila, following allegations that Beijing used corrupt payments to soften the former Arroyo administration’s stance on the South China Sea, the current Aquino administration and its Parliamentary opposition are vying for the most uncompromising policies on the issue. To counter rumours circulating around Hanoi that Beijing has ‘bought’ the Vietnam’s senior leadership, the Vietnamese government has passed a law claiming sovereignty over the Spratly and Paracel Islands. 3. For the United States it’s about Credibility – within limits It is in the South China Sea that Southeast Asia’s anxieties about China overlap with American anxieties about Beijing’s naval buildup. Over the past two years, the United States has taken an active interest and position in what had formerly been a dispute between China and the other claimants. This means there are now in effect two layers to this dispute: a basic stand-off between the territorial claimants; and an overarching strategic contest between Beijing and Washington. For the United States, what’s at stake in the South China Sea is the viability of its entire presence in the western Pacific. The US Navy’s access to the South China Sea is contested by Beijing. China claims it will respect the freedom of passage of ships and aircraft through the area, on the condition that they are en route to another destination, and do not conduct military exercises or collect intelligence or militarily useful data. Washington is adamant that the South China Sea’s sea lanes are international waters, and are therefore subject to freedom of navigation, which in international law allows the conduct of military exercises and the collection of intelligence and militarily useful data. If Washington surrenders its ability to navigate the South China Sea on its own terms, it will lose a major foothold in the western Pacific. The South China Sea in effect pits a Chinese expansive claim (sovereignty based on historical usage) against an American expansive claim, that freedom of navigation allows the collection of intelligence and military data. The American claim is contested in other waters by Malaysia, Indonesia and India, though supported by other regional countries. China accuses the US of ‘hyping’ the freedom of navigation question, arguing that it hides an intention to use the issue to build a coalition against China. For the Southeast Asian states contesting China’s South China Sea claims, the United States’ presence and interest in the issue is a prerequisite for their position. Washington is acutely aware that it needs to be seen as a reliable ally and partner in the Pacific. It realises that its arms-length response to the Asian Financial Crisis eroded its position in Asia and set China on its path towards building soft power in the region. For Southeast Asians worried that Washington’s attention or will to stay in the region may erode, there is virtue in keeping the South China Sea on the agenda. But Washington can’t give its allies and partners a blank cheque which allows them to confront, and even provoke, China from the comfort of the assumption that the United States will back them up. And some in Southeast Asia are watching Washington’s moves very closely, sensitive that any concession could signal its acceptance of China’s claims in the South China Sea. 4. Solutions are Part of the Problem Either multilateral mediation or international law is most often used to resolve disputes of this sort – but in the South China Sea they act to exacerbate the situation. Beijing refuses to discuss the dispute in any multilateral context, fearing that it will facilitate the formation of a front against China. The Southeast Asian claimants, however, are adamant that they must deal with China as a coalition, with Manila particularly insistent that ASEAN must negotiate a common position before negotiating with China. The result is a stand-off: the Philippines insists that ASEAN must find a common position before negotiating with China, while China will only negotiate if ASEAN abandons the search for a common position. International law also intensifies the dispute. The United Nations Convention on the Law of the Sea does not recognise China’s historical claims, and therefore cannot serve as the basis for an adjudication of the dispute. Worse, because international law relies on unbroken longevity of claims as the basis for adjudication, none of the parties to the South China Sea dispute can allow others’ claims to pass uncontested, in case this is taken as evidence of its relinquishing of its claim. The result is a steady drum beat of hydrocarbon prospecting, fishing, the occupation of islets, and maritime clashes. Policy Implications There is a great deal at stake in the South China Sea. The dynamics of this issue will impact on China’s evolving international personality, the response of its neighbours to its rising power, and the longevity of the United States’ position in the western Pacific. With the growth of trade and investment around Asia’s IndoPacific coast, the South China Sea will become ever more crowded with shipping and commerce.

#### Sun explosion causes extinction.

Mundi 07(Exit Mundi, collector of apocalyptic scenarios. 8/8, 2007 http://www.exitmundi.nl/Sunburn.htm)

In case you didn't know, the Sun is in fact a huge nuclear power plant. It runs on hydrogen. The Sun transfers hydrogen atoms into helium by nuclear fusion. It's nothing like the puny hydrogen bombs humanity finds so impressive. Each second, no less than 400 million tons of hydrogen goes boom. Unfortunately, the amount of fuel inside the Sun is limited. You can't see it, but in fact, that huge light bulb in the sky we call `Sun'  shrinks and cools down a tiny little bit every second. The Sun is `middle aged'. In another 5,000 million years, it will run out of hydrogen. Long before, we will notice the consequences. On the one hand, the Sun will get brighter and warmer. On the other hand, as the Sun shrinks and becomes less heavy, its gravitational pull on the Earth will loosen. Consequently, the orbit of our planet and all other planets in the solar system will widen. Okay, so an earthly year will be several weeks longer. But don't mistake, there's a downside here. It will get colder. And not just a little bit. Within `only' several billions of years, Earth will become an icy, permafrost planet, where it will be hard to survive. Well, we're still lucky, really. When the Sun eventually runs out of hydrogen, the nuclear reactions inside the Sun's core will stop. There will be no explosive force pushing outwards from the heart of the Sun anymore. The Sun will collapse, pressed together by its own gravity. Subsequently, temperatures inside the Sun will rise even more. And, lucky we, there will be another nuclear reaction sparking off. The Sun will start fusing helium into carbon and hydrogen this time. KABOOM! This will prevent the Sun from collapsing any further. Finally, we will have warmth again. But wait, we're in trouble. A nuclear power plant that runs on helium gives off a hell of a lot more energy and heat than one run on hydrogen. The new, immense power of the Sun's core will literally blow up the Sun. The Sun will grow, eating up several planets: first Mercury, then Venus. And next on the menu, yes, Earth.

#### Overpopulation causes extinction – SPS is key – allows us to sustain the future.

**Brown 2006** - professor of physiology at West Virginia University (Paul, Notes from a Dying Planet, p. 3-4)

The threats we face stem from overpopulation and environmental degradation. The resulting climate change and mass extinctions are leading to ecological collapse, in which the once-robust tapestry of interrelationships among living creatures, climate, and our physical environment has been weakened and is starting to unravel. Clinical indicators of our planet’s serious illness are illustrated in the graph. I’ve adjusted the vertical scales for population, carbon dioxide (CO2), methane, temperature, and extinction of species per year so they all have a common minimum and maximum.   All the minima occurred tens of thousands of years BC, and all the maxima are now.  The state of the Earth today is unique. We’re consuming the world’s resources faster than they can be restored. The world’s population is now doubling in less than fifty years. Around mid-century the world’s population is expected to level off at eight to twelve billion people. The lower number is far too high: population must start to decline before 2050 if we are to survive. The upper limit, to put it simply, will never be reached because **we would all die first.** Because of population growth and increasing consumption, concentrations of greenhouse gases such as carbon dioxide and methane in our atmosphere are the highest in human history, as are global temperatures. This is not normal climatic fluctuation, as fossil-fuel industry shills would have you believe. The rate of species extinctions is comparable to mass extinctions that have occurred only five times before, and is likely to exceed those. The total decline of species since the Industrial Revolution will soon be worse than the mass extinction caused by the asteroid impact sixty-five million years ago off the Yucatan peninsula, which wiped out 83% of species including the dinosaurs.  Before we came along, species evolved and went extinct for billions of years, creating and filling a diversity of ecological niches. Organisms used energy from the sun to grow and reproduce, recycling the materials needed for life through an interdependent worldwide ecosystem. Mechanisms existed to maintain ecological stability, ensuring that the environment didn’t change too fast for evolution to keep up. Our biosphere recovered from calamitous events like asteroid collisions, even though only a minority of species made it through some of those catastrophes. Today’s ongoing catastrophe may eliminate all but the smallest and simplest of life forms.  Our species has flourished, but without realizing it we’ve changed our environment **too fast for other species to adapt**. A system’s stability can only be eroded so far, after which it becomes unstable. We’re approaching a point where the world’s ecosystem will change too fast even for us to adapt. We will become extinct.  It’s already too late for us to return to the world as we found it or even as it was ten years ago. We’ve wiped out too many species. But we can protect the remaining fragile stability. In a word, we must seek sustainability, which means consuming resources only as fast as they’re replenished. All the trends on our graph have to be reversed, until they’re all back to pre-industrial levels or lower. This doesn’t mean returning to a pre-industrial quality of life – in fact, we should all be able to live much better once there are fewer of us. But we have to take effective action very soon, before it’s too late.