Through the Frontiers Science and Technology

Head of UN Climate panel says human role in warming 'more certain'

According to Prof Pachauri the head of the UN's climate panel who shared the 2007 Nobel peace prize for his work is more certain than ever that greenhouse gases from human activities are heating the planet. Rajendra Pachauri made the comments in an interview with BBC News.

The UN climate panel is due to deliver its latest report on the state of the climate in Stockholm, Sweden.

Its last report was criticised after an error on glaciers unveiled other flaws, but Prof Pachauri said procedures had been reformed and strengthened.

He also dismissed suggestions of a slowdown in global warming.

"There's definitely an increase in our belief that climate change is taking place and that human beings are responsible," he told me.

"I don't think there is a slowdown (in the rate of temperature increase). I would like to draw your attention to the World Meteorological Organization which clearly stated on the basis of observations that the first decade of this century has been the warmest in recorded history.

"And I think the rest will be brought out by the report itself when it's released."

Prof Pachauri's insistence that warming has not slowed hints at a focus of debate this week in Stockholm: Global temperatures have not been increasing as fast as scientists predicted, and several governments insist that this puzzle is properly addressed in the final summary.

Have computer climate models overestimated the sensitivity of the planet to increasing CO2? Or has excess heat been stored up in oceans whence it will emerge to super-heat the planet in decades to come? Or both?

Or just perhaps it could be something else.

Unprecedented change

The draft says a doubling of CO2 concentrations in the atmosphere above pre-industrial levels (expected by mid-century) is likely to result in a temperature rise globally of between 1.5 and 4.5C.

Any rise above 2C could risk major changes on Earth, according to projections, but the results of recent modelling involves a downward tweak at the bottom of the range, offering the tantalising prospect to politicians that if humans are very lucky, they could get away with rising CO2 emissions for a bit longer than previously expected.

The panel is struggling to offer a definitive answer as to why warming is not happening at the rate previously projected. But it will be anxious to ensure that the likelihood of a fortunate escape for humanity should not be overplayed.

It is expected to say that greenhouse gas emissions from human activities have already warmed the ocean, melted snow and ice, raised sea levels and increased climatic extremes.

It will also warn that unless emissions are cut soon, we are likely to suffer severe changes in the climate unprecedented for hundreds of thousands of years.

Prof Pachauri's leadership of the panel has been strongly supported by developing countries, although he has faced criticism in the West. He told me he had no plans to retire after the forthcoming report.

He said the panel enjoyed massive support, with 3,000 people volunteering to act as authors, 831 of whom were selected.

Tightening procedures

In the detailed text of its last report, the UN panel made a controversial mistake on glaciers.

Prof Pachauri said: "We made one mistake about the glaciers melting by 2035 - for which we have apologised. That was totally out of character because we always give a range for these things and it somehow slipped through.

"But it wasn't included in the technical summary or the summary for policymakers, it just somehow escaped attention.

"What we did say about the glaciers was in substance not all that wrong – the glaciers are melting across the globe so that is something we stand by.

"This time we have been doubly careful... [that] we don't have any mistake of that type. And I hope that [the report] will reassure everyone that human influence is having a major impact on the Earth's climate."

Prof Pachauri said he anticipated attempts to discredit the panel. But he claimed evidence of extreme events was persuading more and more people, especially in the US, that humans were taking a risk with the climate.

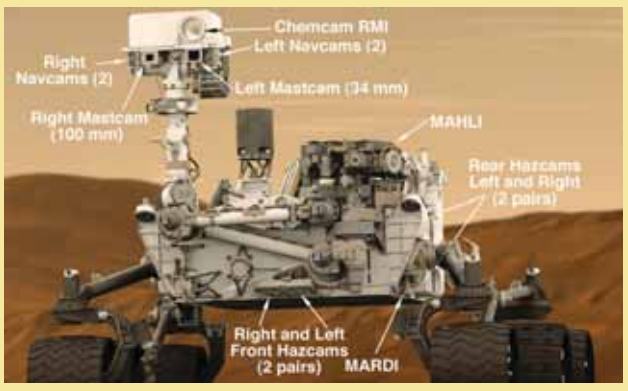
Indeed, the report is expected to say it is very likely that manmade climate change has produced higher precipitation in America.

"Hopefully," he said, "there are enough sane and sensible people in the public who will ultimately prevail."

The broader question is whether science itself will prevail over politics. Whatever the pronouncements of the UN panel, emissions are expected to continue to increase into the foreseeable future as politicians weigh risks to energy bills and competitiveness against risks to the planet.

The UN Secretary-General Ban Ki-moon has re-confirmed that he will invite world leaders to a climate summit next year in an attempt to galvanise action.

NASA Curiosity rover finds evidence of water on Mars



The dean of science at the Rensselaer Polytechnic Institute, New York, Curiosity researcher Laurie Leshin and colleagues reported in the Science Magazine that Mars' dusty red covering holds about 2% by weight of water.

Curiosity collected a sample some of the wind-blown sand and dust at a location called Rocknest, and on analysis found that there is a surprising amount of water bound up in the soil of Mars. When it heated a small pinch of dirt scooped up from the ground, the most abundant vapour detected was H2O.

Acoording to them, this could be a useful resource for future astronauts.

"If you think about a cubic foot of this dirt and you just heat it a little bit - a few hundred degrees - you'll actually get off about two pints of water - like two water bottles you'd take to the gym," Dr Leshin explained.

"And this dirt on Mars is interesting because it seems to be about the same everywhere you go. If you are a human explorer, this is really good news because you can quite easily extract water from almost anywhere."

The revelation about the amount of water chemically bound into the fine-grained particles of the soil is just one nugget of information to come from a series of five papers in the respected journal describing the early exploits of the rover.

Some of this data has been reported previously at science meetings and in Nasa press conferences, but the formal write-up gives an opportunity for the wider research community to examine the detail.

Dr Leshin's and colleagues' publication concerns a sample analysis done at "Rocknest", a pile of wind-blown sand and silt about 400m from where Curiosity touched down on the floor of Gale Crater in August 2012.

The robot used its tools to pick up, sieve and deliver a smidgeon of this Martian dirt to the Sam instrument hidden away inside the belly of the vehicle. Sam has the ability to cook samples and to identify any gases that are released. These products are diagnostic of the different components that make up the soil.

So, for example, Curiosity saw a significant proportion of carbon dioxide - the likely consequence of carbonate minerals being present in the sample. Carbonates form in the presence of water.

And it saw oxygen and chlorine - a signal many had expected to see following similar studies in Mars' "High Arctic" by Nasa's Phoenix lander in 2008.

"[We think these] are break-down products from a mineral called perchlorate, and that's there at about a half-a-percent in the soil," said Dr Leshin.

"If the water was the good news for the astronauts, this is the bad news. Perchlorate actually interferes with thyroid function, so it could be a problem if humans were to ingest some of the fine dust on Mars. It's just something we need to know about now so we can plan for it later."

BBC science reported that three of the other Curiosity papers in the Science Magazine release also concern themselves with the nature of the Martian soil.

The fifth is a report that describes a pyramid-shaped rock found in the vehicle's path. This striking block was dubbed Jake Matijevic, in honour of a recently deceased Nasa engineer.

The team led by Prof Ed Stolper from Caltech, Pasadena, can now confirm that Jake_M is a rock not seen before on the Red Planet.

It is most like a mugearite, says the group - a type of rock found on islands and rift zones on Earth.

"On Earth, we have a pretty good idea how mugearites and rocks like them are formed," said co-worker Prof Martin Fisk from Oregon State University, Corvallis.

"It starts with magma deep within the Earth that crystallises in the presence of 1-2% water.

"The crystals settle out of the magma and what doesn't crystallise is the mugearite magma, which can eventually make its way to the surface as a volcanic eruption."

Mugearite was first identified on Earth by British petrographer/petrologist Alfred Harker. The name references a local croft, Mugeary, on the Isle of Skye, just off the Scottish mainland.

The Curiosity rover is currently engaged in some hard driving in Gale Crater. Since early July, it has been rolling tens of metres a day.

The robot is trying to reach the foothills of the large mountain that dominates the centre of the deep, equatorial impact bowl.

Based on reports from Journals Natiure, Scientific American and BBC

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