Shooting asteroids

(September 2022)

A teeny tiny man-made probe hit yesterday a tiny asteroid some 11 million kilometers from here, at the cost of $330 million nonetheless.

Mankind having such a high opinion of itself, the event is loudly saluted as being of immense significance.

However, when you do some calculation you find that while the kinetic energy of the asteroid was some 600 million tons of TNT-equivalent before impact (10% of our total nuclear arsenal), the kinetic energy of the probe that hit it was, at the time of impact, less than 3 tons of TNT-equivalent, or an infinitesimally small one part in 200,000,000 (one part in 200 million).

The effect is quite likely to be close to zilch, although those whose salary is at stake will certainly rationalize that the effect is humongously significant for Mankind at Large.

For the sake of perspective, the meteorite that crashed on the Yucatan Peninsula some 65 million years ago (and resulted in the end of the Mesozoic era) had a kinetic energy 200,000 times that of the asteroid that was hit yesterday, and 40,000,000,000,000 (40 trillion, or 40 million millions) times that of the probe.

Should we be impressed by the feat, or by its expensive absolute uselessness (except for those who play with it)? No amount of scaling up is likely to achieve anything, except further deplete what is left of our bank accounts.

The seven Apollo missions to the moon more than half a century ago were also totally useless, but at least they were an exhilarating pure form of art. However, as much as I admire unreservedly the technical and organizational feat, especially 50 years later, it was in fact One Small Step for a Man indeed, and also proved to be One Midget Leap for Mankind.

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PS: for information, the median annual salary of NASA aerospace engineers is $175,000

A few more comments:

It's a matter of proportion, as always.

The heaviest load to ever barely escape earth's gravitation was that launched by Saturn V in 1969, at 43.5 metric tons. The new NASA launcher, SLS, which they're having difficulties testing, will have a maximum capacity of 46 tons. Should we be impressed by the technological improvement over 53 years, especially when considering that the SLS will not be operational for several years yet? Elon Musk has a 100 ton project, but it's only a project.

However, the 43.5 ton payload included fuel, so the actual load to travel to moon was in fact more like 25 tons. That's 40 times as large as the one that reached the asteroid.

So, if you managed to launch a 25 ton bullet to an asteroid the size of the big Yucatan one, the ratio of kinetic energies would still be 1,000,000,000,000 (one trillion), unlikely to achieve much, if anything, especially when considering the large margins of error to be expected.

Calculation is one very important issue, but it rests on another, certainly more important, which is the precise determination of the distance and speed of the asteroid. That's a very delicate task which requires several months, typically at least 6, for any accuracy.

Also, the big asteroid of Yucatan is thought to have had a maximum dimension of about 12 km. Given the optical limitations of even the best telescopes, it means it could not be seen as a mere pixel until its distance to Earth is 24 million kilometers, or 1/6 of the distance of Earth to the sun. That's quite close but sending a space craft to such a distance would probably take several months. It took the asteroid bullet of yesterday 10 months to reach half the distance.

Meanwhile, however, it would have taken the Yucatan-type asteroid about two weeks to reach us from the initial point of detection, depending on the position of Earth along its orbit at the time of detection. Barely the time for us to prepare for our Savior, let alone organize any counter-offensive.

That big Yucatan asteroid came from a very large distance. The asteroid of yesterday orbits the sun at a relatively short distance and tangents the orbit of Earth, at a probable distance of about 2 million kilometers only. It was discovered in 1996 when perchance it happened to cruise close to Earth. Such would not be the case for a Yucatan-type asteroid.

We understand the nature of commercial publicity, which brags in the utter bad faith about the relative virtues of a product. Although we fall prey for it, we know we should

exercise caution and not believe in it too much. Why on Earth should we believe blindfolded the self-promotional discourse of politicians and governmental agencies?

The Apollo adventure, which we remember dearly as the major fun it was, was probably utterly useless (otherwise we would have gone back in the past 50 years). We know that the real reason for the costly endeavor was to beat the Russkies at it. If they had not shown an interest we would have spent the money elsewhere. We are now talking of returning to the moon, but most probably only because the Chinaman and the Russky are currently at it.

However, this does not provide much transcendental importance to the delusional efforts, no matter the degree of rationalization, although NASA people will resort to the most outrageous publicity to keep their $175,000 jobs. In that they are well served by the contention that they understand the subject while the common man doesn't. Incidentally, isn't it the argument used by every profession? Physicians, politicians, lawyers, for example?

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PS: the humongous Category 4 hurricane announced in the Gulf of Mexico is in fact a mere Category 1, and the first to enter the Gulf of Mexico 4 months into this hurricane season, which does not put any brake on the most hyperbolic reports and predictions.