

Preventing Asteroid Hit with HAMMER

Why in news?

\n\n

US scientists have conceptualised the HAMMER to deal with asteroids heading for earth.

\n\n

What is the need?

\n\n

∖n

- Few years back, Stephen Hawking warned of one of the major threats to intelligent life in the universe. \n
- It is the high probability of an asteroid colliding with inhabited planets. n
- If these bodies impact Earth, they can cause regional damage across a whole country or even a continent.

\n

\n\n



\n\n

\n

- In response, scientists are looking at possible ways to ward off the threat, if and when it comes.
 - ∖n
- The chance of an impact appears slim now, but the consequences would be dire.

∖n

- The studies thus aim to help shorten the response timeline when the threat is evident, so as to have more options to deflect it. \n

\n\n

What are the possible ways of dealing with it?

\n\n

\n

- Scientists are looking at two possible ways to ward off the threat. \n
- One is to "nudge" the asteroid off its Earthbound course. $\slash n$
- The idea is to give a small push that is needed to change the asteroid's course and save the planet. \n

n The

• The second one is the nuclear option.

\n

- The idea is to blow the asteroid into pieces, most of which will miss the Earth or burn up in the atmosphere. γ_n
- Two new studies have sought to assess the practicability of the two approaches and choosing the better between the two. \n

\n\n

What is the HAMMER?

\n\n

∖n

- Mission HAMMER is the short for Hypervelocity Asteroid Mitigation Mission for Emergency Response vehicle. \n
- HAMMER is a spacecraft designed to serve as either a kinetic impactor or as a transport vehicle for a nuclear device. \n
- It can deflect an asteroid by nudging i.e. a device (a battering ram) is used to apply force to cause deflection. \n
- The US team evaluated how effective HAMMER would be in nudging away the asteroid Bennu.

\n

\n\n



\n\n

\n

- **Bennu** Bennu is a 500 m wide and 79 billion kg asteroid.
- It has a 1-in-2,700 chance of striking the Earth on September 25, 2135. $\ngreen n$
- If it does, the energy released would be equivalent to 1,200 megatonnes or 80,000 times the energy of the Hiroshima bomb. \n
- Launches Delta IV Heavy rocket is the world's second highest-capacity launch vehicle.
 - \n
- If launched from the Delta IV Heavy rocket 10 years before the impact, HAMMER would take between 34 and 53 launches of the rocket. \n
- Each of the launches would carry a single HAMMER impactor, to make a Bennu-class asteroid miss Earth.
 - ∖n
- If launched 25 years in advance, it would still need 7 to 11 launches. $\slash n$
- The spacecraft, on the other hand, can carry a nuclear device to the object, to cause detonation to deflect the object. $$\n$

\n\n

Why is the nuclear option more viable?

\n\n

\n

- Nudging an asteroid is the preferred option, because blasting it entails the risk of fragments crashing into Earth. \n
- If the object were smaller (say 100 m) or the time to impact were greater (say 100 years), a kinetic impactor may provide a better result. \n
- But using a single HAMMER spacecraft as a battering ram would prove inadequate for deflecting an object like Bennu. \n
- The spacecraft capabilities make the nuclear option more viable against a large asteroid within a limited response time. \n
- The nuclear option is also the only viable option for launches 10-25 years before impact.

\n

\n\n

What is the Russian research on this?

\n\n

∖n

• Russian scientists, have made toy asteroids, and blasted them with a laser pulse.

∖n

- They then estimated the size of the nuclear explosion that would be required to blow up an actual asteroid. $\$
- Notably, to eliminate a rocky asteroid 200 m wide, the bomb needs to deliver the energy equivalent of 3 megatonnes of TNT (trinitrotoluene, an explosive chemical compound).
 - ∖n
- This is 200 times the TNT equivalent of Little Boy (15 kilotonnes), the atomic bomb that exploded in Hiroshima in 1945. $\nprotect{\scale}$

\n\n

\n\n

Source: Indian Express, The Hindu

∖n

