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Vital Next Steps in Global Response to the Asteroid Threat

Asteroid impacts—an ongoing cosmic and geological process—have dramatically altered the course of life on Earth. A rogue asteroid will certainly strike Earth in the future, and such impacts pose a global threat to human life and society. Search efforts to date have discovered scarcely 1% of potentially hazardous near-Earth objects (NEOs). Current telescopes were unable to warn us of the Feb. 2013 Chelyabinsk impact, which released 440 kilotons of explosive energy and injured more than a thousand people.

Because near-Earth asteroid searches have focused almost exclusively on large objects with global destructive potential, 99% of the objects big enough to level a major metropolitan area remain undiscovered. As technology improves and hundreds of thousands of new asteroids are found, the global community will likely be confronted by one posing a worryingly high probability of striking Earth.

To prevent such a destructive impact, we must act together.

The United Nations did so in December 2013, with the General Assembly approving concrete measures to help prevent asteroid disasters. This promising milestone stems from discussions held over the past dozen years, hosted by the UN Committee on the Peaceful Uses of Outer Space (COPUOS) and its Action Team 14 (AT-14), comprised of scientific and space agency delegates from interested states and non-governmental organizations.

In 2007, the Association of Space Explorers (ASE), an official observer at the COPUOS, convened its expert Panel on Asteroid Threat Mitigation to study how the global community should respond to threatening asteroids. ASE's panel, with support from another COPUOS observer, the Secure World Foundation, finished its work in 2008 and submitted it to the UN. The ASE report, *Asteroid Threats: A Call for Global Response* (1), proposed an effective decision-making process with three specific functions aimed at NEO impact prevention.

ASE recommended that the UN support asteroid warning and information sharing, mission operations planning, and authorization and oversight functions. During the last five years, the UN COPUOS Scientific and Technical Subcommittee, its NEO Working Group, and AT-14 discussed and refined these proposals. The resulting 2013 COPUOS report (6) includes specific language authorizing and endorsing two of these functions, and the General Assembly approved this via resolution on December 11, 2013 (7).

First, several space agencies have agreed to move forward on creation of an International Asteroid Warning Network, sharing information on hazardous asteroid detections and impact



predictions. Timely impact warnings will originate here, along with dissemination of information on the physical consequences of an NEO impact. Second, space agencies have agreed to discuss in 2014 the formation of a Space Missions Planning Advisory group to undertake joint studies of NEO deflection mission options, mission costs, and needed technologies. Still to be resolved is how the global community will consider and authorize any necessary NEO deflection campaigns.

These steps not only begin to address the physical threat posed by hazardous asteroids, but also promote cooperative actions and planning to avoid critical delays in response to an impact threat. The ASE NEO Committee commends these significant actions by the international community and leading national space agencies. To maintain this momentum, ASE believes the global community should now take further significant steps to prevent a future impact:

1. The UN delegations should brief their respective national policy makers on the asteroid hazard and the General Assembly actions taken to prevent a NEO impact.
2. All national policy makers (not just those of the space-faring nations) should specifically address impact hazards in their disaster response plans and budgets.
3. To create clear accountability, national governments should explicitly assign lead responsibility for asteroid hazard response to their space or disaster response agency, as appropriate.
4. To find the approximately one million NEOs capable of threatening Earth, policy makers should commit the modest funds necessary to support the launch by 2020 of a space-based search telescope.
5. Anticipating these search results, policy makers should direct their space agencies to launch within ten years an international deflection demonstration, to alter the path of a small near-Earth asteroid.

We all share the dangers of asteroid impact, and thus must share responsibility for protecting our home planet. Policy makers, having seen at Chelyabinsk the damage potential of NEO impacts, should now direct the necessary resources to find those hazardous objects that threaten Earth.

Governments must also direct the cooperation and resources required to accomplish an international deflection demonstration mission a decade from now. The target should be a ~100-meter asteroid in a safe solar orbit, with the goal of altering its velocity enough to simulate a successful deflection from Earth collision. The demonstration will be a useful example of collaboration and cost-sharing in advance of a true threat.

To sum up, Earth has endured asteroid impacts for billions of years. They are a significant, long-term threat to our civilization. Our society now possesses the knowledge and resources necessary



to prevent them. With last year's action by the UN General Assembly, our society has acknowledged the asteroid hazard and taken positive steps toward ensuring our species' survival.

However, *knowing* what we must do is only a first step. To prevent a future disaster, we must actually take action—in space. The Association of Space Explorers commends this initial progress, and urges the global community to accelerate and broaden our efforts to create the practical, tested means needed to head off these most devastating of natural disasters.

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