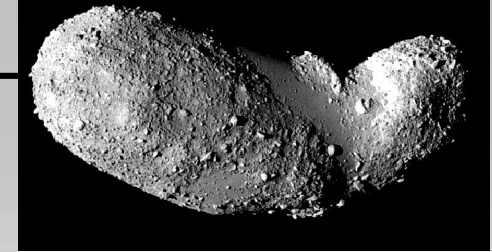




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*“The [IAF] encourages the advancement of knowledge about space and the development and application of space assets for the benefit of humanity. It plays an important role in disseminating information, and in providing a significant worldwide network of experts in the development and utilisation of space.”*

## **Assessment of the Proposal**

***Asteroid Threats: A Call for Global Response***

**by the Association of Space Explorers Panel on Asteroid Threat Mitigation**

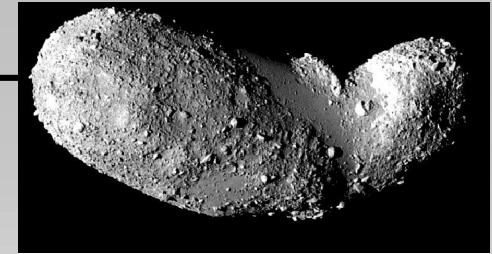
**Alan Harris**

**German Aerospace Center (DLR) Institute of Planetary Research, Berlin, Germany,  
on behalf of the IAF Technical Committee on Near-Earth Objects**



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## The IAF Technical Committee on NEOs

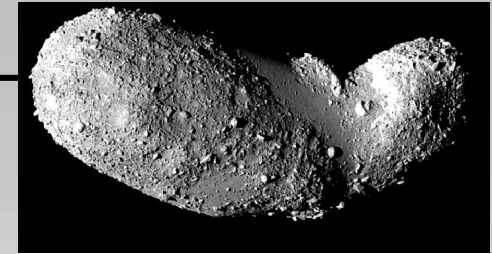
**Established in 2008. Primary aims:**

- *To encourage, monitor and assess (i) progress in our understanding of the near-Earth object (NEO) population and the associated impact hazard and (ii) the innovative application of space technology for the purposes of NEO reconnaissance and mitigation.*
- *To exchange information on current and prospective activities, which aim to understand the NEO environment and apply space technology for monitoring and mitigation.*
- *To provide a point of contact, in particular for national and international bodies and the press, for authoritative information and advice on the NEO impact hazard and mitigation possibilities.*



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## The IAF Technical Committee on NEOs

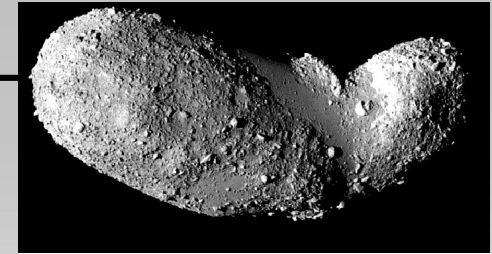
### Membership:

- **V. Adimurthy** Indian Space Research Organisation, Trivandrum, India
- **William Ailor** The Aerospace Corporation, El Segundo, CA, USA
- **Erik Asphaug** Dept. of Earth and Planetary Sciences, Univ. of California, Santa Cruz, USA
- **Clark Chapman** Southwest Research Inst., Boulder, CO, USA
- **Alan Fitzsimmons** Astrophysics Research Centre, Queen's University Belfast, UK
- **Alan Harris (Chair)** German Aerospace Center (DLR) Institute of Planetary Research, Berlin, Germany
- **Patrick Michel** CNRS, Observatoire de la Côte d'Azur, Université de Nice-Sophia Antipolis, France
- **Harold Reitsema** Ball Aerospace, Boulder, CO, USA
- **S. Pete Worden** Center Director, NASA Ames Research Center, Moffett Field, CA, USA
- **Makoto Yoshikawa** Japan Aerospace Exploration Agency, Sagamihara, Japan
- **Changyin Zhao** Purple Mountain Observatory, Nanjing, China



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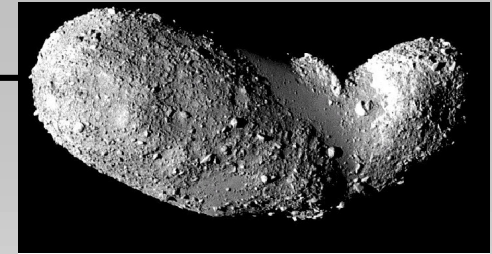
## Extracts from the IAF NEOTC Position Statement on the impact threat

- The risk of a serious impact in any one year is very small but it is a scientifically established fact that such impacts have occurred in the past and will occur in the future.
- Conceptual studies of mitigation missions have already been performed, but as yet no such mission has been tested in space. We view the development and execution of a mitigation test-mission as a prudent and top-priority goal for the near future, which should be carried out with international participation.
- One of the most urgent needs for threat mitigation is a fully funded international program to discover, characterize, and track near-Earth objects.
- All nations share the risk. Individual nations, no matter how economically and technically advanced, cannot assume proxy on behalf of the international community for the many associated technical and societal challenges. To address the issue and its many facets satisfactorily, the attention and compliance of many of the world's governments will be essential.



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## IAF NEOTC responses to the major points of the ASE Proposal

*“Near Earth Object impacts represent a global, long-term threat to our collective welfare. It is recommended that international preparations, under the umbrella of the United Nations, are the only way our society can identify a specific impact threat and decide on effective prevention or disaster response measures.”*

The TC agrees that the threat is global and therefore preparations must involve the international community.

*“These preparations should include:*

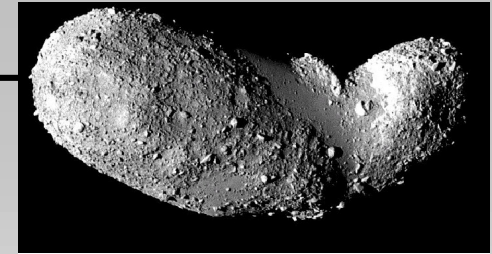
*1. An Information, Analysis, and Warning Network. This network would operate a global system of ground- and/or space-based telescopes to detect and track potentially hazardous NEOs.”*

The TC is convinced that an efficient international search program with adequate and secure funding is a vital prerequisite. Major questions are how funding for the observatories and associated NEO data centre(s) (e.g. the MPC) can be secured long term, and how a UN body should “operate” such a program, elements of which already exist within national organizations. (continued...)



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## IAF NEOTC responses (2)

The TC sees advantages in maintaining two or more independent analysis centres as sources of information pertaining to NEO alerts and warnings (e.g. JPL/Sentry; NEODyS). Each provides an important check on the results of the other(s).

Physical characterization of NEOs (mineralogy, porosity, internal structure, etc.) is also crucial for planning purposes and must be supported in addition to discovery and tracking.

*“2. A Mission Planning and Operations “Group,” drawing on the expertise of the spacefaring nations, and mandated to outline the most likely options for NEO deflection missions.”*

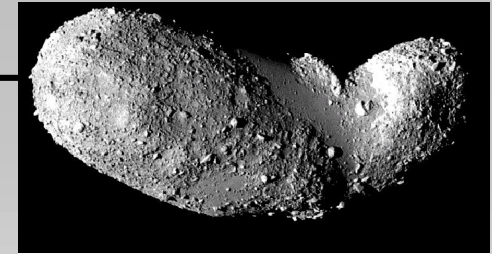
In order to rank deflection options the TC views the development and execution of mitigation test-missions as a top-priority goal. Our current state of knowledge is an inadequate basis on which to decide the relative effectiveness of different mitigation strategies. Initial emphasis of the group should be on identifying and encouraging useful experimental mitigation missions, examples of which have already been studied, but not executed, by agencies such as NASA and ESA.

While the Deep Impact Mission demonstrated some elements of kinetic deflection, the TC points out that the deflection is not measurable due to the effects of cometary outgassing. A true demonstration of kinetic deflection remains to be done.



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## IAF NEOTC responses (3)

***“3. An intergovernmental Mission Authorization and Oversight “Group.” This group would, under the auspices of the UN, develop the policies and guidelines that represent the international will to respond to the global impact hazard.”***

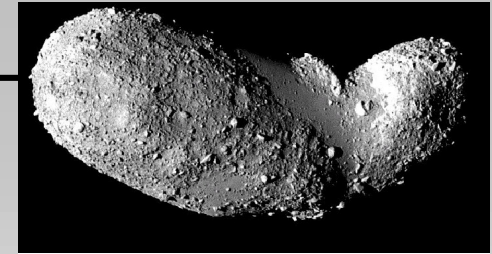
**The TC strongly endorses the ASE proposal to establish a UN body to develop a funding policy for authorized NEO activities, and policies to guide the international community’s response to an impact threat.**

**A measure of the international will to respond to the global impact hazard is the preparedness of the international community to provide long-term stable funding for the activities proposed. The TC views the question of funding as paramount and would welcome any UN initiative to secure adequate funding.**



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## IAF NEOTC general comments

The IAF NEO Technical Committee strongly supports the general recommendations presented in “Asteroid Threats: A Call for Global Response” relating to the need for international discussion and action in assessing and mitigating NEO threats.

Concerning details of the technical and legal discussions, the TC views the ASE proposal as a useful introduction to the issues involved (e.g. keyholes, mitigation strategies, legal concerns) but sees a need for further research and discussion on a number of details presented by the ASE. Unanimity amongst experts regarding preferences for different mitigation strategies has not yet been reached.

Since the intervals between perceived impact threats are very long, the UN bodies proposed by the ASE (especially the MPOG and MAOG) must have long-term functions to maintain activity during “normal” times.