Asteroid Threats: A Call for Global Response

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Chairman, ASE-NEO Committee
A Decision Program re NEO threats, submitted to the UN by the ASE and its international Panel on Asteroid Threat Mitigation

Presented to STSC in February 09 and being coordinated within COPUOS by Action Team-14
Association of Space Explorers

Members of the ASE Committee on Near Earth Objects
Rusty Schweickart, Chair
Sergei Avdeev (Russia)
Chris Hadfield (Canada)
Thomas Jones (USA)
Edward Lu (USA)
Dumitru Prunariu (Romania)
Viktor Savinykh (Russia)
Franklin Chang-Diaz (USA/Costa Rica)

Members of the Panel on Asteroid Threat Mitigation
Adigun Ade Abiodun, Nigeria
Vallampadugai Arunachalam, India
Roger-Maurice Bonnet, Switzerland
Sergio Camacho-Lara, Mexico
James George, Canada
Tomifumi Godai, Japan
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Sergey Kapitza, Russia
Paul Kovacs, Canada
Walther Lichem, Austria
Gordon McBean, Canada
Lord Martin Rees, United Kingdom
Karlene Roberts, United States
Michael Simpson, United States
Sir Crispin Tickell, United Kingdom
Richard Tremayne-Smith, United Kingdom
Frans von der Dunk, Netherlands
James Zimmerman, United States
Four International Workshops were held over two years:
- April 07, France
- September 07, Romania
- April 08, Costa Rica
- September 08, San Francisco
Association of Space Explorers
Key Recommendations
Defined functional responsibilities
Apophis Close Pass
13 April 2029
Association of Space Explorers

Apophis Risk Corridor

2036
Risk Corridor; Apophis – 2036
Probability ~ 1:45,000
Asteroid 2009 KK
Size = 270 meters
Vimpact = 19.14 km/sec
Impact energy = 1100MT
Potential impact date = 29 May 2022
### 2009 KK

**Earth Impact Table**

These results were computed on May 22, 2009

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<tr>
<th>Date</th>
<th>Distance (r_Earth)</th>
<th>Width (r_Earth)</th>
<th>Sigma Impact</th>
<th>Sigma LOV</th>
<th>Stretch LOV</th>
<th>Impact Probability</th>
<th>Impact Energy</th>
<th>Palermo Scale</th>
<th>Torino Scale</th>
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<tbody>
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<td>2022-05-29.76</td>
<td>0.59</td>
<td>1.67e-02</td>
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Today IP = 1 in 10,000

These results were computed on Jun 03, 2009

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These results were computed on May 27, 2009

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Impact Probability

- 1 in 34,000
- 1 in 31,000
- 1 in 32,000
- 1 in 22,000
- 1 in 27,000
- 1 in 28,000

Impact Probability

- 1 in 10,000

1 in 10,000
Association of Space Explorers

$\Delta v$ plot: NEO 2004 MN4

Along track positive $\Delta v$: thick line
Along track negative $\Delta v$: thin line

Impact date: 2036 Apr. 13, 08:51:40 UT

10 x Kinetic Impactor
1 metric ton @ 5 km/sec
1 x

1 year

Gravity Tractor
1 metric ton
1 day

Epoch of interception (yr)

$\log \Delta v \ (m/s)$

Log Total Impulse (ns)

12.2 days @ 0.04 N
= 42,160 NS
It is too early to speculate on the outcome of this process. The recommendations, taken at face value, are precedent setting, calling for the establishment of a standing international decision-making process designed to yield timely decisions in the face of a global threat for which action must be taken a decade or more in advance of a potential disaster. Moreover a decision to act to prevent a disaster will necessarily involve the temporary shifting of risk between nations in the process of eliminating the risk to all. Whether or not the international community, within or outside the United Nations, can rise to the demands of such a challenge in advance of an impact …, is problematic. Nevertheless through the considered work of the ASE and its international Panel on Asteroid Threat Mitigation (and AT-14) the issues and related recommendations to protect the Earth from NEO impacts are now placed squarely on the member states of the United Nations Committee for the Peaceful Uses of Outer Space.
Q&A

ASE report available online @
http://www.space-explorers.org/ATACGR.pdf