

Action Team 14: Near Earth Objects

**Interim Report
22 February 2007**



COMET

or

ASTEROID

with orbit within 0.3 AU of Earth

1 AU = 150,000,000 km

Potentially Hazardous if within 0.05 AU (7,500,000 km) and size > 150m

ToRs from UNISPACE III

- Review the content, structure and organization of ongoing efforts in the field of NEOs;
- Identify any gaps in the ongoing work where additional coordination is required and/or where other countries or organizations could make contributions;
- Propose steps for the improvement of international coordination in collaboration with specialized bodies

Members of Action Team 14

- Countries:
 - Australia, Brazil, China, Czech Republic, Finland, Germany, Iran, Japan, Kazakhstan, Lebanon, Malaysia, Nigeria, Pakistan, Poland, Russian Federation, Saudi Arabia, Syrian Arab Republic, United Kingdom, United States of America
- Organisations:
 - Association of Space Explorers (ASE), European Space Agency (ESA), Committee of Space Research (COSPAR), International Astronomical Union (IAU), National Space Society, Space Generation Advisory Council, European Space Science Committee, European Science Foundation, SpaceGuard Foundation

Work Plan 2006/7

- Reports to be received from Member States and international organizations on their NEO activities, including missions, search and follow-up
- The Action Team will consider the way forward and specifically the possible need for further activity to be carried out nationally, regionally or through international cooperation
- The Action Team will update the work programme for the third year as necessary and consider the need for inter-sessional work

AT14 Report 2006/7

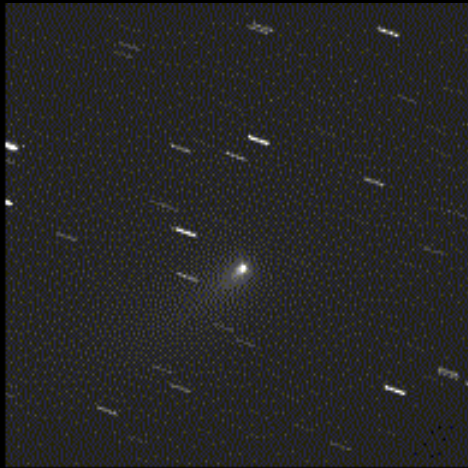
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12 December 2006

NEO AT 14 Report Structure

- NEO Detection and Remote Characterisation
- Orbit Determination and Cataloguing
- Consequence Determination
- In-situ Characterisation
- Mitigation
- Policy

NEO Detection and Remote Characterisation



NEAR target asteroid 433 Eros
3 1/2 hours motion through the
stars of Hydra on 1998 Jan 28
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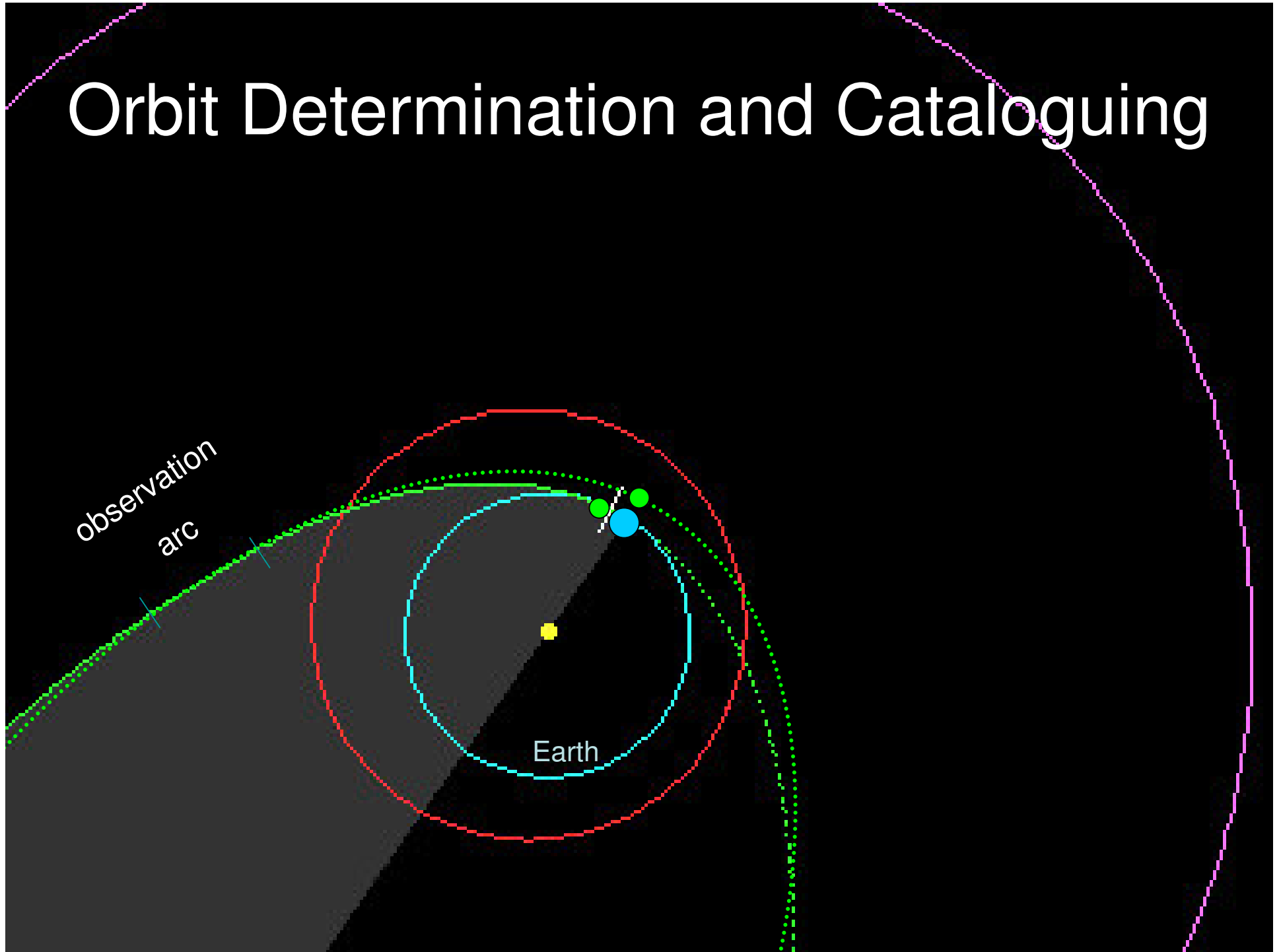
NEO Detection and Remote Characterisation

- USA makes major contribution to NEO detection and remote characterisation:
 - Spacewatch
 - Near-Earth Asteroid Tracker (NEAT)
 - Lincoln Near-Earth Asteroid Research (LINEAR)
 - Lowell Observatory Near-Earth Object Search (LONEOS)
 - Catalina Sky Survey
 - 2 planetary radars (Goldstone, Arecibo)
- Other contributions include:
 - German Aerospace Centre (DLR), the Queens University (Belfast), the University of Helsinki, the Turin Astronomical Observatory, the Calar Alto Observatory, the Universities of Oslo, Helsinki, Copenhagen & Uppsala, the Bisei Spaceguard Center, Korea Astronomy and Space Science Institute (KASI) and Yonsei University Observatory (YOU), Pulkovo Observatory, Ondrejov Observatory, Siding Springs (Australia)
- Action Team recognised that significant efforts were being addressed internationally to detection and, to a lesser degree, follow-up observations of potentially hazardous NEOs but noted that objects in the 100m to 1km size range, for which the current surveys are not optimized, also pose a significant impact threat

Orbit Determination and Cataloguing

observation
arc

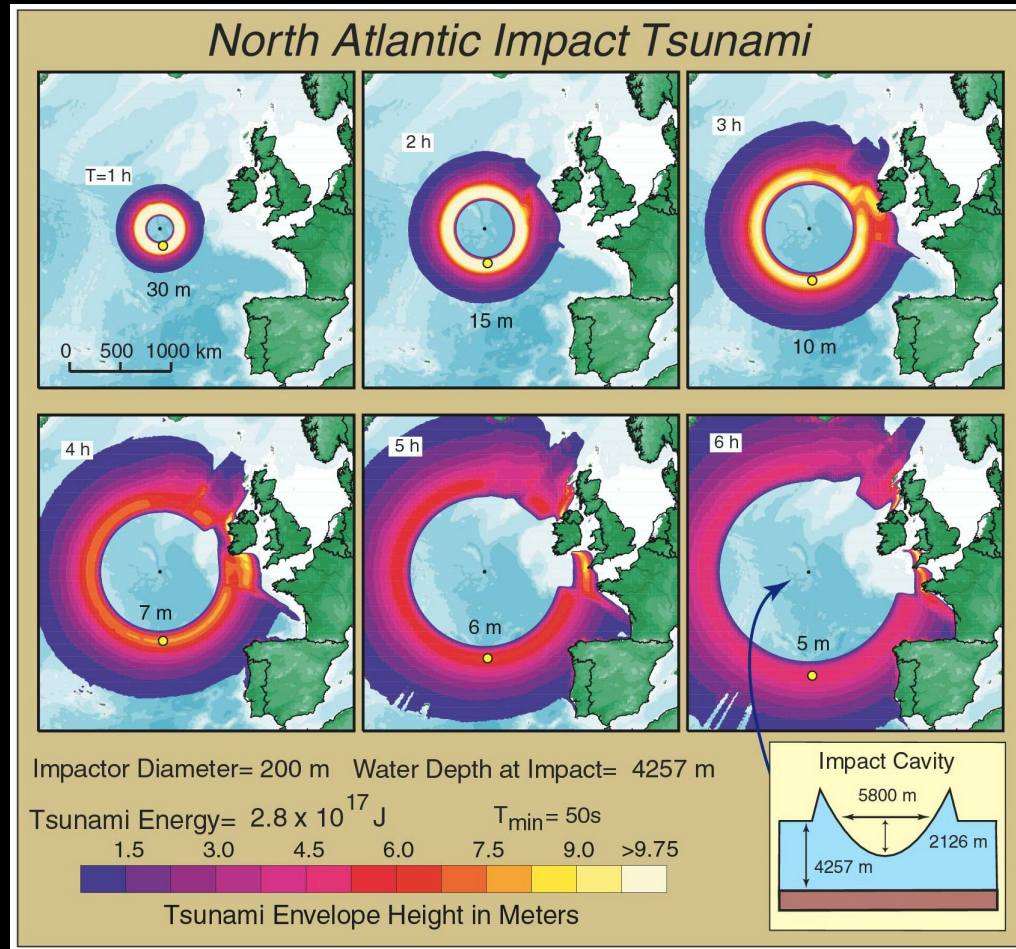
Earth



Orbit Determination and Cataloguing

- The Minor Planet Center (MPC) in USA processes and organizes data, identifies objects, computes orbits, assigns tentative names and disseminates information on a daily basis. For objects of special interest, the center solicits follow-up observations and requests archival data searches by professional and amateur astronomers
- Based on inputs from MPC, NASA JPL SENTRY & HORIZON systems, and University of Pisa NEODYS perform high precision orbit and impact probability determinations
- The Action Team recognises the critical role of the MPC - system is already working at capacity and it is not clear that the current system can cope with the anticipated significant increase in tasking

Consequence Determination & Risk Analysis



Consequence Determination & Risk Analysis

- AT recognised the importance of work conducted by NASA JPL in this field over many years
- Emerging capability in Czech Republic, Germany and UK
- Need to engage with global risk community
- Important to address societal impacts in developing a science-based policy response
- Need to communicate issues and present case for approach and action

In-situ Characterisation

NEAR target asteroid 433 Eros
3 1/2 hours motion through the
stars of Hydra on 1998 Jan 28
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In-situ Characterisation

- AT recognised importance of Hayabusa following other successful in-situ missions providing unique insight into NEO characteristics :
 - Deep Impact, Deep Space 1, Near Earth Asteroid Rendezvous (NEAR) and Stardust
- AT welcomed the news that NASA is evaluating:
 - Deep Impact eXtension Investigation (DIXI) to study comet Boethin
 - Stardust Next to fly the Stardust spacecraft closely past comet Tempel 1
 - OSIRIS to return a surface sample from primitive near-Earth asteroid

Mitigation

- ESA currently evaluating Phase A studies for Don Quixote mitigation precursor mission
- AT 14 recognised that only one mitigation mission is being actively considered
- AT14 encourages ESA to continue with development of the concept
- AT14 also looks forward to the analyses to assess alternative deflection scenarios that will be addressed in NASA's imminent report to Congress
- AIAA Planetary Defense Conference, Washington, March 5-8, 2007
 - www.aero.org/conferences/planetarydefense/

Policy

- AT 14 recognises that the impact threat posed by NEOs is real, although it is a low probability event, but catastrophic when it occurs
- AT 14 recognises that the impact effects from such objects are indiscriminate and the ubiquity and scale of their effect is such that the NEO hazard should be considered a global issue
- AT 14 knows of no member states with national NEO strategies and as such recognises that the United Nations has an important role to play in informing the process of policy development that would benefit all nations
- ASE aims to facilitate this process by convening a series of workshops to prepare a draft NEO deflection protocol for consideration by COPUOS during its 2009 session

Work Plan

- 2008
 - Continue inter-sessional work & consider reports submitted in response to annual request for information on NEO activities. For 2008 presentations to focus on national, regional, and internationally collaborative activity for observation and analysis of NEOs
 - Review and update Interim Report
- 2009
 - Continue annual reporting on NEO activities and inter-sessional work in preparation for the 2009 theme which will include an update on NEO missions and draft procedures related to threat handling at the international level
 - Review and update Interim Report
- 2010
 - Continue with drafting (or agree) international procedures for threat handling and review progress with international cooperation and collaboration on observations
 - Review and update Interim Report