

## WORKING GROUP ON NEAR EARTH OBJECTS

(*GROUPE DE TRAVAIL POUR LES OBJETS PROCHES DE LA TERRE*)

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This Working Group is sponsored jointly by Division I and Division III. The charge of the WG includes (1) Liaison with SpaceGuard Foundation; (2) Advise on coordination of NEO activities worldwide; (3) Advise on reporting of NEO hazards; (4) Advise on research relevant to NEOs. The WG also maintains a standing review committee to provide a voluntary technical peer review of predicted close approaches of NEOs, where such predictions include estimates of the possibility of collision with the Earth. The IAU also provides partial sponsorship of the Minor Planet Center in Cambridge MA, with orbital and other information on all known NEOs available at <http://cfa-www.harvard.edu/iau/mpc.html>.

During this triennium, the WGNEO met at the IAU General Assembly in Manchester and held one additional formal meeting in Palermo, Italy, in conjunction with the conference "Asteroids 2001: From Piazzi to the Third Millennium" (June 11-16, 2001). More than half of the WGNEO members were present at Palermo. The WGNEO reaffirmed its commitment to providing accurate, timely, and responsible information to the public on NEO impact risks. The WGNEO maintains a Technical Review Committee for the purpose of providing rapid peer review of predictions of possible impacts. However, the development of on-line computational tools at JPL and in Pisa (see below) means in practice that such reviews are automatic and practically instantaneous, so that the formal IAU procedure is unlikely to be much required in the future. A new hazard metric, called the Palermo Technical Scale, was approved to compare the risk from newly discovered NEAs (<http://neo.jpl.nasa.gov/risk/doc/palermo.html>), although it does not replace the Torino Scale for public communication (see below).

The past three years have seen a tremendous growth in the study of NEOs. This period includes the one-year orbital study of 433 Eros by the NASA spacecraft NEAR-Shoemaker, followed by a landing on the asteroid surface (<http://near.jhuapl.edu>). This mission has effectively resolved in the affirmative the long-standing issue of the association between S-type asteroids and the primitive ordinary chondrite meteorites. New radar studies have provided images of NEAs and include the discovery of several binary objects, which permit

the calculation of densities (<http://echo.jpl.nasa.gov>). Automated orbital calculation and risk estimates are now continuously available on-line through the NEO Dynamics system at Pisa (<http://newton.dm.unipi.it/cgi-bin/neodys/neoibo>) and the Sentry system at JPL (<http://neo.jpl.nasa.gov/risk/>). The Spaceguard Survey discovery programs, led by the LINEAR MIT system (<http://www.ll.mit.edu/LINEAR/>), have found more than 600 of the estimated  $1100 \pm 100$  NEAs brighter than absolute magnitude  $H=18$  (diameter approximately 1 km). The primary Spaceguard search programs are supported by the United States government (NASA and the U.S. Air Force), with an international team for astrometric follow-up. The goal of the Spaceguard Survey is to find 90% of the NEAs larger than 1 km diameter by the end of 2008.

Communication with the international scientific community and with the interested public represents an important part of the WG efforts. One tool for public communication is the Torino Impact Scale, which has been adopted by the WG and other NEO scientists for this purpose. The Torino Scale is a "Richter Scale" for categorizing the Earth impact hazard associated with newly discovered asteroids and comets. The scale is described at <http://impact.arc.nasa.gov>. Other websites, although not formally endorsed by the IAU, also provide valuable communication functions. These include the NASA NEO Program Office (<http://neo.jpl.nasa.gov>), the NASA impact hazard website (<http://impact.arc.nasa.gov>), the United Kingdom NEO Information Centre (<http://www.near-earth-objects.co.uk>), and the Spaceguard Foundation and its on-line magazine *Tumbling Stone* (<http://spaceguard.ias.rm.cnr.it/SGF/>).

David Morrison

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