INTERNATIONAL NEAR-EARTH ASTEROID SEARCH. Eleanor F. Helin and R. Scott Dunbar, Earth and Space Sciences Division, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109

A plan to organize a coordinated, multi-telescope survey for near-Earth asteroids based on existing facilities in several countries is presented. The observatories participating in this program, with Schmidt-type or other wide-field photographic cameras, will each contribute a modest portion of observing time and resources to cover an allotted area of sky in each dark lunation. Such a plan will enable greater sky coverage and time distribution of observations during a lunation than is currently practical with only a single telescope pursuing an independent asteroid search. Integration of multiple telescopes in a coherent search program will in turn lead to a significant increase in the discovery rate of near-Earth asteroids.

Surveys for near-Earth asteroids are sensitive to two principal variables, sky coverage and limiting magnitude of the telescope. Because these asteroids are typically discovered as they make close approaches to the Earth, they may be found anywhere in the sky, not necessarily restricted to the vicinity of the ecliptic even for objects with low orbital inclinations. Also, the effects of phase angle on the apparent brightnesses are offset by the small heliocentric and geocentric distances at these close encounters. The discovery rate of near-Earth asteroids to a given limiting magnitude therefore becomes approximately proportional to the area of sky searched.

With these considerations in mind, a coordinated photographic survey to search for near-Earth asteroids is being considered. Schmidt-type cameras have the advantage of a wide field of view, providing the rapid sky coverage which is necessary for this project. Moreover, there are at present 8 wide-field (Schmidt and Ritchey-Chretien) telescopes in the world of 1 meter class or larger, and several others of the 45-60 cm class, where the host observatories have expressed the desire to conduct such a joint program. This network of existing instruments can be used effectively to provide primary sky coverage for discovery and subsequent follow-up observations of near-Earth asteroids. Sufficient redundancy can be built into the observing plan so that the impact of adverse weather, mechanical problems, and scheduling conflicts for observing time at a particular site can be minimized without jeopardizing the coverage in a given lunation or losing needed observations. This program will be capable of detecting and securing the orbits of asteroids as faint as photographic magnitude 18-19, and obtaining at least 5 times the sky coverage of a single systematic survey at one facility at a modest individual level of effort. Each participating observatory, supplying its own personnel and supplies, will be used only 3-5 nights per dark lunation on the average for this project, thus having minimum impact on other observing programs at any one site. At this level of effort, it is estimated that a three- to five-fold increase in the discovery rate of near-Earth asteroids over the current worldwide annual rate of 6-10 new asteroids per year can be expected.

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