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THE DETECTION OF NEAR EARTH OBJECTS,NEO'S

Abstract

Abstract: Near-Earth Objects (NEOs) are comets and asteroids that have been nudged by the gravitational attraction of nearby planets into orbits that allow them to enter the Earth's neighborhood. Composed mostly of water ice with embedded dust particles, comets originally formed in the cold outer planetary system while most of the rocky asteroids formed in the warmer inner solar system between the orbits of Mars and Jupiter. The scientific interest in comets and asteroids is due largely to their status as the relatively unchanged remnant debris from the solar system formation process some 4.6 billion years ago. The giant outer planets (Jupiter, Saturn, Uranus, and Neptune) formed from an agglomeration of billions of comets and the left over bits and pieces from this formation process are the comets. Likewise, today's asteroids are the bits and pieces left over from the initial agglomeration of the inner planets that include Mercury, Venus, Earth, and Mars. With an average interval of about 100 years, rocky or iron asteroids larger than about 50 meters would be expected to reach the Earth's surface and cause local disasters or produce the tidal waves that can inundate low lying coastal areas. Given several years warning time, existing technology could be used to deflect the threatening object away from Earth. The key point in this mitigation process is to find the threatening object years ahead of time so that an orderly international campaign can be mounted to send spacecraft to the threatening object. One of the techniques suggested for deflecting an asteroid includes; nuclear explosions, nuclear powered ion propulsion, solar sails, mass drivers, gravity tugs, and more exotic technologies. However, deflection by simple impact, were it demonstrated to be viable for large asteroids, would have important advantages over other proposals. It would require no new technologies and would likely be the least costly, least risky, and fastest to effect. It would also be far less politically difficult to develop and test than any option involving nuclear warheads. The authors take asteroid diameter, density, crate ring, and Earth-collision warning (lead) time as parameters whose influence is to be investigated. As the catalog of the Near-Earth Object (NEO) population orbits expands, lead times for any discovered Earth colliding objects are likely to be one or two centuries, the time horizon out to which NEO orbits may typically be reliably projected.