

Keeper of the Objects

With a shoestring budget, asteroid and comet watcher Brian Marsden looks out for Armageddon from the skies—and not without controversy By STEVE NADIS

Every day our neighborhood appears a bit more crowded—and dangerous. The band between Earth and Mars hosts swarms of swift-moving asteroids, some of which might eventually threaten our planet. The inner solar system is home to an estimated 1,000 to 1,500 asteroids a kilometer or greater in width, with perhaps a

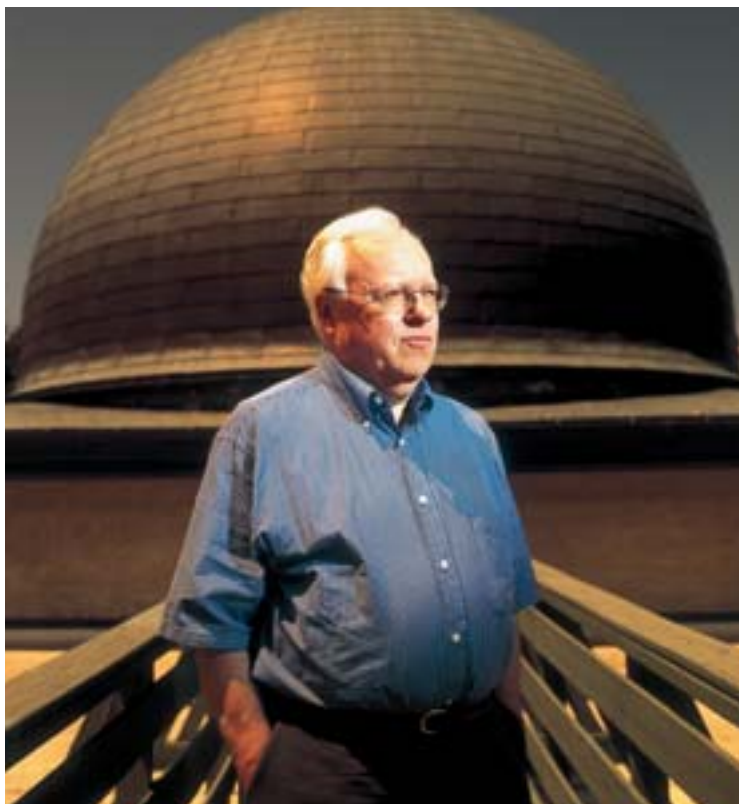
million rocks 50 meters and larger. Asteroid observations pour in at the rate of 15,000 or more a day.

The burden of keeping track of near-Earth objects (NEOs)—asteroids and the occasional comets that pass through our vicinity—falls on Brian Marsden. Since 1978 he has directed the Minor Planet Center (MPC) at the Smithsonian Astrophysical Observatory in Cambridge, Mass. Sky watchers from all over the world send putative sightings to the MPC, which operates on behalf of the International Astronomical Union (IAU). The MPC 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. “We are the focal point,” Marsden says. “All the observations come here.”

Marsden has served as the referee for all NEO sightings over the past 25 years—a period in which the total search effort has grown from a fledgling survey or two into a productive and efficient international network. At times this role has put him in the middle of controversy. Perhaps the most notorious incident occurred on March 11, 1998, when Marsden indicated on the MPC Web site that an asteroid discovered in December 1997 (then named 1997 XF11 and now called asteroid 35396) would make a close approach in 30 years. “The chance of an actual collision is small,” he wrote, “but one is not entirely out of the question.” That phrase set off a media circus that ranked among the 20 top science debacles of the century, according to *Discover* magazine.

Marsden admits that his word choice was “ill advised” but insists the calculation was correct at the time. He emphasized its uncertainty in the original notice and asked for more data. When the computations were redone a day later, incorporating orbital information from an old photograph, the threat vanished.

“Much as the incident was bad for my own reputation, we needed a scare like that to bring attention to



BRIAN MARSDEN: HEADS UP ON DANGER

- **On national security:** “There’s a lot of concern about security these days, but does it go beyond terrorism and extend to outer space?”
- **On the power of fear:** “I think a good scare is occasionally helpful.”
- **Of 42 near-Earth asteroids with nonzero impact risk, only one object, 1997 XR2, warrants careful monitoring. See <http://neo.jpl.nasa.gov/risk/>**

this problem,” Marsden remarks. “Many wondered whether I’d survive, but I’m still here.” More important, he says, the field itself has prospered. In the wake of XF11 publicity, NASA increased funding for asteroid searches from \$1 million to \$3.5 million annually. In addition, groups at the University of Pisa in Italy and the Jet Propulsion Laboratory in Pasadena, Calif., began doing routine risk evaluations of potentially menacing objects. To date, the confirmed NEO total includes about 2,250 asteroids, a dozen comets that complete their orbits in less than 200 years, and 1,000 long-period comets (on orbits 200 years or longer) that pose no immediate concern.

It’s a far cry from the early 1960s, when Marsden started adding to the list of some two dozen known NEOs with detections he made as a Yale University graduate student. After earning his Ph.D. in astronomy in 1965, he took a job at the Smithsonian, where he has worked ever since.

When Marsden began studying minor planets, “nobody cared about asteroids. They were dismissed as ‘vermin of the sky.’” Now the study is a bona fide field, thanks to automated search programs such as the Lincoln Near-Earth Asteroid Research (LINEAR), run by the Massachusetts Institute of Technology Lincoln Laboratory, and NASA’s Near-Earth Asteroid Tracking (NEAT), which collectively account for 90 percent of all NEO detections. The MPC is hard-pressed to keep up with the tide of incoming data, especially with a volume of main-belt asteroid observations 100 times as great as that for NEOs.

Despite the workload, the MPC staff consists of only 2.5 people, including Marsden, who would like to keep the center running 24 hours a day. But that is not feasible: MPC gets just \$130,000 a year from NASA, despite the agency’s increased spending on NEO surveys. Other income, from subscriptions and donations, is not enough to cover the 80- to 100-hour workweeks. “Here we are saving the world, and they expect us to do it on our own time,” Marsden quips.

More draining than the task at hand, however, is the time wasted on arguments. “There’s a lot of infighting in this business. Not everybody likes everybody,” he says. Besides the XF11 affair, which soured his relationships with several colleagues, Marsden has taken heat over access to information. He would rather not release data for tentative, single-night asteroid sightings—“one-night stands,” as he calls them—both to ensure the data’s reliability and to conform to the policies of leading programs such as LINEAR, NEAT and Spacewatch, which do not want unsubstantiated data made public. Astronomers who are anxious to see everything blame Marsden for impeding the information flow. “Brian follows the rules [set by the IAU], but

the rules are flawed,” Lowell Observatory astronomer Ted Bowell complains. He states that Marsden and others “often post orbital predictions without sharing the data that led to the calculations. I find that scientifically unacceptable.”

Despite such criticism, the IAU recently extended the Smithsonian’s contract for running the MPC through 2006. As for beyond that, rumors swirl about “hostile takeovers,” in Marsden’s words. Grant Stokes, who heads the LINEAR program, thinks that moving the MPC to a new home would be a mistake. “Brian and his center service the observing community wonderfully,” Stokes says. “It’s hard for me to believe this effort could be duplicated elsewhere.”

Marsden tries to ignore the squabbles as he looks to the future. One day, inevitably, there will be a NEO on a collision course with Earth. With luck, it will be small and won’t cause much damage. If it is spotted years or decades in advance, there might be time to intervene. “This is one threat we can do some-

thing about,” he declares. Various defensive strategies have been proposed, including nudging an approaching asteroid with a nuclear blast or darkening part of the object’s surface so that the thrust produced by radiated heat changes its orbit. Marsden is not sure how much money should be spent exploring these options but insists that “we have to do more than the dinosaurs.”

Until now, the focus has been on large asteroids, a kilometer or bigger. The goal of the Spaceguard Survey, funded mainly by NASA, is to find 90 percent of these objects by 2008. More than 650 asteroids have

been identified so far, perhaps half the total. (Astronomers estimate the total based on discovery rates from previous surveys.) Still, Marsden remarks, “we should begin planning the next step.” Looking for 200- to 300-meter-wide objects is often proposed as a sensible target, but that would require new telescopes and roughly 10 times as much money.

Marsden turns 66 this month and would eventually like to hand the reins over to MPC’s associate director, Gareth Williams, his partner since 1990. There’s no timetable for a transition, says Williams, who admits he has “very big shoes to fill. Brian has been preeminent in the field since the 1960s.” NASA Ames astronomer David Morrison, chair of the IAU’s NEO working group, also lauds Marsden’s efforts. Given Marsden’s long tenure in the NEO field—starting out as he did when there was no “field” to speak of—Morrison is skeptical about talk of his impending retirement: “I think he’ll do it forever.” That is, of course, if the world doesn’t end first. SA

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COLLISIONS with even small NEOs pose a threat: an object only 100 meters wide flattened these trees in Siberia in 1908.