Near miss, but no threat: Asteroid in close pass was smaller than thought, astronomer shows

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(PhysOrg.com) -- On March 2, an asteroid whizzed past the Earth at a distance of just 41,000 miles -- a near miss by cosmic standards (most communications satellites orbit at a distance of about 22,300 miles from Earth). Headlines around the world proclaimed that Earth had dodged a bullet, and many mentioned that if the space rock had hit our planet, it might have packed a punch comparable to the Tunguska impact in 1908 that flattened trees over an 800-square-mile area in Siberia.

But some fast-tracking observations by MIT Professor of Planetary Sciences Richard Binzel proved that this rock was actually much smaller than that. Likely just 19 meters (about 60 feet) across, it would probably have disintegrated high in the atmosphere, with only a few small fragments making it to the ground.

Discovered just two days before its closest approach to Earth, the asteroid, called 2009 DD45, was initially estimated as between 20 and 40 meters across. At the high end, that would have made it comparable to the devastating Tunguska bolide. Binzel, on sabbatical at the Paris Observatory, decided to try to make observations of the fast-moving asteroid, aided by MIT planetary science alum Francesca DeMeo '06 SM '07, who is currently completing her doctoral research in Paris on a Fulbright scholarship.

The asteroid's close pass was on the opposite side of the planet from

Paris -- over the Pacific Ocean. No problem for Binzel: He and his students have routinely made observations using a remotely controlled telescope in Hawaii. The telescope can be run from a number of different locations, including a control room on the MIT campus and the Paris Observatory.

But following such a nearby encounter with a large telescope is a technical challenge. "The object was moving about 100 times faster than the 'normal' rate of objects we track as they cross the Earth's orbit, all on account of its very close passage," Binzel explains.

Despite that challenge, Binzel says, "All told, we stayed on the target for about two hours, before sunrise in Hawaii brought our observations to a close." And it was well worth it, because this enabled detailed spectroscopic measurements that determined the object's composition, which matched that of an S-type asteroid -- the most common type. That, in turn, allowed a more accurate estimate of how reflective it was, essential to being able to determine its actual size based on measurements of its apparent brightness.

After completing the observations at the observatory's facility in the Paris suburb of Meudon, Binzel headed back in to the city. "Final calculations for the size were made on the train ride home," he says, "where it occurred to me that the 19 meter size was about the same as the train car I was riding in, except the asteroid was going much faster."

Provided by Massachusetts Institute of Technology (news : web)