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Asteroids Go Hollywood

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It's a little known fact that Chocolate Pop Tarts bring good weather, and that's why the happy little blue and brown boxes adorn the cabinets and shelves of Richard P. Binzel's laboratory. Unfortunately, he's just been told they don't look good on camera, so with a heavy hand Binzel moves the lucky goodies out of the shot, winning an appreciative nod from the cameraman.

It's 11 p.m., and Discovery Channel Canada is filming Binzel's lab as part of an upcoming special on asteroids, especially ones that travel close (astronomically speaking) to Earth. That evening the Massachusetts Institute of Technology scientists are using NASA's Infrared Telescope Facility in Hawaii to follow asteroids through the evening sky. But sadly there will be no shots of palm trees or the ocean for the special, because Binzel's team isn't in Hawaii.

Binzel, the film crew, a grad student, and a reporter are crammed into a glorified closet on the fourth floor of Building 54 on the campus of MIT in Cambridge, Massachusetts. It's a dead-of-the-night mission to learn about deviant hunks of rock and metal that swoop 'round in our solar system, but it won't take place at the telescope itself. Assisted by two glowing computer screens and a TV with a video link to Hawaii, Cristina Thomas, Binzel's surprisingly-awake graduate student, will remotely observe asteroids a hundred million miles away using a telescope five thousand miles away, all from the comfort of her squeaky rolling chair.

Richard Binzel and Cristina Thomas
Photo: Donna Coveny

Remote observing is a phenomenon made possible by computers, a wicked fast internet connection, and a kindly telescope operator. Oh, and a world-class telescope sitting 4,200 meters above sea level. Several nights a month, Binzel gets telescope time allocated by NASA for his asteroid hopping. He charts a plan of the best targets for the night and hands it to Cristina. If it's a good night, Cristina should be able to collect light from about six or seven near-Earth asteroids.

When light from the sun hits an asteroid, it is reflected in many directions, some of it toward Earth. Each packet of light, or a photon, carries a trace of the asteroid with it—a distinctive fingerprint of energy. Different materials absorb and emit various wavelengths of light at different energies, so examining an asteroid's light spectrum can tell you what it's made of. As the Hawaiian telescope collects those photons, the fingerprint is recorded and later analyzed to get a best guess at the asteroid's make-up.

The clock strikes twelve, and most participants lean back in their chairs, stifling yawns, and wait for the TV lights to be angled for the next shot. Except for Binzel, who is wheeling around the room pumping his arms to a new war cry, "More photons! Better data!" Unfortunately, his rallying call won't summon the troops tonight; it's a wet, cloudy sky in Hawaii. No photons for Binzel. Shouldn't have moved those Pop Tarts.

When conditions are not miserable and data can be successfully collected, Binzel's observations help us learn a little more about the solar system around us, and more interestingly about big hunks of rock that might smash into our planet. Last year, Binzel's lab published a paper on the composition of Apophis, a near-Earth asteroid that has a (small) chance of hitting Earth in 2036. "It's good to know your enemy," Binzel says with a straight face. You know, in case we need to blow it up or something.

Unfortunately the practical experience of the lab, even with tonight's "lights, camera, action," isn't as blood pumping as giant boulders from space striking Earth. Tracking the asteroid requires a person (usually a grad student with a box of cereal and a keg of coffee) to sit through the wee hours of the night listening to a beep every eight minutes and clicking a mouse every two. The data are gathered by two computer programs named by some canine-loving engineer—Big Dog and Guide Dog. Big Dog is the brains of the operation, in charge of gathering data from the telescope. Guide Dog is the loping scout in need of a human guardian; the program tracks the asteroid, but it does not simply latch on and follow. If it did, what would the grad students do? Instead, someone must monitor the incoming light, adjusting the telescope occasionally to keep the asteroid in Guide Dog's crosshairs. It's not glamorous work, but it's somehow comforting to know humans are still necessary for some tasks.

So, with clouds hiding the asteroids and the film crew getting antsy, there's a general consensus to fake it and get some action shots. As Cristina loads the programs and prepares to go on camera, Binzel, who consents to the charade and hasn't stopped pacing, shouts a final directive over his shoulder. "Make it look cool!"

Tags: asteroids, Cristina Thomas, NASA, Richard Binzel