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## SNAPSHOT Ghosts of destruction

A set of contrails behind close-flying jets? Orderly raking in a muddy zen garden? A phalanx of harvesters on a giant prairie?

No: this is an image of shrimp trawlers (see inset) off the coast of China. The long plumes of sediment churned up by their nets — ‘mudtrails’ — are a highly visible sign of the disturbance to sea-bottom ecosystems that they leave in their wake.

Conservation ecologist Kyle Van Houtan of Duke University in North Carolina, and fisheries expert Dan Pauly of the University of British Columbia in Vancouver, have identified many such mudtrails in satellite images available through Google Earth. From the Gulf of Mexico to Malaysia, remote-sensing imagery captures details ranging from the

number of trawl nets dragged behind a boat to the white dots of seabirds flocking nearby to feast off the unwanted bycatch that is dumped overboard.

This particular image was taken by the QuickBird satellite on 20 February 2003, off the coast of Jiangsu province near the mouth of the Yangtze River; ten trawlers cover each square kilometre of ocean.

Van Houtan and Pauly are now working with Quickbird, Landsat and other satellite data to quantify exactly how much sediment is churned up by these boats to try to get a handle on the toll taken by fishing. Repeated trawling, they say, can permanently modify the seabed and alter the ecosystem for creatures living in the upper metres of the ocean.

“Imagining is one thing, but imaging is something else,” says Van Houtan. “When we see an image, it really crystallizes the impacts and an attitude towards the sea.”

competition between three different designs for a space telescope that will survey thousands of distant supernovae. But it will do so not out of fascination with the grandeur of exploding suns. Its purpose is simply to gather data on their distances and velocities as a means to improving estimates of dark energy’s ‘equation of state’, a ratio that is a critical parameter in cosmological calculations.

### A diet of wormholes

Astronomers have traditionally built telescopes and satellites that allow them to study a panoply of objects and that enable individuals to pursue their own ideas. In contrast, the new mission would look more like a particle-physics experiment: a large team of researchers would be working exclusively to confirm an already known theory. Such an approach could ostracize the more traditional astrophysicist.



**“Dark energy has done more than anything else to energize interest in astronomy.”**  
— Matt Mountain

Steidel agrees: confirming theory is only part of what astrophysicists do. “One of the things that make astrophysics interesting to people is that one is almost always surprised,” he says. “I think it’s that discovery aspect of things that may suffer if resources are directed to answer ‘big questions.’”

Schechter adds that dark energy, although fundamentally interesting, is a murky concept that doesn’t have much effect on stars and galaxies — the things most astronomers like to study. “We already know as much about dark energy as we

need to know,” he says.

Mountain, however, counters with his view that the questions surrounding dark energy are among the most important in the field, and are bringing welcome publicity to astronomy. Furthermore, he says, the missions

under consideration for JDEM are a fraction of the cost of the more general-purpose large telescopes being advanced by astronomers. And many of the missions would collect data useful to people across the discipline.

Ultimately, Mountain says, White’s anxiety is more nostalgia for the good-old days of astronomy than concern for its future. “There’s a kind of romantic sense that a lone person with a telescope or a piece of paper should still be able to make breakthroughs in the field.” But that’s not the way it works in the modern era, he warns. “The contribution of the individual is being lost because some of these problems are getting extraordinarily hard to tackle. The only question is: are we actually losing great science? Or are we just losing the sense that science is as much fun as it once was?”

White stands firm in his belief that the old approach needs to be preserved. “You need to keep the subject vibrant so that it attracts the best young people,” he says. “Otherwise the traditional way we do astronomy will cease to function.”

**Geoff Brumfiel**

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