New Google ocean maps dive down deep

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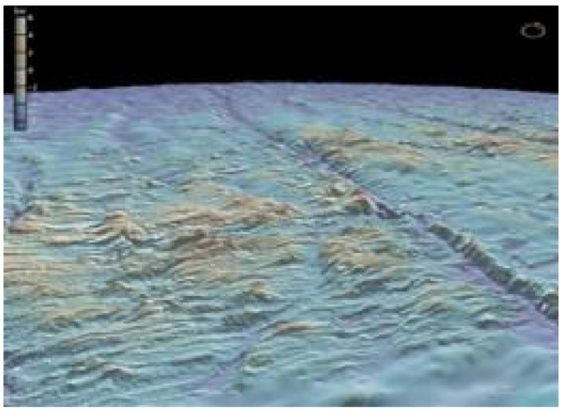

The Kane Fracture Zone cuts across the Mid-Atlantic Ridge. The floor of the fracture is over 5 kilometers deep and the mountain peaks are 1.5 kilometers below the surface. Credit: Lamont-Doherty/GMRT

(PhysOrg.com) -- Starting today, armchair explorers will be able to view parts of the deep ocean floors in far greater detail than ever before, thanks to a new synthesis of seafloor topography released through Google Earth. Developed by oceanographers at Columbia University's Lamont-Doherty Earth Observatory from scientific data collected on research cruises, the new feature tightens resolution in covered areas from the former 1-kilometer grids to just 100 meters.

The ocean floors contain dramatic landscapes--volcanic ridges, lofty peaks, wide plains and deep valleys—but most areas remain mapped in less detail than the surfaces of the Moon and Mars. The new, sharper focus is currently available for about 5 percent of the oceans—even at that, an area larger than North America--and provides spectacular scenery, including the huge Hudson Canyon off New York City, the Wini Seamount near Hawaii, and the sharp-edged 10,000-foot-high Mendocino Ridge off the U.S Pacific Coast.

Viewers can use the "ground level view" feature of Google Earth to take them to the seafloor for a closer look at the terrain. To find which areas offer greater detail, users can download a plug-in, the Columbia Ocean Terrain Synthesis. This provides an extra layer to the conventional Google Earth imagery, showing the tracks of research cruises that have produced the higher resolution. (For those who really want to dive in, there is information on the cruises themselves, and even the original bathymetry data.)

Google's new 2011 Seafloor Tour takes you to some prime spots, such as the Pacific Ocean's Lamont Seamounts (named for the institution) and Mendocino Ridge, where the Juan de Fuca plate slides toward western North America, and where an earthquake could potentially send a massive tsunami up onto land.

A second virtual tour, Deep Sea Ridge 2000, fueled by the new synthesis and produced by Lamont-Doherty scientist Vicki Ferrini and colleagues, takes visitors to see seafloor hydrothermal vents spewing lava and hot liquids, and to learn about the creatures that thrive there.

In addition to providing intriguing imagery, the more accurate data reflected in the pictures is helping scientists understand the risks posed by some features, including earthquake zones.

"In spite of the importance of the oceans for life on earth, the landscape beneath the sea is hidden in darkness and poorly mapped," said William Ryan, an oceanographer at Lamont-Doherty who, along with Suzanne Carbotte and their team, created the system used to generate the imagery. "While we can map the surface of planets from spacecraft in a single mission, to obtain comparable detail of the hidden seascape requires visiting every spot with a ship." (The 100-meter resolution in the new views is still generally less than the resolution on land, which goes to centimeters in some areas.)

The Lamont Seamounts are an example of the view from the seafloor synthesized by a team of oceanographers at Lamont-Doherty Earth Observatory. The seamounts are due west of El Salvador, at about 9.55 degrees N, 104 degrees W

The imagery is the result of hundreds of cruises by scientific research vessels from many institutions traveling roughly 3 million miles across the oceans over the past two decades. To create the new maps, the team combined multi-beam sonar measurements into Lamont-Doherty's Global Multi-Resolution Topography system. This same database feeds the recently released EarthObserver, Lamont's global scientific mapping application for iPads and other mobile devices. The ocean synthesis was begun in the early 2000s, with funding from the National Science Foundation. It is ongoing, with the team continually adding new data. While most of the data assembled so far has come from U.S. institutions, many foreign institutions hold troves of mapping data, which the team hopes to tap in the future.

Lamont scientists have long been at the forefront of ocean-floor mapping. Lamont oceanographers Marie Tharp and Bruce Heezen created the first comprehensive map of the world's ocean beds, published in 1977. In the 1980s, satellite measurements helped fill in gaps, and another Lamont scientist, William Haxby, used these to compose the first "gravity field" map of the oceans. These maps revolutionized seafloor imaging by providing a uniform, if low-resolution, view of the global seafloor. With the advent of multi-beam sonar mapping, also in the 1980s, scientists began to chart the ups and downs of the seafloor in much finer detail.

Even from the 5 percent now available, scientists have learned much. For instance, researchers can see details of earthquake faults and underwater landslides. Shifts in the seafloor can trigger tsunamis, as shown by this year's disaster in Japan, and the 2004 wave that swept Sumatra. The sharper imagery helps scientists assess the risk in various regions, including along the U.S./Canada west coast. The maps also bring erupting mid-ocean ridges into sharper focus and help scientists understand volcanic eruptions on earth, the vast majority of which occur hidden far from view on the ocean floor.

Other institutions that have contributed data to the effort include the Monterey Bay Aquarium Research Institute, Scripps Institution of Oceanography, University of Hawaii, University of New Hampshire, University of Washington, the U.S. Coast Guard, the U.S. National Oceanic and Atmospheric Administration, the U.S. Navy, Woods Hole Oceanographic Institution, the Leibniz Institute of Marine Sciences at the University of Kiel and the Hydrographic and Oceanographic Service of the Chilean Navy.

Provided by Columbia University