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International Collaborations In Geodesy Advance Geoscience Research

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1 Abstract

UNAVCO supports geoscience research at 113 US academic Member institutions, and another 104 Associate Member institutions include international universities, laboratories, observatories, academies of science, and a museum. This diverse membership shares UNAVCO's purpose at home and abroad, giving UNAVCO global reach in advancing geodesy.

Since the mid-1980s, modern geodesy has evolved into a cutting-edge, multi-faceted toolbox with remarkably diverse research and real-world applications, including studies and observation or forecasting of solid-Earth hazards, the dynamics of the atmosphere, climate, near-Earth space environment, and of key environmental parameters such as water storage, soil moisture, and sea- and lake-level changes. UNAVCO operates facilities on behalf of the U.S. National Science Foundation to support investigators who use geodetic tools across all of these Earth and atmospheric domains.

UNAVCO has built a number of large dense regional networks of GPS stations, including the EarthScope Plate Boundary Observatory in North America, the COCONet Caribbean network, TLALOCNet in Mexico, GNET in Greenland, and ANET in Antarctica. Going forward, UNAVCO plans to federate the Plate Boundary Observatory (USA), TLALOCNet (Mexico), and COCONet (Caribbean) GPS networks as the Network of the Americas, with upgrades to state-of-the-art, multi-sensor, multi-GNSS observations.

While UNAVCO community scientists actively engage in using space and terrestrial geodetic techniques to study geodynamics at all scales, this proliferation of continuous networks is the basis for a suite of recent contributions that focus on improved daily positioning to sense Earth's elastic response and other perturbations to loading by atmospheric and surface water, oceans, and ice. Day-to-day and sub-daily variations in the GPS vertical and horizontal correlate to increasingly well-understood short-term mass variability, such as monsoonal flooding in Bangladesh, sub-daily changes in tidal loading at continent scales, day-to-day surface water and ice storage in the western U.S., variations in the rate of GIA in Greenland across a variety of scales, and improved understanding of the inter-annual variation in sea level rise due to changes in terrestrial water storage.

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