

GAGE2 Project Summary – revised from the UNAVCO proposal submitted in response to the NCEO solicitation

Revised October 9, 2018

Explanatory Statement: During the review of the UNAVCO NCEO submission, the NSF resource outlook for the next decade changed. As a result, award scope was refined to match anticipated resource availability. This summary captures that revised scope, to be executed under phase 2 of the GAGE Facility (herein, GAGE2).

Intellectual Merit and Broader Impact:

Since the mid-1980s, the US academic geodesy community has grown from first-ever (yet isolated) studies of high precision tectonic and volcanic deformation, to a transformative vision of Earth System interactions that span the evolution of and interactions among the geocenter, lithosphere, hydrosphere, cryosphere, troposphere and ionosphere. GPS is succeeded by a growing suite of international GNSS constellations, and complemented by gravity, radar and lidar, with data services that extend scientific reach to a broad spectrum of stakeholders. Curriculum modernization, career-cycle professional development, and community engagement activities are also critical to ensuring the benefits of GAGE2 to students and society.

The GAGE2 Facility will provide services for (1) Geodetic Infrastructure (GI) that provide coordinated support of operations and maintenance for long-term continuous geodetic observations as well as PI-driven projects using temporary geodetic deployments; (2) Geodetic Data Services (GDS) that provide data collection or acquisition, quality control, archiving, and distribution through the GAGE Data Management Systems; and (3) Education and Community Engagement (ECE) services that enable broad audiences to use geophysical data for research and educational purposes and fosters improved public understanding of geoscience and to engage the broader geoscience community.

Geodetic Infrastructure:

GI supports data acquisition in the field, including management and operations of networks of continuously operated stations that include Global Positioning System and Global Navigation Satellite System (GNSS), borehole strainmeters with collocated seismometers, tiltmeters, and meteorological sensors. GI also supports individual investigator research projects with project planning, engineering, and instrumentation and/or acquisition of new data. Under this cooperative agreement GI will upgrade a subset of currently operated GPS stations to full GNSS-capable instruments and improve data telemetry solutions to support real-time, high rate (> 1 Hz) GNSS observations. The newly federated Network of the Americas (NOTA), will integrate ~1100 stations from the Plate Boundary Observatory (PBO, formerly of EarthScope), COCONet (Caribbean), and TLALOCNet (in Mexico) on a resource-available basis. In addition, GI will continue its support of polar GPS/GNSS networks and field experiments; geodetic instrumentation testing and support; and field and operational support of NASA's Global GNSS Network (GGN).

GDS provides data operations and management for the full suite of supported techniques: GPS/GNSS, and terrestrial laser scanning (TLS) data sets; support for As part of its NASA scope, GDS acquires synthetic aperture radar for interferometry (InSAR) and the activities of the IGS Central Bureau that make millimeter-level global geodesy possible.

ECE supports student internships, short courses and workshops for graduate students and researchers, informs the community and public of GAGE2-supported scientific discoveries, and cultivates diversity in the workforce, a portfolio that is complementary to IRIS. In related awards, ECE also contributes to a national curriculum development effort to showcase critical geodetic science contributions to undergraduates nationwide.