

The 2009 CORS User Forum

—by Richard A. Snay

NOAA's National Geodetic Survey (NGS), in cooperation with the U.S. Department of Transportation and the U.S. Coast Guard, convened the 9th Annual Continuously Operating Reference Station (CORS) Users Forum on September 22, 2009, in Savannah, Georgia. The Forum was an integral part of the Civil GPS Service Interface Committee (CGSIC) meeting held September 21 and 22.

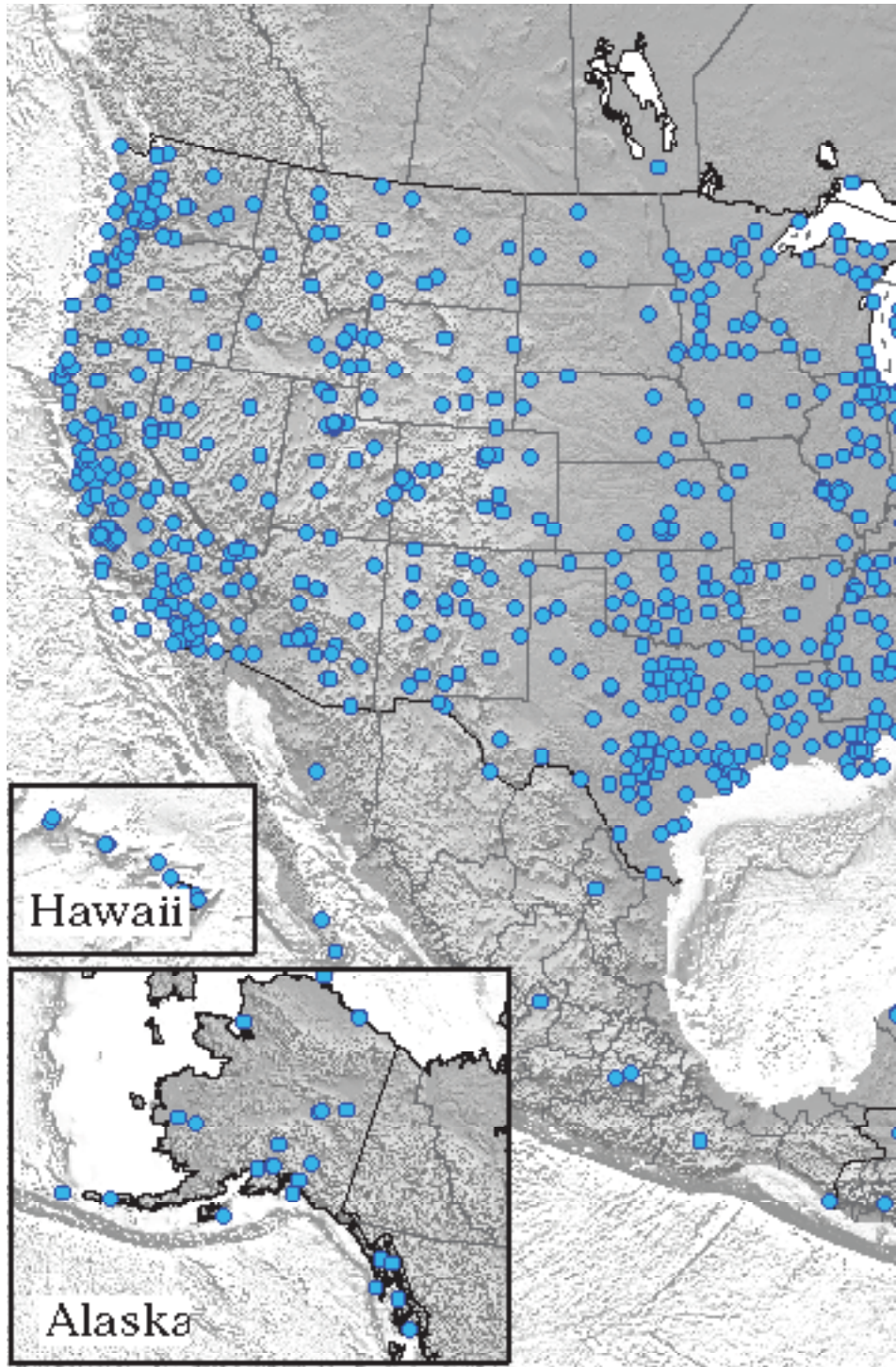
The CORS network is comprised of numerous sub-networks operated by about 200 organizations. Collectively, these networks include approximately 1,370 sites—each containing a geodetic-quality, dual-frequency GPS receiver. The CORS network is growing at a rate of about 200 sites per year, many with updated GNSS capabilities, such as receiving GLONASS observables.

The National Geodetic Survey and its partners collect, process, store, and distribute data from the CORS sites on a continuous basis, in support of land surveying, navigation, GIS development, remote sensing, weather forecasting, satellite tracking, geophysics, and other activities.

In my welcoming address to the forum, I described a recent study to estimate the socio-economic benefits of both the CORS program and the Gravity for the Redefinition of the American Vertical Datum (GRAV-D) project. According to the study, conducted by Leveson Consulting of Jackson, New Jersey, the annual benefit of the CORS program is \$758 million. Details on the study are available at www.ngs.noaa.gov.

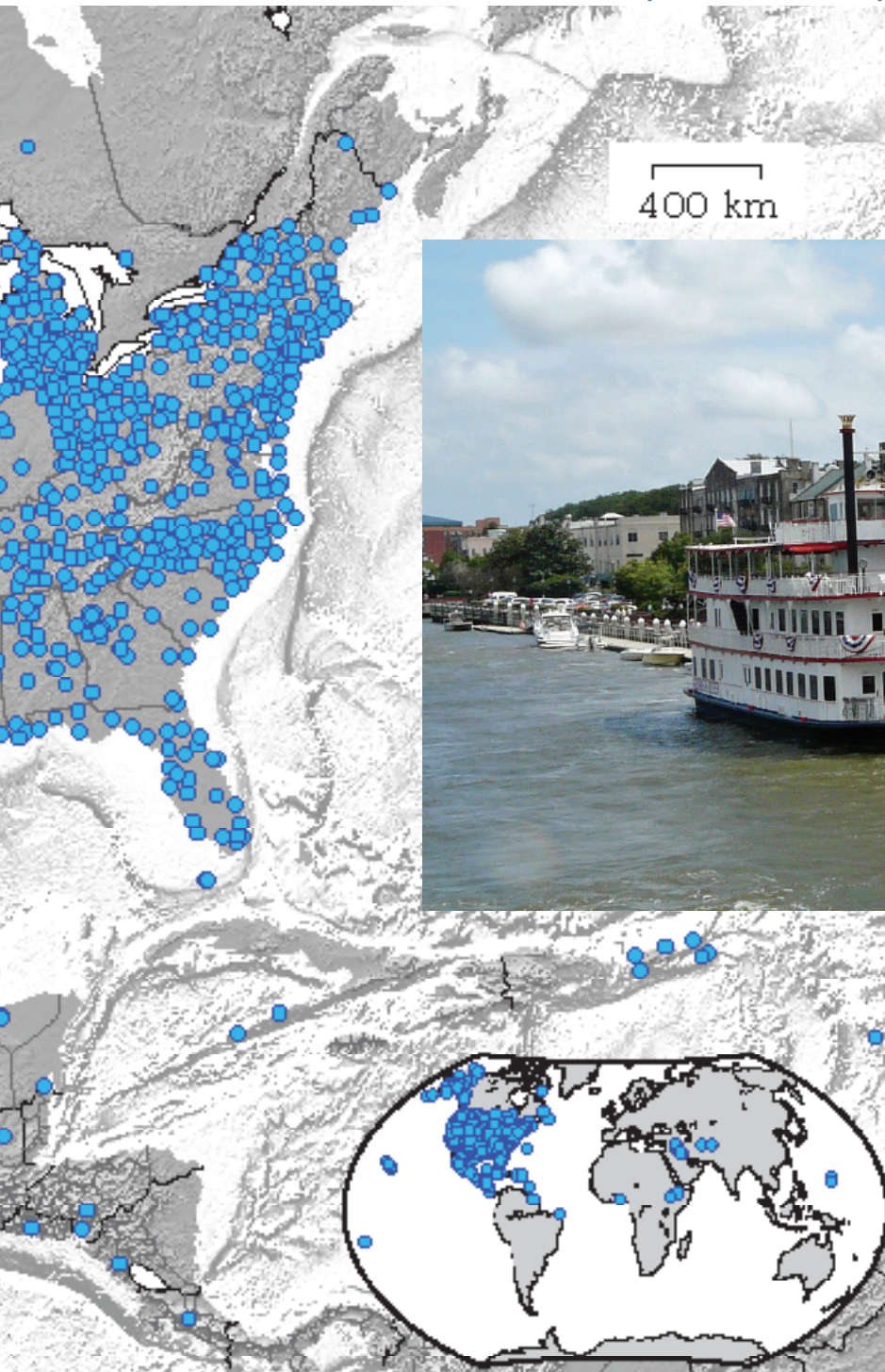
Giovanni Sella, the CORS Program Manager at NGS, reported that NGS added 180 new stations to the CORS network during the past year, including new sites in Iraq, Afghanistan, and Benin.

The National Geodetic Survey also merged the National CORS network and the Cooperative CORS network into a single network in 2009. As



a result of the merger, users may now obtain data from former Cooperative CORS sites in the same manner they obtain data from National CORS sites, from either of the two parallel CORS data facilities—one located in Silver Spring, Maryland, and the other in Boulder, Colorado.

CORS network. [Source: NOAA/NGS]



Riverfront View of Savannah

Additionally, NGS recently enhanced the OPUS utility, enabling users to archive their OPUS-generated coordinates at NGS, together with other information, such as a photo and a description of where the corresponding observations were collected. Thus, OPUS now

allows its users to share their survey results with others.

During 2010, NGS will publish positional coordinates and velocities for all CORS in the soon-to-be-released International Terrestrial Reference Frame of 2008 (ITRF2008), as well as in a new realization of the North American Datum of 1983 (NAD 83).

The National Geodetic Survey also plans to begin distributing GLONASS data from selected CORS and to start generating precise orbits for GLONASS satellites within the next 12 months. The Survey, moreover, is developing the OPUS-Projects utility which will rigorously process and adjust GPS data collected at multiple locations, using one or more receivers and during one or more observing sessions.



L-R: Richard A. Snay, Dan Martin, and William Henning, all of NOAA's National Geodetic Survey. Richard Snay is available for comments on this report at <Richard.Snay@noaa.gov > or 301-713-3191 x 103.

This year's Forum featured a panel of speakers who discussed the guidelines being prepared to assist GNSS real-time network (RTN) operators, as well as those using RTN positioning services. More than 60 people have been involved in developing these guidelines. Among them were current RTN administrators (both public and private), representatives from several GNSS manufacturers, and NGS employees. The draft guidelines will be made available for public review early in 2010.

Dan Martin (NGS) began the panel session with a presentation on the construction of RTN sites, including options for mounting the GNSS antenna. This was followed by a discussion of RTN planning and design considerations.

Gary Thompson, Director of North Carolina Geodetic Survey spoke on issues involved in RTN administration.

William Henning (NGS) rounded out the presentations with a discussion of best methods for RTN users—methods that build upon the single-base, real-time kinematic (RTK) user guidelines (which may be viewed and/or downloaded at www.ngs.noaa.gov/PUBS_LIB/NGSRealTimeUserGuidelines.v2.0.4.pdf).

The formal presentations were followed by a lively session with the audience who directed many questions to the speakers panel. At least two questions focused on how the RTN guidelines will be vetted and subsequently shared with the geospatial community.

Henning cited plans to work with the American Congress on Surveying and Mapping (ACSM), the International Federation of Surveyors (FIG), and the Federal Geodetic Control Subcommittee (FGCS) to vet the guidelines. Part of the vetting process will be a series of workshops and webinars presented by NGS personnel and others.

A question was asked whether there was a way to validate OPUS results. Sella identified several other similar utilities, including Auto-Gipsy, AUSPOS, CSRS-PPP, and SCOUT. Martin mentioned

that some people compare OPUS-S (static) results with OPUS-RS (rapid static) results, because each of these utilities employs a different processing engine.

The National Geodetic Survey routinely validates the OPUS-S processing engine by comparing its computed coordinates with those generated by software packages of other Analysis Centers of the International GNSS Service (IGS). This validation process is part of NGS' responsibility as the current IGS Analysis Center Coordinator.

Following the question-and-answer session, Forum participants formed three smaller groups to discuss, for about an hour, various issues in an interactive manner. A more detailed report on the Forum, as well as the PowerPoint files of the formal presentations, can be viewed at www.ngs.noaa.gov/CORS/CorsPP/PPT.html and downloaded by anybody interested in CORS and other civil GPS services.

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