

GGOS Ground Based Space Geodesy Networks Required to Improve the Reference Frame

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Ground-based networks of co-located space geodetic techniques are the basis for the development and maintenance of the International Terrestrial Reference Frame (ITRF), which is our frame of reference for measurements of global change. Within this network, SLR plays an essential role. The Global Geodetic Observing System (GGOS), a component of the International Association of Geodesy (IAG), has undertaken the task to develop a strategy to design, integrate and maintain a modernized fundamental geodetic network and supporting infrastructure in a sustainable way to satisfy the long-term requirements for the reference frame. The GGOS goal is an origin definition at 1 mm or better and a temporal stability on the order of 0.1 mm/y, with similar numbers for the scale and orientation components. These goals are based on scientific requirements to address sea level rise with confidence, but other applications are not far behind. Simulations are underway to examine accuracies for origin, scale and orientation of the resulting ITRF based on various network designs and system performance to determine the optimal global network to achieve this goal. To date these simulations indicate that about 30 co-located stations with modern technology will be required to define the reference frame, and a more dense GNSS and DORIS network will be required to distribute the reference frame to users anywhere on Earth or in orbit. Additional sites with two or three co-located techniques would further densify and strengthen the network. Sites of the new global network should be geologically stable, with good weather, established infrastructure, and local support and personnel. Major strides in the technique improvements are also underway.

GGOS has issued a performance guideline for new technology instruments based on guidelines from the geometric geodetic services and has developed a Site Requirements Document as a guideline for site selection and development.

In response to a GGOS Call for Participation for groups interested in participation in the GGOS network, fifteen groups, encompassing 35 sites, have expressed plans to participate. Other groups are encouraged to participate, and are expected to do so in the near future.