

# SLR, GNSS, VLBI, AND DORIS NETWORKS:

## ILRS+IGS+IVS+IDS

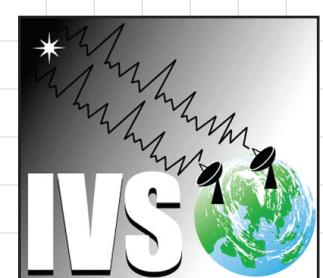
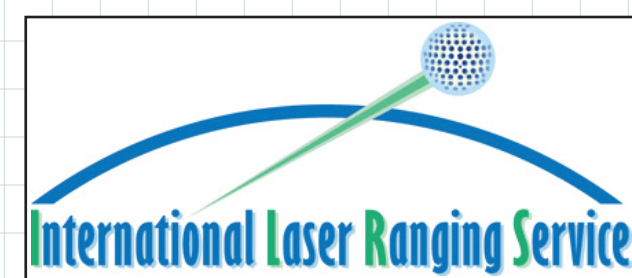
Carey Noll

NASA Goddard Space Flight Center, Greenbelt MD, USA



● ILRS (SLR) Network Site (42 sites)    
 ● IGS (GNSS) Network Site (453 sites)    
 ■ IVS (VLBI) Network/Cooperating Site (35/18 sites)    
 ▼ IDS (DORIS) Network Site (58 sites)

**Abstract:** The global networks of the International Laser Ranging Service (ILRS), the International GNSS Service (IGS), the International VLBI Service for Geodesy and Astrometry (IVS), and the International DORIS Service (IDS) are the backbone of GGOS. The observations obtained from these global networks provide a continuous monitoring of the International Terrestrial Reference Frame (ITRF). Co-location of two or more techniques at sites is an important aspect for generation of the ITRF as well as providing an assessment of the observation quality, accuracy, and validation of results. As of mid-2014, these networks consisted of 47 laser ranging sites, 453 GNSS sites, 48 VLBI sites, and 58 DORIS sites. The data generated by the stations in these networks, and the products derived from these data, are available from the Crustal Dynamics Data Information System (CDDIS). This poster will illustrate the global coverage of these networks, highlighting inter-technique co-locations.



### Scientific Contributions of the ILRS, IGS, IVS, and IDS:

- **Terrestrial Reference Frame (TRF):**
  - +Station positions and velocities: **SLR, GNSS, VLBI, DORIS**
  - +TRF scale and temporal variations: **SLR, VLBI**
  - +Network densification: **GNSS**
  - +Homogenous network distribution: **DORIS**
- **Celestial Reference Frame: VLBI**
- **Precise Orbit Determination (POD):**
  - +Accurate satellite ephemerides: **SLR, GNSS, DORIS**
  - +Calibration and validation for remote sensing missions and instruments: **SLR, GNSS**
  - +Sea level monitoring: **SLR, GNSS, DORIS**
- **Earth Orientation Parameters (EOP):**
  - +Polar motion and rates: **SLR, VLBI, GNSS, DORIS**
  - +Length-of-day: **SLR, GNSS, DORIS**
  - +UT1-UTC and long-term stability of nutation: **VLBI**
- **Atmosphere:**
  - +Tropospheric zenith delays: **GNSS, VLBI**
  - +Global maps of ionosphere mean electron content: **GNSS, DORIS**
  - +Limb sounding for global profiles of water vapor: **GNSS**
- **Gravity:**
  - +Static and time-varying coefficients of the Earth's gravity field: **SLR, DORIS**
  - +Total Earth mass: **SLR**
  - +Temporal variations of network origin with respect to Earth center of mass: **SLR**
- **Timing:**
  - +Station and satellite clock solutions: **GNSS**
  - +Time and frequency transfer between time laboratories: **GNSS**
- **Fundamental Physics:**
  - +General relativity and alternative theories: **SLR/LLR**
  - +Light bending, time dilation: **VLBI**

