The Global GNSS, SLR, VLBI, and DORIS Networks and their Support of GGOS:

IGS+ILRS+IVS+IDS

Summary:
The global networks of the IAG's geodetic services, the International GNSS Service (IGS), the International Laser Ranging Service (ILRS), the International VLBI Service for Geodesy and Astrometry (IVS), and the International DORIS Service (IDS), provide the ground-based infrastructure for GGOS. The observations obtained from these global networks provide the fundamental information used for the determination and maintenance of the International Terrestrial Reference Frame (ITRF)—an accurate set of positions and velocities that provides a stable, coordinate system for the Earth. The IGS operates a network of over 300 stations worldwide. These stations observe the position of the satellites using very-long-baseline interferometry. The data from these stations is used to determine the position of the satellites with respect to the Earth. The data is then used to update the ITRF, which is the global reference frame. The ITRF is used to determine the motion of the Earth's crust and to monitor the movement of tectonic plates.

Scientific Contributions of the IGS, ILRS, IVS, and IDS:
- **Earth Orientation Parameters (EOP):** The EOP are used to determine the rotation of the Earth. The EOP are determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The EOP are used to improve the accuracy of the ITRF.
- **Celestial Reference Frame (CRF):** The CRF is used to determine the position of the stars. The CRF is determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The CRF is used to improve the accuracy of the ITRF.
- **Tropospheric zenith delays:** The tropospheric zenith delays are determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The tropospheric zenith delays are used to improve the accuracy of the ITRF.
- **Limb sounding for global profiles of water vapor:** The limb sounding for global profiles of water vapor is determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The limb sounding for global profiles of water vapor is used to improve the accuracy of the ITRF.
- **Homogenous network distribution:** The homogenous network distribution is determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The homogenous network distribution is used to improve the accuracy of the ITRF.
- **Network densification:** The network densification is determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The network densification is used to improve the accuracy of the ITRF.
- **ITRF scale and temporal variations:** The ITRF scale and temporal variations are determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The ITRF scale and temporal variations are used to improve the accuracy of the ITRF.
- **Co-location of 3 Techniques (14 sites):** The co-location of 3 Techniques (14 sites) is determined by analyzing the data from the IGS, ILRS, IVS, and IDS. The co-location of 3 Techniques (14 sites) is used to improve the accuracy of the ITRF.

References:

**Data Sources:**
- IGS
- ILRS
- IVS
- IDS
- Other agencies

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**Supporting Agencies:**
- NASA
- NSF
- Other agencies

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