

Global Geodesy Supply Chain - underpinning infrastructure for earthquake science -

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The Earth is a planet which is continuously moving and deforming, and thus accurate observations are not possible in the most of Earth Science fields if accurate spatio-temporal variation of the Earth's shape is not available. The most of observations related to earthquake science also need accurate positions of the sensors, and thus dependent on products which give information on Earth's shape and its spatio-temporal variation.

This information on the Earth, more specifically geodetic reference frame (Earth's shape), Earth Rotation, and Earth's gravity field, are called geodetic products, and generated only by global collaboration on continuous global geodetic observation, data sharing and analysis. This series of collaboration is called global geodetic supply chain (Fig 1), and the global geodetic supply chain is a key to deliver geodetic products to users in all science and social fields all over the world. The geodetic products give references which enable all human activities describe their place on the Earth, but the most of users do not aware value of the global geodetic supply chain yet, and thus all components of the global geodetic supply chain are maintained only by best effort of geodetic station operators, data centers, and analysis centers. This means that there is a risk on the global geodetic supply chain to be easily degraded or stopped by lack of resources at the contributors.

The United Nations recognized this risk and established a new UN entity, the United Nations Global Geodetic Center of Excellence (UN-GGCE) in 2023 at the UN Campus in Bonn to support the Member States to make the global geodetic supply chain more sustainable. UN-GGCE published a report entitled "Hidden Risk: How weaknesses in the global geodesy supply chain could have catastrophic impacts on critical infrastructure and national economies" in June 2024 as a background report for decision-makers to raise their awareness on the value of global geodetic supply chain. This report reveals critical impacts caused by failure in the global geodetic supply chain especially to space missions and Earth observations. For example, geodetic products such as Earth Rotation Parameters are critical for stable operation of the Global Navigation Satellite System (GNSS), and accuracy of its positioning and time synchronization is easily degraded once updates of the ERPs are stopped. The report also recommends the Member States to urge key activities including strengthening national awareness and governance in geodesy, recognizing the global geodetic supply chain as national critical infrastructure and engaging in bilateral or multilateral agreements with other Member States. The USA and Japan are two of core contributors to the current global geodetic supply chain and this presentation intends to raise awareness on the value of geodesy in earthquake science community between the U.S. and Japan.

References

United Nations Global Geodetic Centre of Excellence (2024): Hidden Risk - How weaknesses in the global geodesy supply chain could have catastrophic impacts on critical infrastructure and national economies,

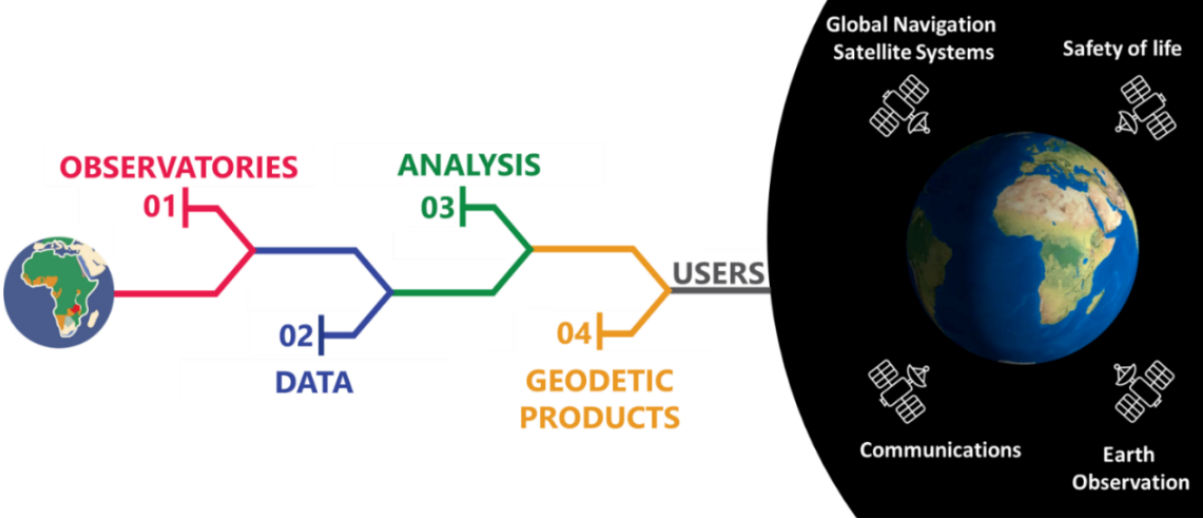


Figure 1: Global Geodetic Supply Chain (UN-GGCE, 2024)