



UNITED NATIONS GLOBAL GEODETIC CENTRE OF EXCELLENCE

MODERNISING GEOSPATIAL REFERENCE SYSTEM CAPACITY DEVELOPMENT WORKSHOP

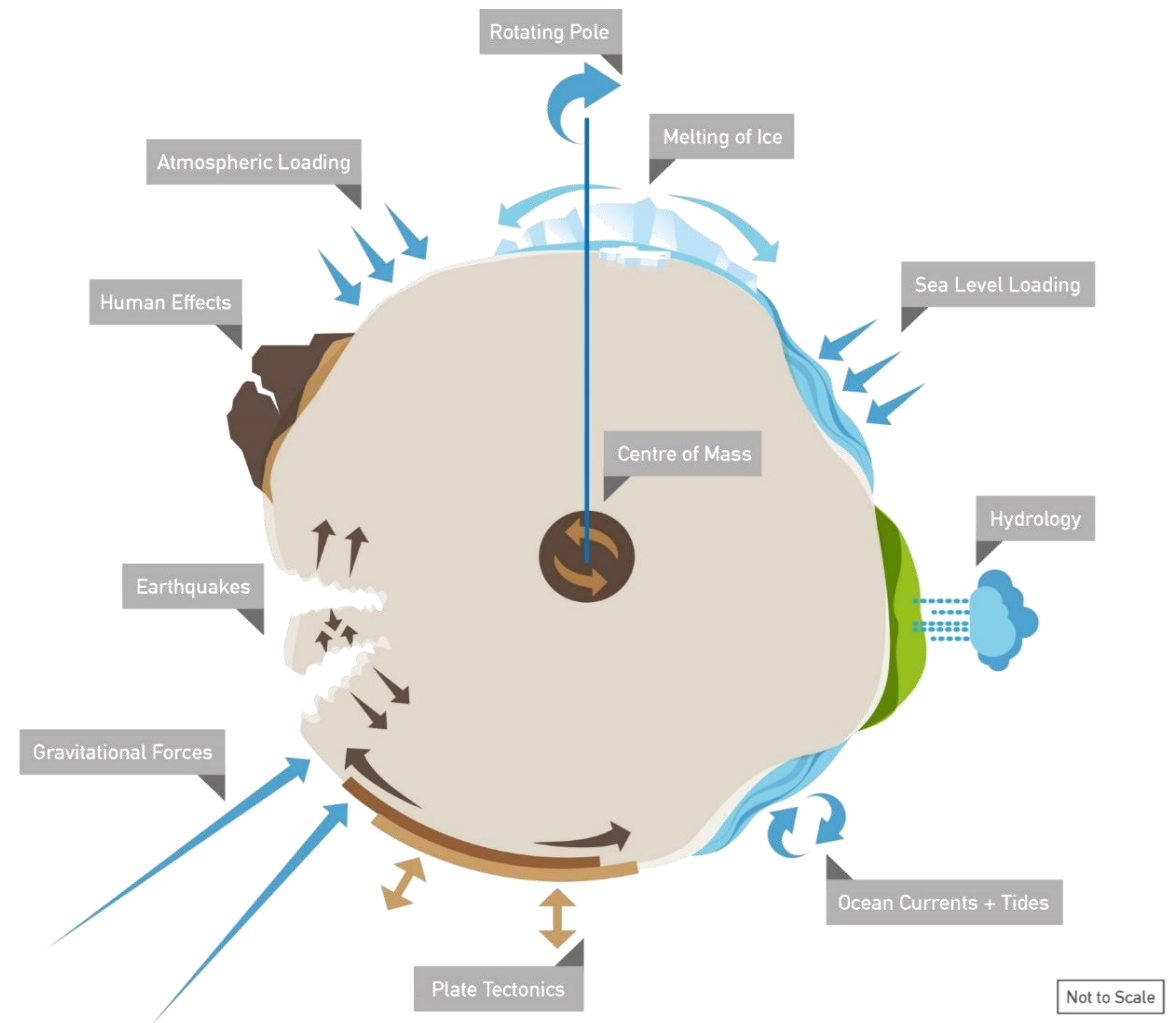
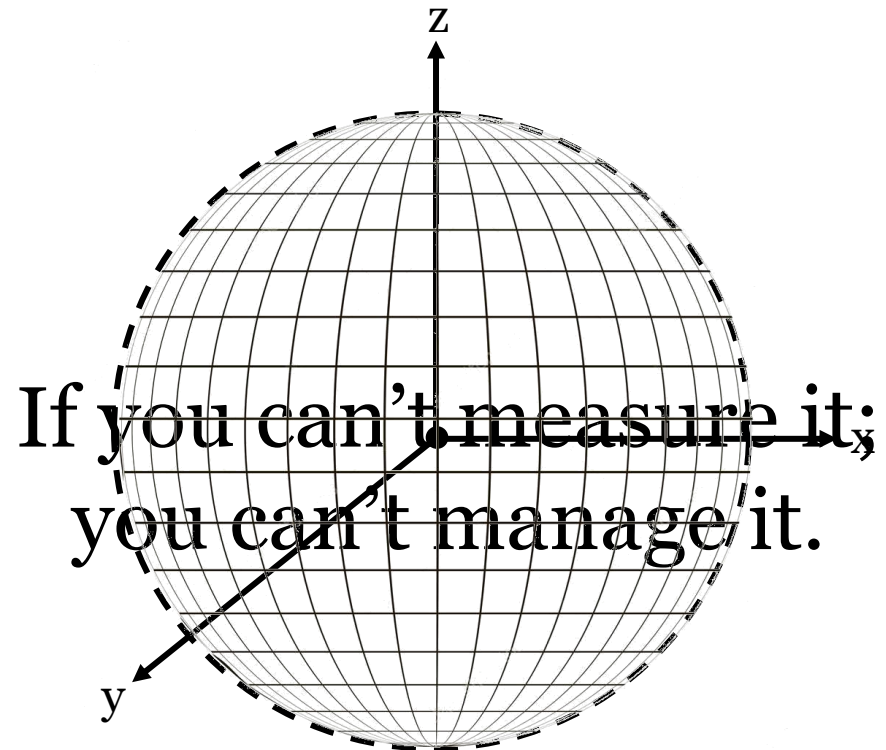
Aligning national geodetic datums to ITRF

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HOW

Day 1, Session 2 [\[1 2 4\]](#)

Acknowledgements: Zuheir Altamimi (FRA); Detlef Angerman (TUM); Johannes Bouman (GER); Jan Dostal (UN-GGCE); Andrick Lal (SPC); Anna Riddell (AUS); Jeffrey Verbeurgt (BEL).



Source: Dr Anna Riddell, Geoscience Australia



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Motivation for aligning NGD with ITRF

Accurate Positioning and Navigation

- GNSS are closely aligned to ITRF.
- Alignment of a country datum to ITRF ensures that geospatial data within a country aligns seamlessly with satellite positioning, enabling high-precision navigation and surveying.

Global Consistency and Standardization

- The ITRF provides a globally consistent reference system.
- By aligning national geodetic datums to it, countries ensure their geospatial data and mapping systems are interoperable with others. This is essential for international cooperation in areas like navigation, aviation, and disaster management.

Improved Scientific Research

- The ITRF supports Earth science research, including plate tectonics and crustal motion, sea-level rise monitoring through precise satellite altimetry and tracking changes in the Earth's gravity field for applications like understanding mass redistribution (e.g., melting glaciers).
- Aligned datums allow local data to contribute meaningfully to these global scientific efforts.



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Motivation for aligning NGD with ITRF

Disaster Management

- Precise and consistent geodetic data is critical for natural disaster prediction, monitoring, and response. For example, accurate positioning aids in early warning systems for earthquakes, tsunamis, and landslides.
- Post-disaster, consistent datums ensure rescue operations and recovery efforts are coordinated effectively across borders.

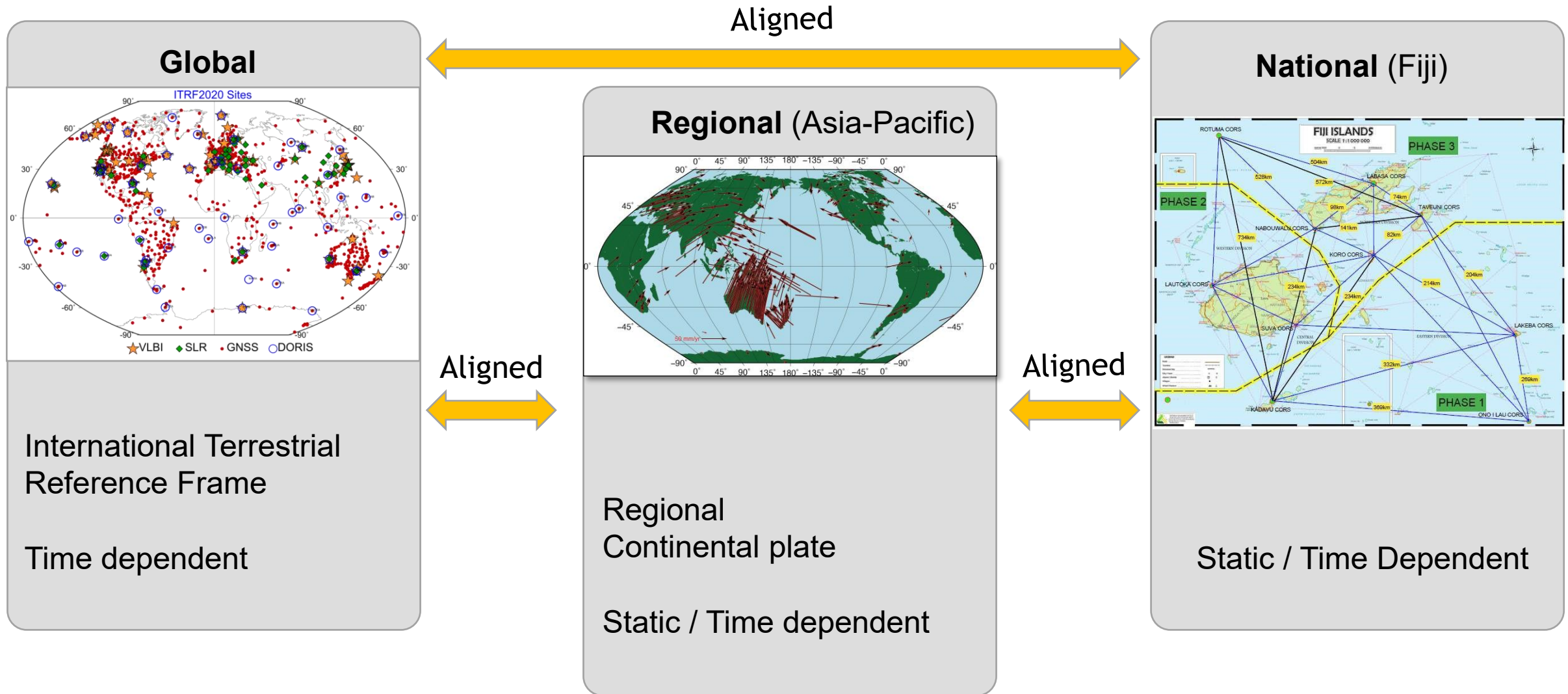
Economic Efficiency

- Misaligned geodetic datums can lead to costly errors in infrastructure projects, such as pipelines, bridges, and cross-border transportation networks. Alignment reduces discrepancies, minimizing errors and disputes in construction, land management, and resource allocation.

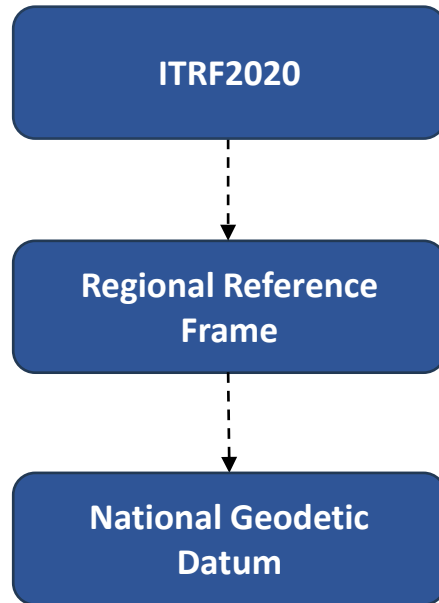


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How to align NGD with ITRF

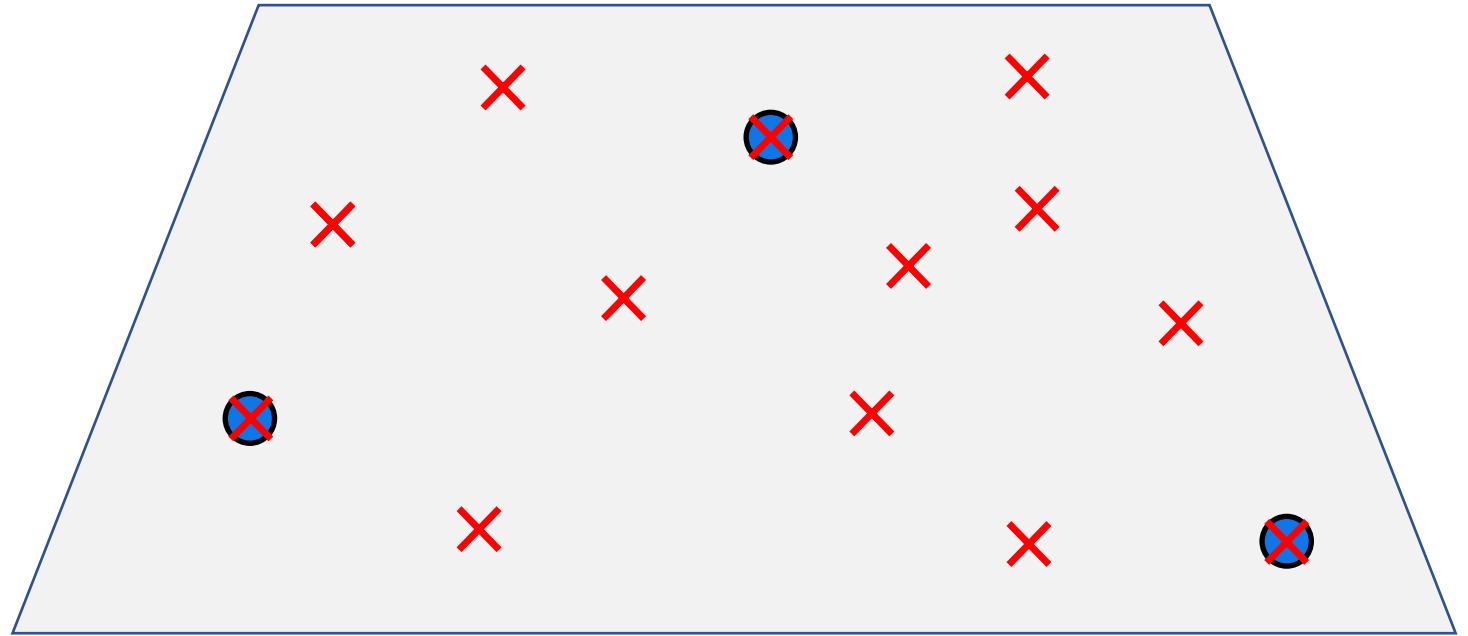


1. Choose an ITRF realisation and epoch to align to (e.g. ITRF2020@2024)
2. Include the GNSS Continuously Operating Reference Stations from your country in the regional reference frame (e.g. APREF) or compute their coordinates with respect to ITRF sites
3. The coordinates from the GNSS CORS in your country which are analysed in the regional reference frame or ITRF are used as the constraint in the national adjustment.



How to align NGD with ITRF

- ✗ - GNSS CORS
- - GNSS CORS included in regional / international reference frame



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