WORKING WEEK 2025
AND Locate25 THE NATIONAL GEOSPATIAL CONFERENCE
Collaboration, Innovation and Resilience: Championing a Digital Generation
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Initial implementation of Chile's REDGEOMIN datum in Trimble Geodetic Library

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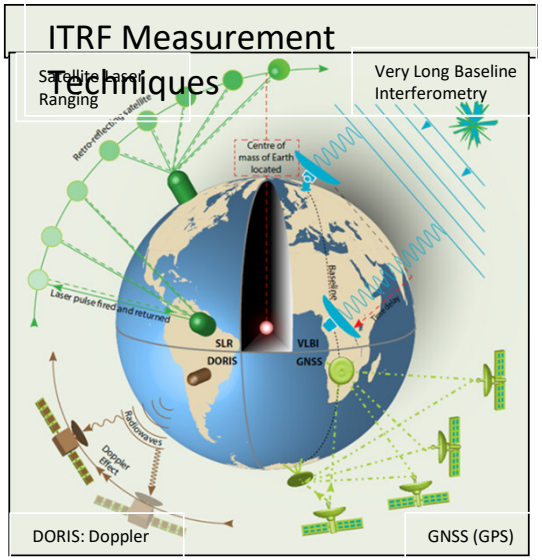
Time-dependent datum transformation in TGL

between ITRF & Global* coordinates

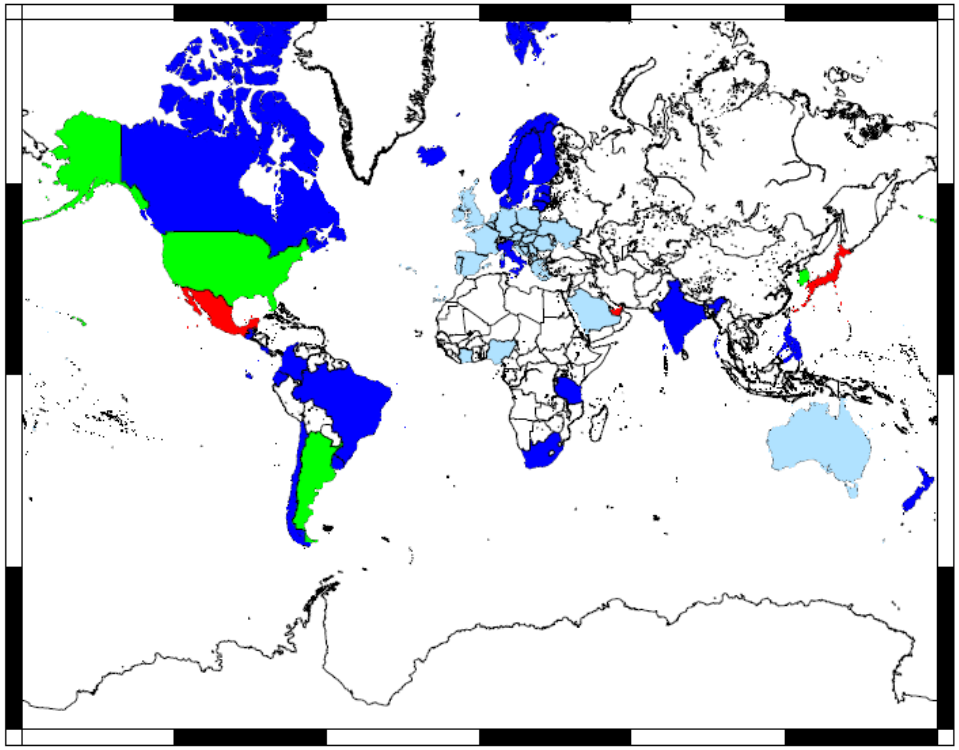
*the term Global coordinates includes many ITRF based national datums

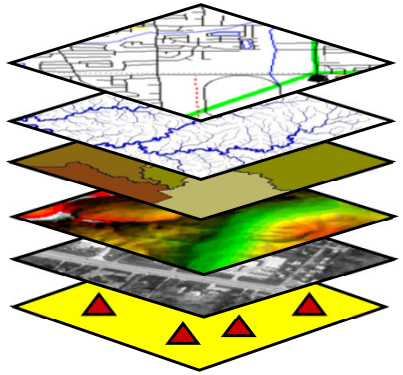
Datum transformation 14 param

Displacement model



ITRF (currently ITRF2020) at epoch of measurement





National datum at reference epoch

Euler Poles

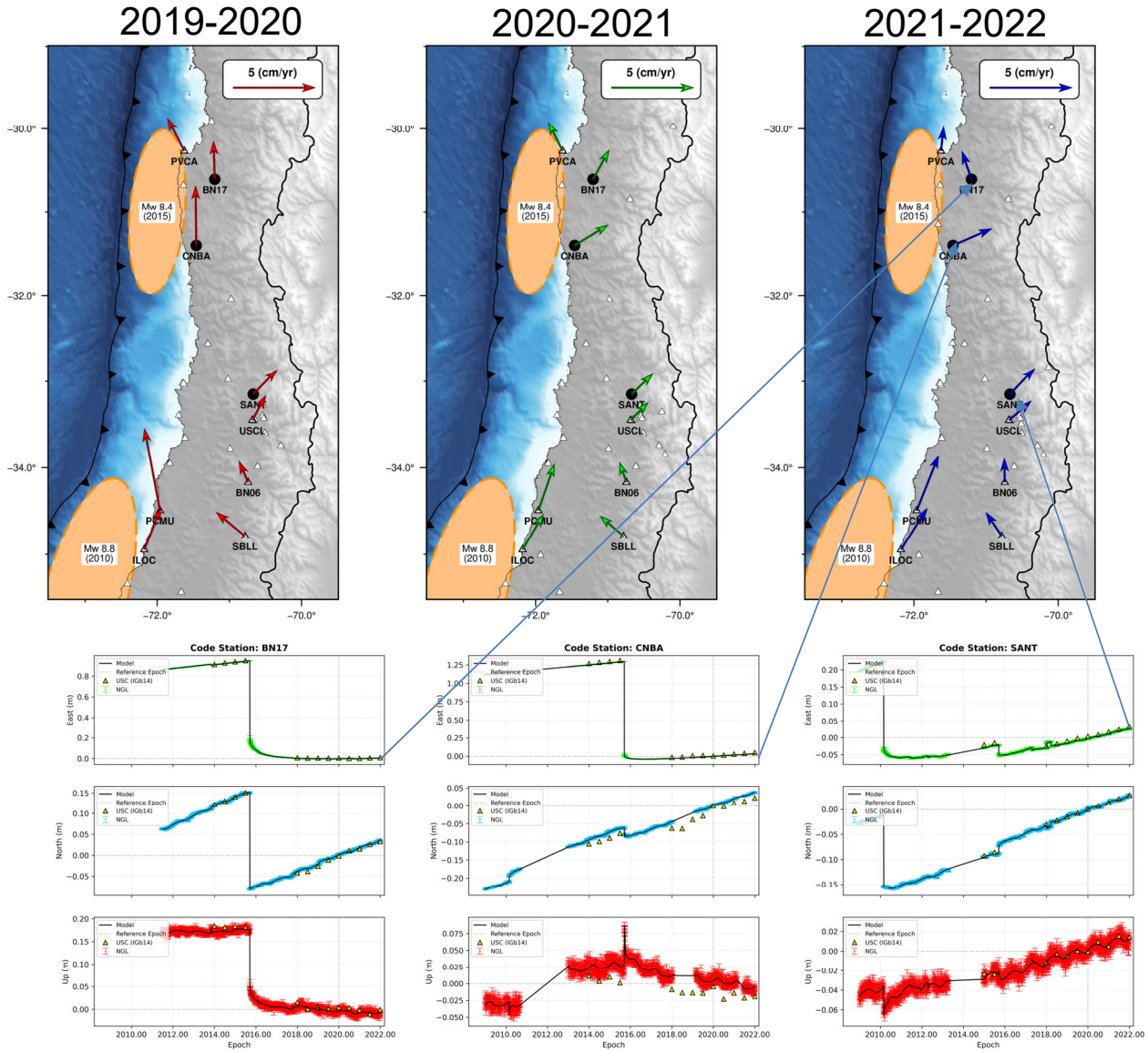
Velocity grid

Velocity + EQ & PS patches

Distortion grid

Timeseries based Interpolation

- Because Chile's velocity field is variable both temporally and spatially USACH has developed a timeseries-based interpolation strategy
- Interpolation relies on taking adjacent stations and determining the displacement for each component at the epoch in question.
- Then using a thin plate spline interpolation procedure to estimate the coordinate for an unknown point



Graphics from José Tarrío Universidad de Santiago de Chile (USACH)

ITRF2020 to REGEMON conversion

- The timeseries based approach developed by USACH can't be implemented in TGL because TGL is based on bilinear interpolation of grids
- We approximated their approach by subtracting the USACH Bernese solution for all of the cGNSS stations for the REDGEOMIN epoch (t_{ep}) from the most current solution (t_{sol}). We then gridded these to form a datum shift grid.
- We corrected for ongoing displacement by subtracting the current and penultimate (t_{sol-1}) datum shift grids to form a difference grid.
- The REDGEOMIN coordinate is just the interpolated datum shift grid (DSG) plus the difference grid (DG) multiplied by the time between the eom and the epoch of the last solution (Δt).

$$m_k(t_{ep}, \theta, \lambda) = DSG_k(t_{ep}, t_{sol}, \theta, \lambda) + DG_k(t_{sol-1}, t_{sol}, \theta, \lambda) * (\Delta t)$$

Test of REDGEOMIN conversion

22 points	e m	n m	u m	combined
RMS	0.0046	0.0034	0.0040	0.0069
Max	0.0042	0.0055	0.0042	0.0180
Min	-0.0175	-0.0011	-0.0077	0.0027
average	-0.0024	0.0032	-0.0015	0.0062

Conclusion mm level rms Only one point had total resid > 1cm

Location of test Points. Orange dot shows the worst residual

The most relevant SDGs related to the presentation and theme of this session

1st relevant SDG

2nd relevant SDG

3rd relevant SDG

SUSTAINABLE DEVELOPMENT GOALS

International Federation of Surveyors supports the Sustainable Development Goals