Initial implementation of Chile's REDGEOMIN datum in Trimble Geodetic Library

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SUMMARY

Since 2020, Trimble Geodetic Libraries (TGL) have supported deformation models to correct coordinates from the epoch of measurement (eom) to the reference epoch of National datums. This step is critical to allow coordinates from Trimble's RTX system to be accurately transformed in to epoch of measurement of the national datum. Currently TGL supports 63 dynamic datums including NZGD2000, GDA2020 and a beta version of PGD2020 which allows NAMRIA to use Trimble products to complete their work on this datum.

However, maintaining accurate geodetic coordinates in Chile is a significant challenge to geodesists because of the combination of a very active plate boundary, co-seismic deformation from a series of great earthquakes and complex time varying post seismic deformation field. The ADELA (Analysis pf Deformation beyond Los Andes) project from the University of Santago Chile (USACH) has developed a novel approach based on time series analysis of the time series from continuous GNSS from Chile and adjacent parts of South America. However, this approach is challenging to implement in TGL which is based on the application of a functional model of deformation where the values for geophysical parameters (crustal velocities, earthquake shifts and post seismic decay constants) as a function of latitude and longitude are determined from the interpolation of grids. Implementing this in TGL requires that a new paradigm be introduced. In this paper, we describe how we have developed a hybrid approach where the individual network solutions based on USACH's Bernese processing of a network of over 250 cGNSS stations are used to develop a series of distortion grids by differencing the Bernese crd files. These grids together can be used to approximate the time dependent motion of Chile. This approach has two advantages compared to the geophysical based models we have used in other areas. First, the process of developing distortion grids can be automated which substantially reduces latency. In addition we do not have to wait for new geophysical models to be developed which gives us substantially greater flexibility in

modeling deformation.