EVALUATION OF SOME MEAN DYNAMIC TOPOGRAPHY MODELSFOR UNIFYING THE FRAMES IN THE CHILEAN HEIGHT SYSTEM

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Chile is a long, narrow, and limited in the east by the Andes Mountains, and to the west by the Pacific Ocean. In addition, it presents a particular topography as strong variations in heights and several geographical characteristics which put impossibilities for connecting regions with basis in conventional survey approaches. These characteristics put several difficulties for the gravimetric and leveling surveys. In this context, Chile as well as most of the countries in South America, carry out its leveling network from several tide gauges taking advantage of its coast in the Pacific Ocean. Most of the leveling lines were started from the coast to the interior, and not linked together mainly because fiords and glaciers. Nowadays, one of the aims of the Geodesy community is the unification of all national geodetic networks in a global context. This purpose is fundamental for establishing a consistent structure of an Earth Observing System. The geometrical positioning networks are unified, mainly with the help of space geodesy techniques (e.g. GNSS, SLR, VLBI and DORIS). On the other side, an unified vertical positioning still remains as a problem at the different scales; local, regional and global. Usually, each segment is independent from the others. In order to solve this problem and other aspects in America, SIRGAS (Sistema de Referencia Geocentrico para las Americas) was created. Specifically the working group III is the responsible for defining a Height System with physical meaning and promoting its realization with basis in one unified datum and vertical network. To resolve the continental unification of vertical networks, first it is necessary to solve the local unifications. In this context is located our attempt to unify three segments of Chilean vertical network. Several alternatives for unification of vertical networks exist. However, with the available data few approaches are possible. One possibility is the use of an oceanographic approach. As is well know, the separation between Mean Sea Surface and Geoid is the main reason for most of offsets among local vertical frames in the world. Then, the unification problem could be solved from estimation of that separation, the so-called Mean Dynamic Topography (MDT) or Sea Surface Topography (SSTop). The present advancement in Sea Surface Topography and Geoid models, opens the possibility to explore the offset among the segments of the Chilean height frames through current models, DNSC08 and CNES_CLS_2011 MDT. Due to spatial resolution of the models (~1'), an interpolation was necessary. We used Krigging interpolation to obtain the SStop values in tide gauges location. Three tide gauges widely separated were used: Iquique (20°12'16'' S, 70°8'52'' O); Valparaiso (33°1'38'' S, 71°37'33'' W) and Talcahuano (36°41' 43'' S, 73°6'22'' W). The differences between SSTop values for every tide gauge were calculated. The results from MDT models were compared with Mean Sea Level (MSL) values obtained from tide gauge data. The MSL computation was done over the 1993-2004 period, the same used in construction the DNSC08 MDT model. The obtained differences in the SSTop for Iquique-Valparaiso, Valparaiso-Talcahuano with respect to the values obtained from TG were 38 and -3 cm from the DNSC08, and -5 7 and 35 cm from CNES_CLS_2011 MDT respectively.