GEODETIC OBSERVATION AND ANALYSIS SYSTEM IN SEISMICALLY ACTIVE REGIONS IN CHILE

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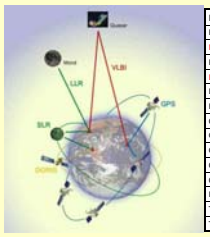
Introduction

Megathrust earthquakes can produce big deformation in the continental crust. This effect can be detected very precisely with GNSS observations but, one of the most problematic things, from geodetic point of view, is that every earthquake destroys the regional geodetic reference frame. We propose to analyze GNSS, VLBI and SLR observations, to produce solutions from each techniques. This will be made in three analysis centers, GNSS in IGM-Chile, SLR and VLBI in UDEC. We report here the status of the project and first results.

Technique and parameter sensibility



Parameter space	VLBI	GNSS	SLR
Radio sources (ICRF)	X		
Nutation	X	(X)	
Polar motion	X	X	X
DUT1	X		
Length of day	X	X	X
High frequent ERP	X	X	
Coord. + vel. (ITRF)	X	X	X
Geocenter		X	X
Gravity field coefficients		X	X
Orbit determination		X	X
Orbit of LEOs		X	X
Ionosphere	X	X	
Troposphere	X	X	
Time transfer		X	

SOFTWARE FOR SLR AND VLBI

DOGS – **D**GFI **O**rbit and **G**eodetic parameter estimation **S**oftware

OC - Orbit Computation, numerical integration of satellite orbits, adjustment of the orbit, earth orientation parameters, station coordinates and low degree spherical harmonics, using SLR observations. Least squares adjustment. Processing of all geodetic satellites is possible.

RI – Radio Interferometry, processing of VLBI observations, generation od station coordinates, earth orientation and nutation parameters.

CS – Combination and Solution, set of individual programs to combine various normal or observation equations reduce or eliminate variables and solve for parameters. Source can be any normal equation also from external source, usually in SINEX format. Adding of various conditions is possible.

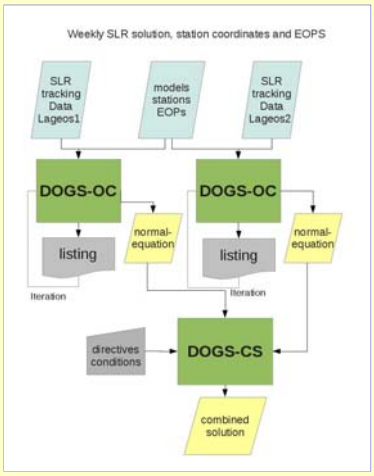
OV – Output and Visualization.

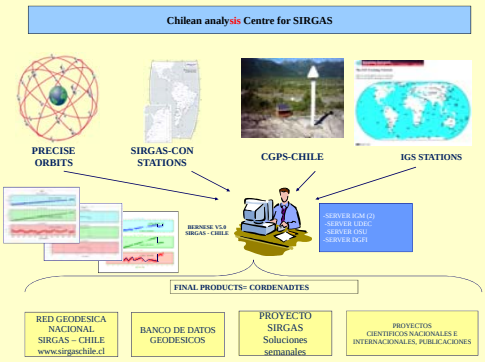
OU – Output post processing

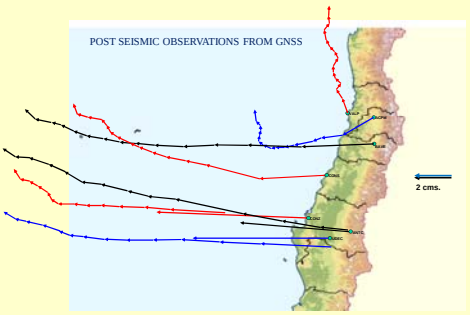
IN – Generation of inputs

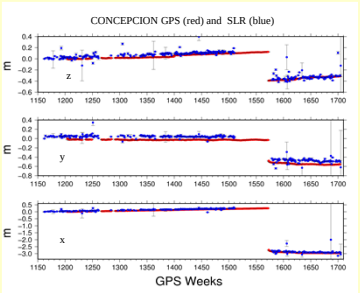
The program is under constant development and follows the actual IERS standards.

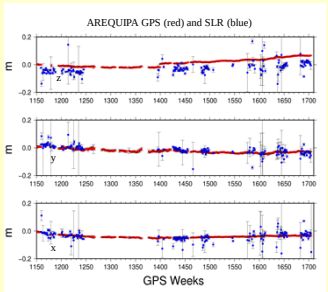
Development has started in 1980 with Fortran 77 Standard and is now completely in Fortran 2008.

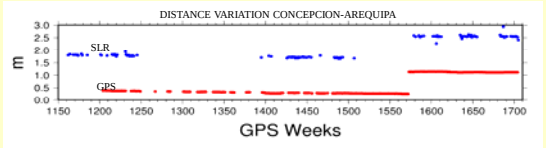


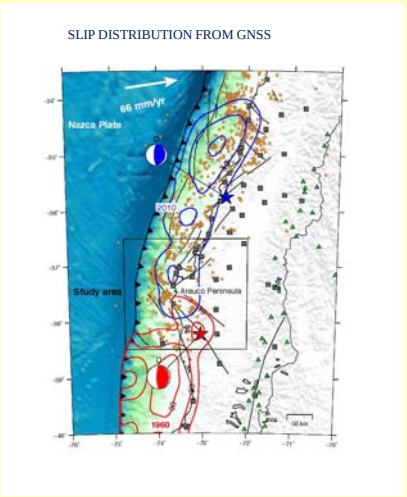












CONCLUSION

We installed three analysis centers, one for GNSS in IGM-Chile (for SIRGAS), one for SLR in UDEC, and one for VLBI, also in UDEC. The DOGS software, developed in DGFI, was brought to the state of the art in all conventions, also an English documentations was prepared. All data used for SLR and VLBI are globally distributed, but GNSS data are regional. VLBI was processed using the OCCAM software and now we will start to use also DOGS. Results from GNSS are useful to observe the co-seismic and post-seismic effects and can be used for geodetic and geophysical modeling.

The next step in the project will be to combine SLR, VLBI and GNSS solutions to obtain frequent TRFs which can be used to fast recover the regional frame, in case of earthquakes.

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