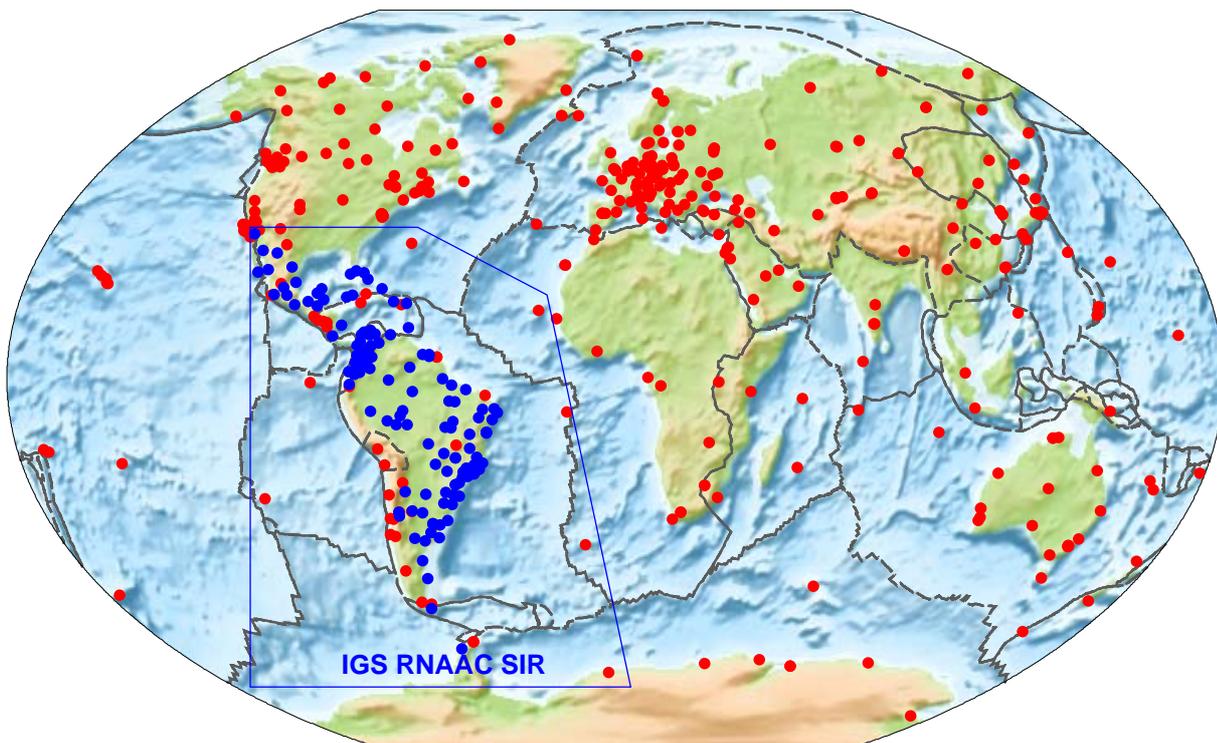


# Activities of IGS Regional Network Associate Analysis Centre SIRGAS (IGS RNAAC SIR) and Solution DGF08P01

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# Introduction

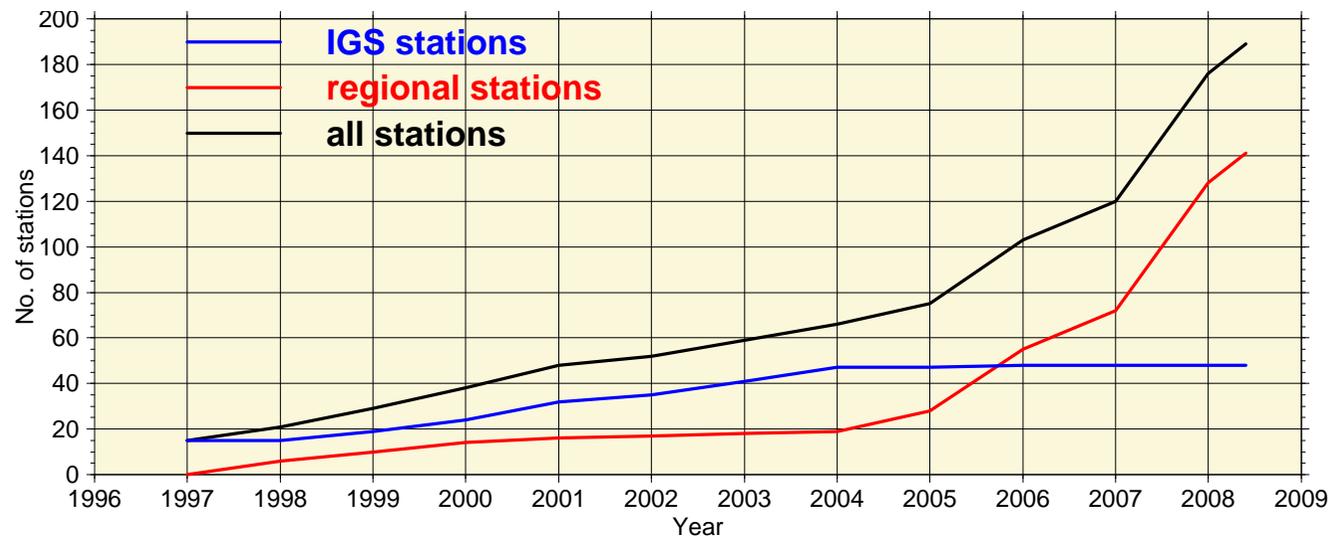
- The International GNSS Service (IGS) analysis a global and several regional satellite tracking networks by ten Analysis Centres (AC) and by seven Regional Network Associate Analysis Centres (RNAAC).
- Two Global Network Associate Analysis Centres (GNAAC) combine all global and regional network solutions to a global polyhedron
- The DGFI is acting as the IGS RNAAC SIR for the Geocentric Reference System for the Americas (SIRGAS)

# Introduction (cont'd)

- The IGS decided to introduce the new ITRF2005 (IGS05 resp.) solution and to implement absolute phase centre corrections starting with GPS week 1400
- To provide homogeneously processed weekly solutions for the complete time span, IGS RNAAC SIR is reprocessing all former weekly solutions since GPS week 0860 (July 1996)
- This talk presents a new position and velocity solution containing the weeks 1199 to 1470 (December 2002 to March 2008)

# Activities of IGS RNAAC SIR

- The IGS RNAAC is processing all permanent global and regional GPS stations of South America, Central America, the Caribbean, and surrounding areas
- Each week a coordinate solution is delivered to the IGS data centres
- At the beginning in July 1996 the weekly solutions contained only 10 IGS stations, today the number of processed stations has increased to 189, 131 of them are regional stations



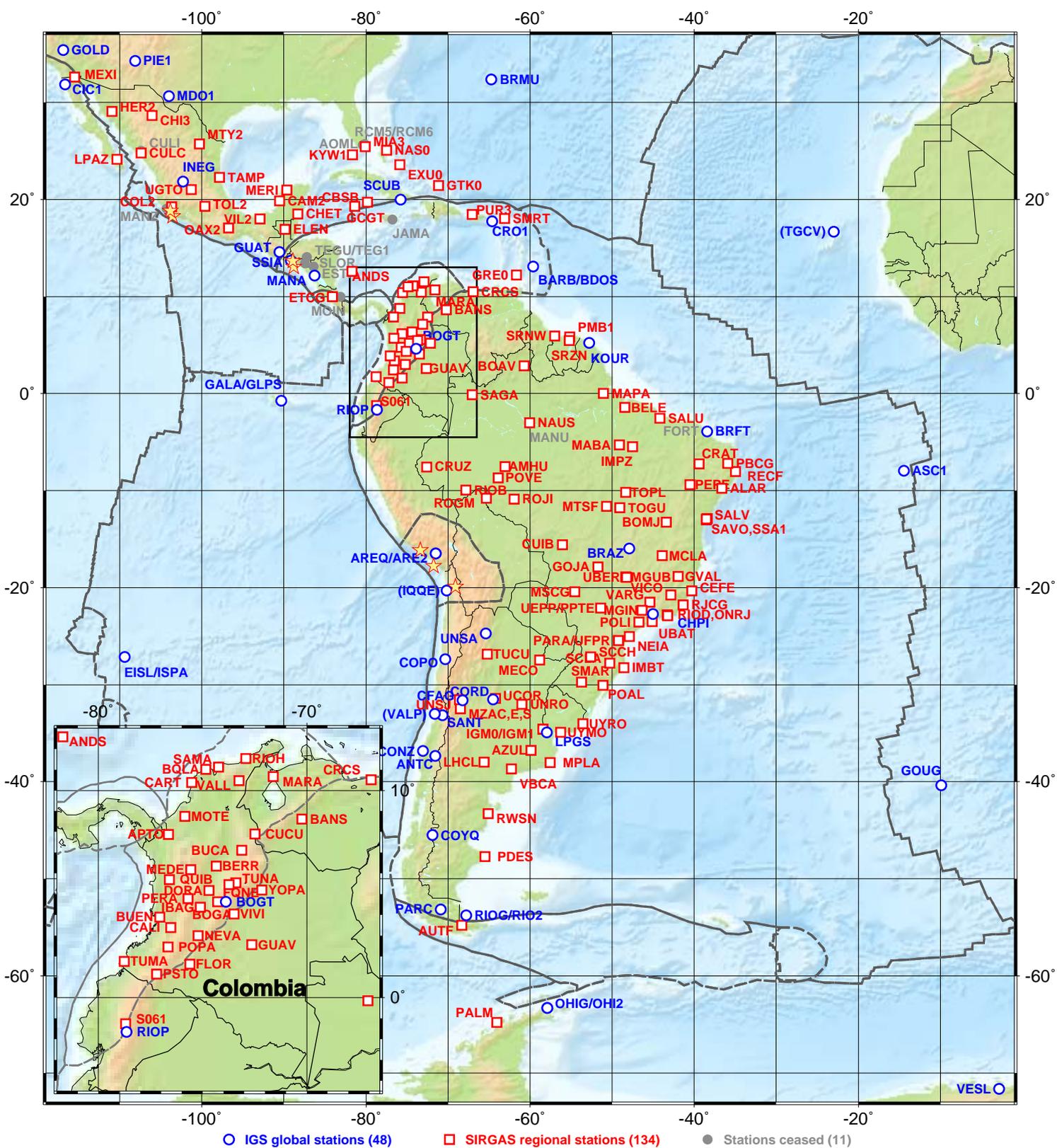
# Activities of IGS RNAAC SIR (cont'd)

- At the workshop of the SIRGAS-WG I in Rio de Janeiro in August 2006, Experimental Processing Centres (EPC) and Experimental Combination Centres (ECC) were installed. The DGFI was appointed as an ECC
- At various meetings (e.g. GRF2006, Munich, October 2006) comparisons of EAC solutions w.r.t IGS RNAAC solutions were presented with promising results
- ECC results are summarized in the DGFI Report 80 by L. Sanchez et al., 2008

# Activities of IGS RNAAC SIR (cont'd)

- Since the year 2000 accumulative combinations of all weekly normal equations resulting in a multi-year position and velocity solution are generated
- Previous position and velocity solutions are DGF00P01, DGF02P01, DGF04P01, and DGF06P01
- Two preliminary solutions DGF07P01 and DGF07P03 with reprocessed solutions were presented at the AGU meetings in Acapulco (May 2007) and San Francisco (December 2007) by posters

# IGS RNAAC SIR Network (Status: June 19, 2008)



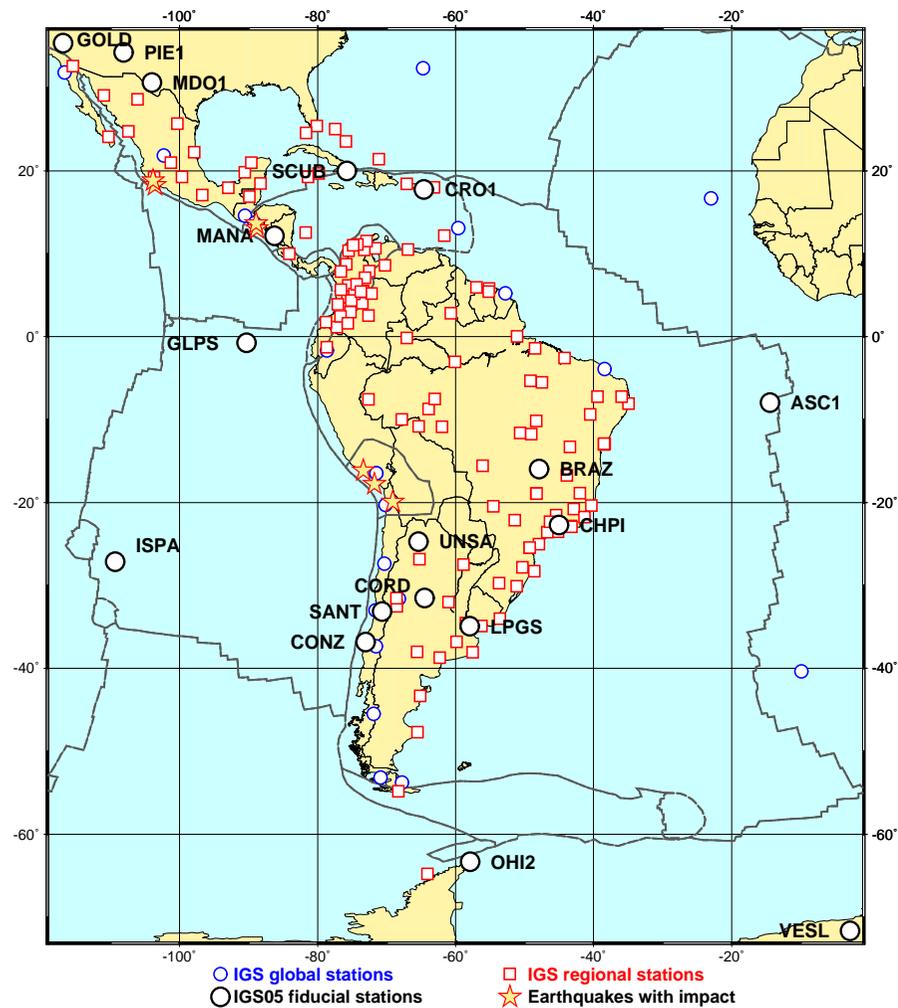
# IGS RNAAC SIR stations ordered by country

Country	Stations		Number		
	IGS Stations	Regional Stations	IGS	Reg.	
Antarctica	OHIG/OHI2, VESL	PALM	2	1	
Argentina	CFAG, CORD, LPGS, RIOG/RIO2, UNSA	AUTF, AZUL, IGM0/1, LHCL, MECO, MPLA, MZAC, MZAE, MZAS, PDES, RWSN, TUCU, UCOR, UNRO, UNSJ, VBCA	5	16	
Barbados	BARB/BDOS		1		
Brazil	BRAZ, BRFT, CHPI, (FORT)	ALAR, AMHU, BELE, BOAV, BOMJ, CEFE, CRAT, CRUZ, CUIB, GOJA, GVAL, IMBT, IMPZ, MABA, (MANU), MAPA, MCLA, MGIN, MGUB, MSCG, MTSF, NAUS, NEIA, ONRJ, PARA/UFPR, PBCG, PEPE, POAL, POLI, POVE, RECF, RIOB, RIOD, RJCG, ROGM, ROJI, SAGA, SALU, SALV, SAVO, SCCH, SCLA, SMAR, SSA1, TOGU, TOPL, UBAT, UBER, UEPP/PSTE, VARG, VICO	4	51	
Cape Verde	TGCV		1		
Chile	ANTC, CONZ, COPO, COYQ, EISL/ISPA, IQQE, PARC, SANT, VALP		9		
Colombia	BOGT	ANDS, APTO, BERR, BOGA, BQLA, BUCA, BUEN, CALI, CART, CUCU, DORA, FLOR, FQNE, GUAV, IBAG, MEDE, MOTE, NEVA, PERA, POPA, PSTO, QUIB, RIOH, SAMA, TUMA, TUNA, VALL, VIVI, YOPA	1	29	
Costa Rica	(MOIN)	ETCG	1	1	
Cuba	SCUB		1		
Ecuador	GALA/GLPS, RIOP	S061	2	1	
El Salvador	SSIA		1		
French Guyana	KOUR		1		
Guatemala	GUAT	ELEN	1	1	
Honduras	(SLOR), (TEGU/TEG1)		2		
Jamaica	(JAMA)		1		
Mexico	CIC1, INEG, (MANZ)	CAM2, CHET, CHI3, COL2, CULC, (CULI), HER2, LPAZ, MERI, MEXI, MTY2, OAX2, TAMP, TOL2, UGTO, VIL2	3	16	
Nicaragua	(ESTI), MANA		2		
Peru	AREQ		1		
Suriname		PMB1, SRNW, SRZN		3	
United Kingdom	ASC1, BRMU, GOUG		3		
Uruguay		UYMO, UYRO		2	
USA	(AOML), CRO1, GOLD, MDO1, PIE1, (RCM5/6)	KYW1, MIA3, PUR3	6	3	
Venezuela		BANS, CRCS, MARA		3	
Other regional sites		CBSB, EXU0, GCGT, GRE0, GTK0, NAS0, SMRT		7	
Stations in brackets are decommissioned (11 sites)			Total Number of sites (10 are identical/replaced): 192	48	134

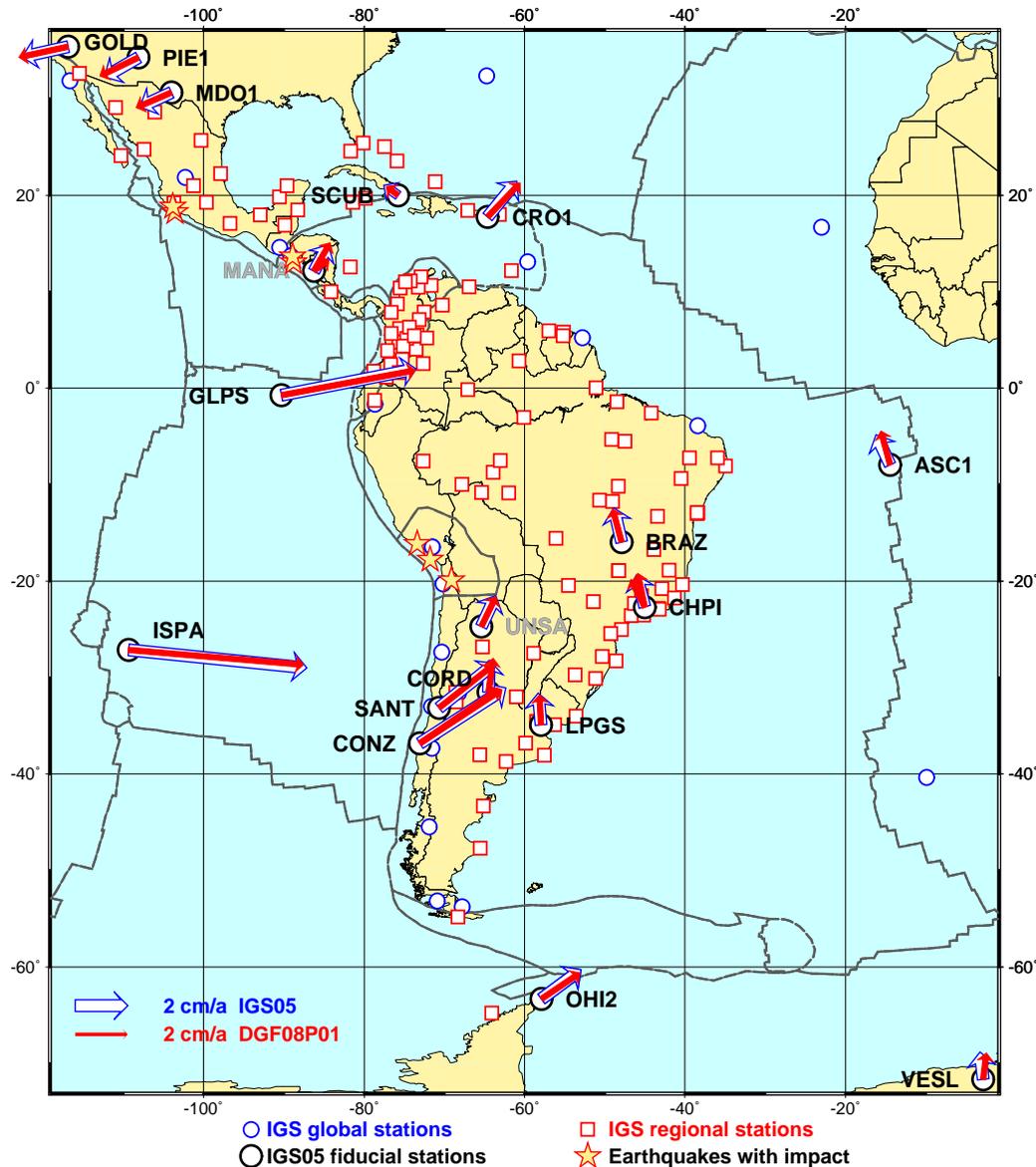
# Station position and velocity Solution DGF08P01

- The multi-year station and velocity solution DGF08P01 covers the time period from December 2002 (GPS week 1199) to March 2008 (GPS week 1470) with 272 reprocessed weeks
- The adjustment is done with the programme ADDNEQ2 of the Bernese GPS software
- The main features of the adjustment strategy is described in DGFI Report 79
- For the datum realization we adopted the positions and velocities of the IGS05 stations as fiducials
- The positions and velocities of these reference stations were constrained by NNR and NNT conditions w.r.t to IGS05 at epoch 2004.4, such that the network is optimally referred to IGS05 by least squares adjustment

# IGS05 Fiducial Stations in RNAAC SIR

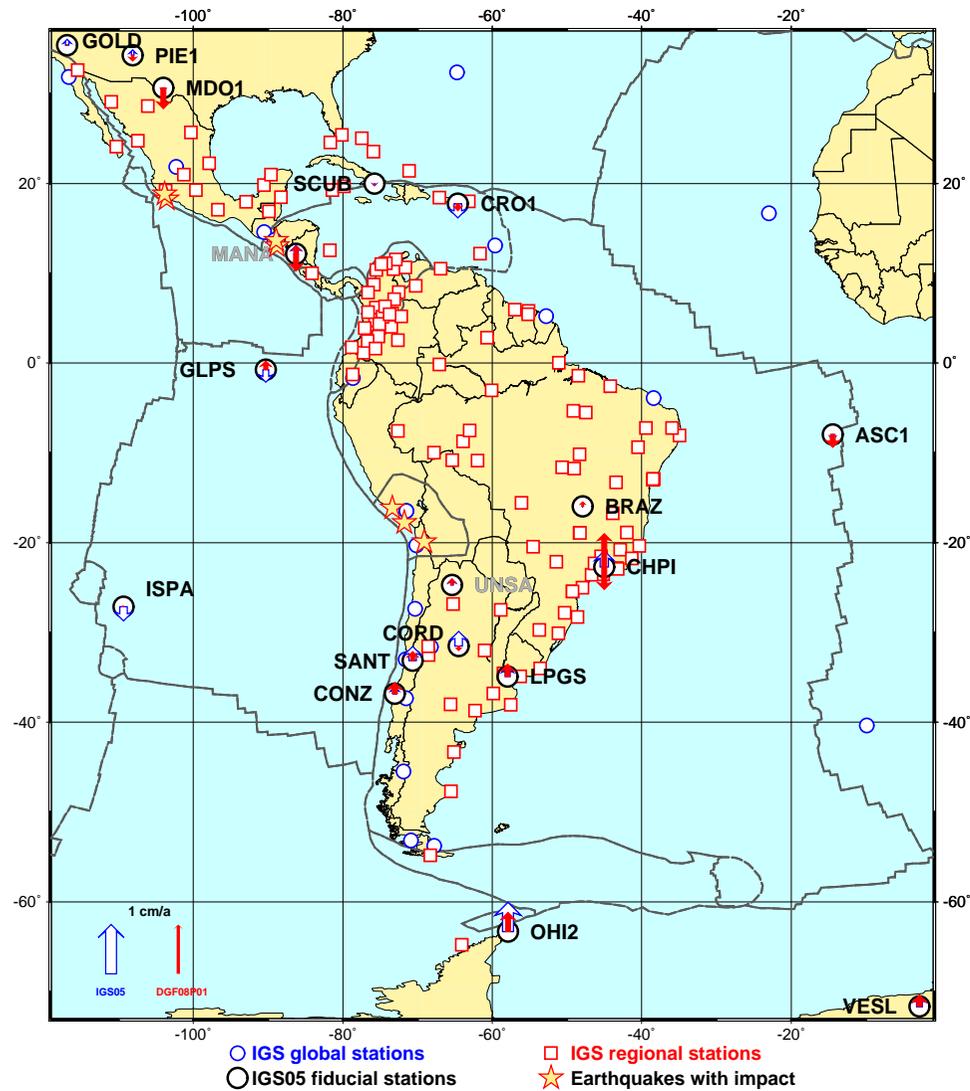


# Horizontal Velocities of IGS05 Stations

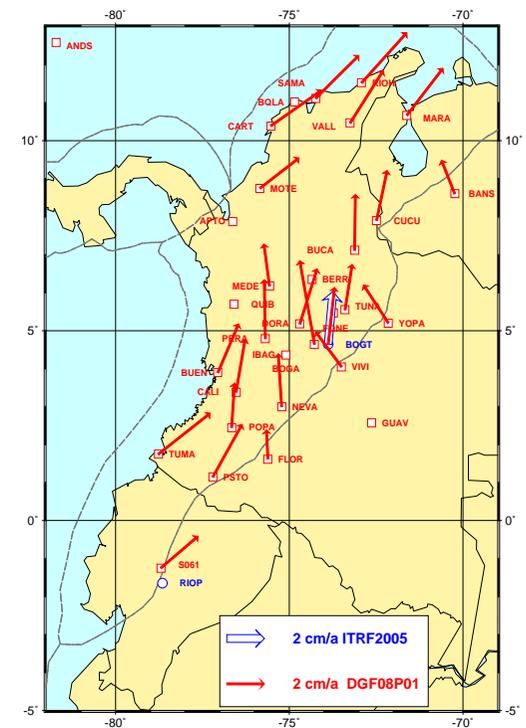
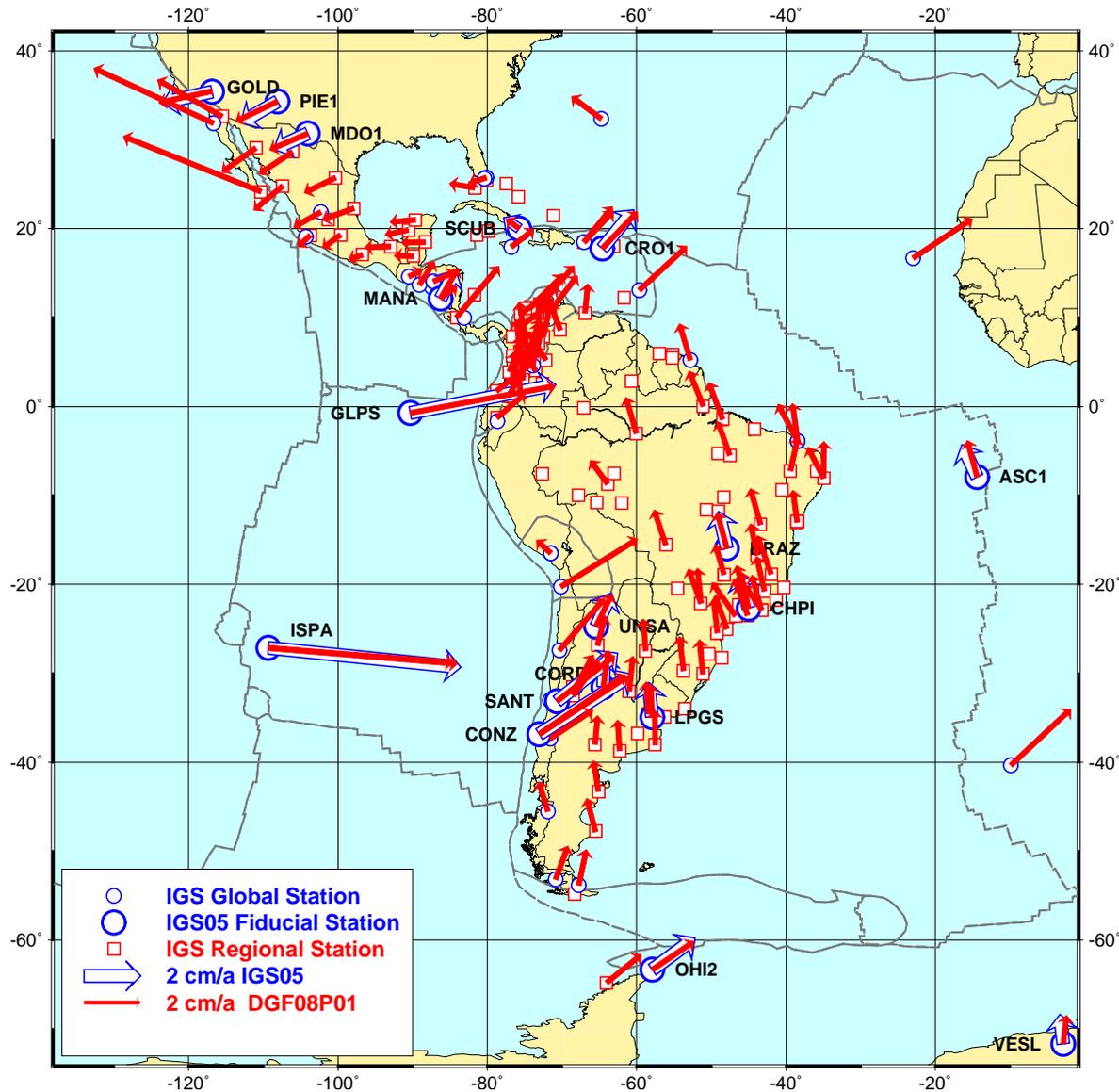


This and the next figure show the horizontal and vertical velocities of the IGS05 reference stations, representing the orientation of the solution DGF08P01; the IGS05 stations MANA and UNSA were excluded for the datum realization.

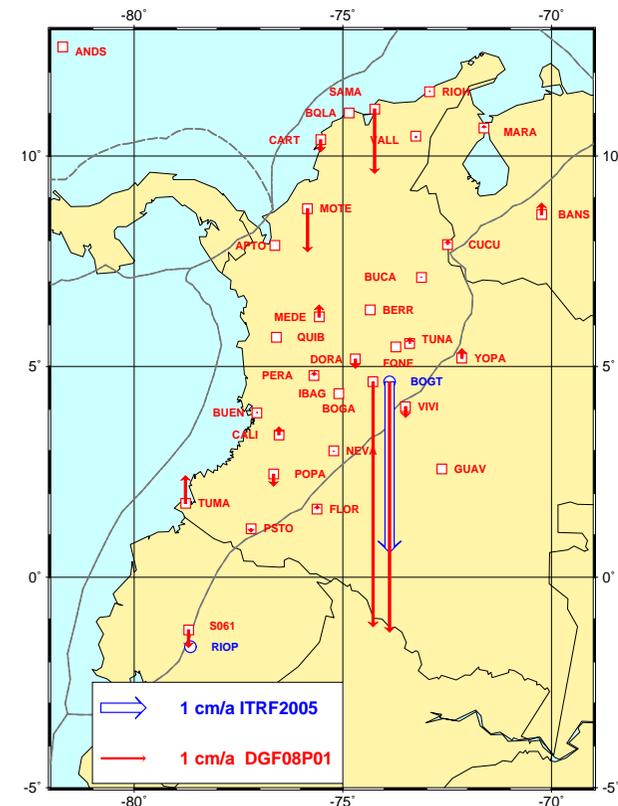
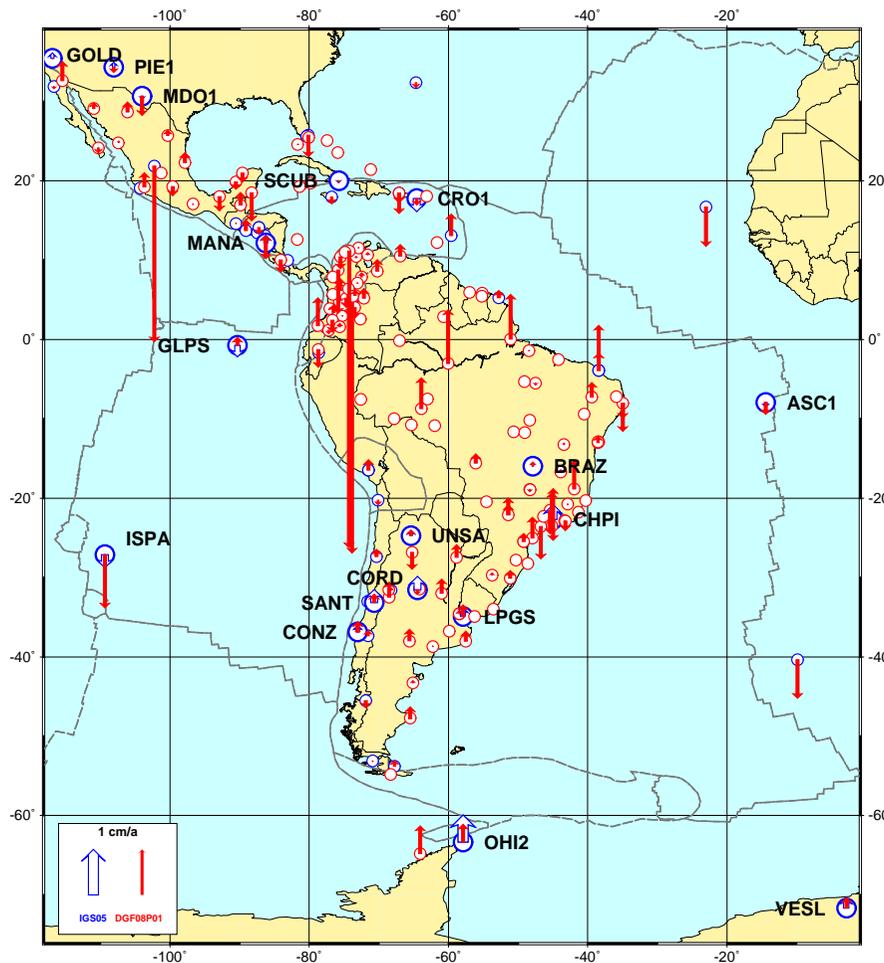
# Vertical velocities of IGS05 Stations



# Horizontal velocities of all DGF08P01 stations



# Vertical velocities of all DGF08P01 stations

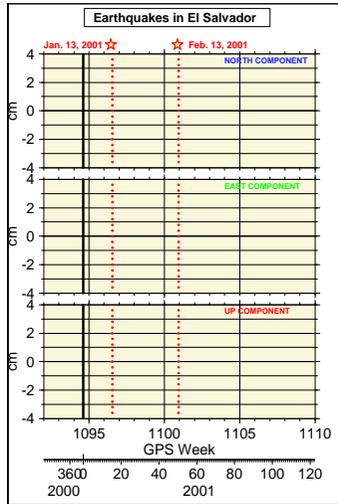


# Impact of earthquakes in the SIRGAS region

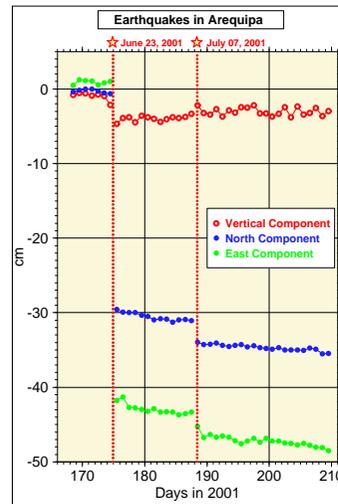
- The western part of the IGS RNAAC SIR region is a seismically extremely active area, and therefore earthquakes cause many episodic station displacements
- These episodic events have to be taken into account in the coordinate and velocity estimates by introducing new position and/or velocity parameters for these stations after an earthquake

# Earthquake Signals

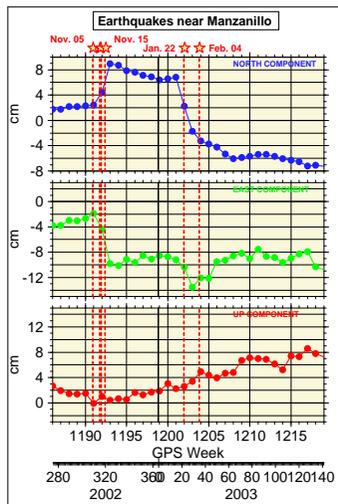
These earthquake signals have to be excluded from the station and velocity solution



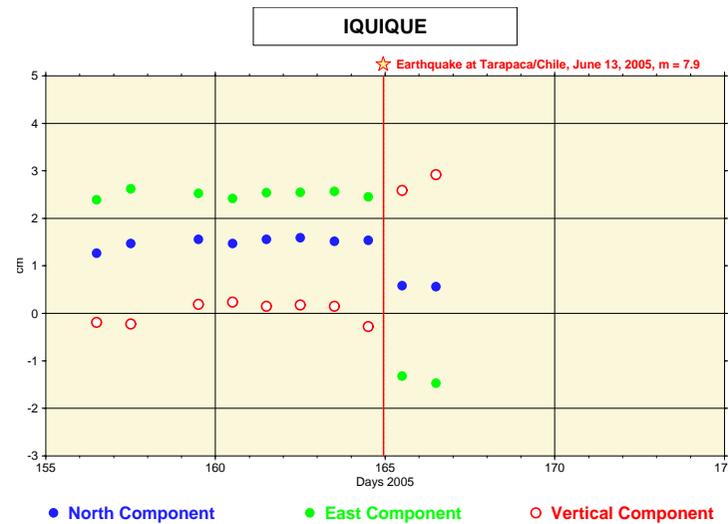
a) Earthquakes in San Salvador



b) Earthquakes in Peru



c) Earthquakes in Mexico

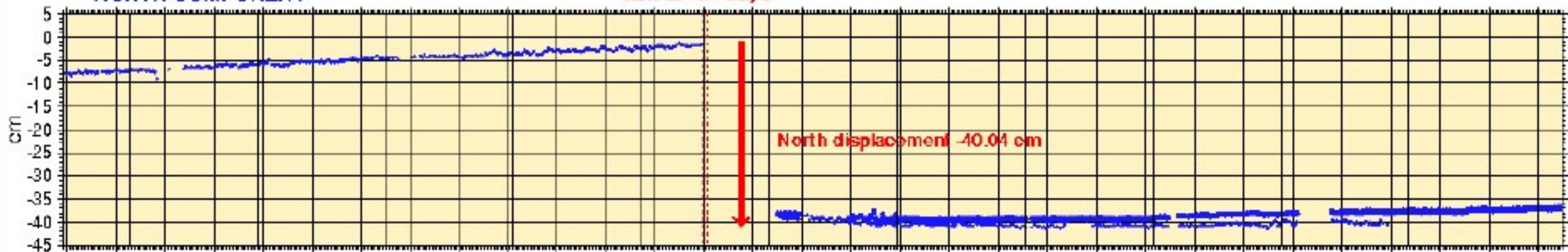


d) Earthquakes near Iquique

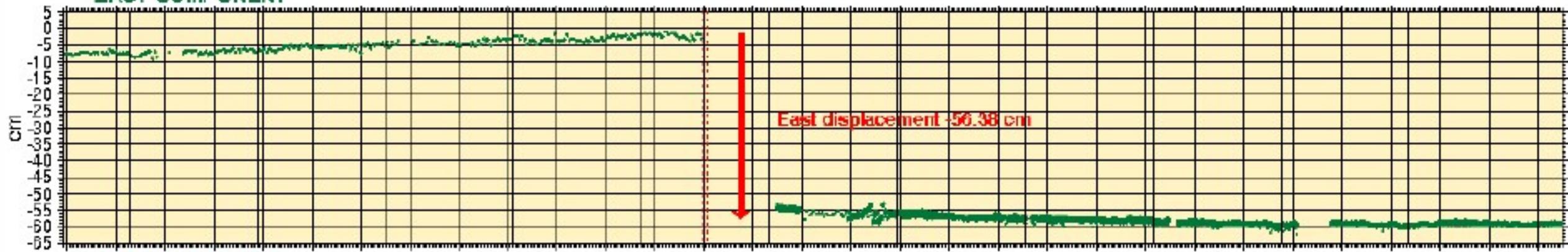
# AREQUIPA (AREQ)

Earthquakes near Arequipa 2001  
June 23 ✦ July 07

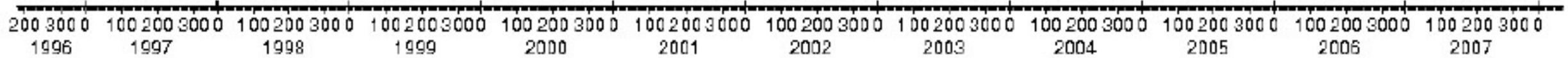
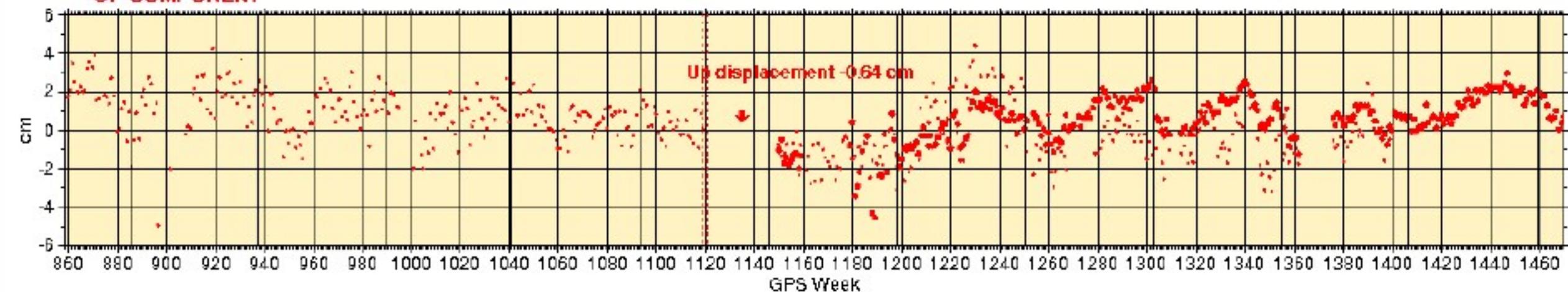
## NORTH COMPONENT



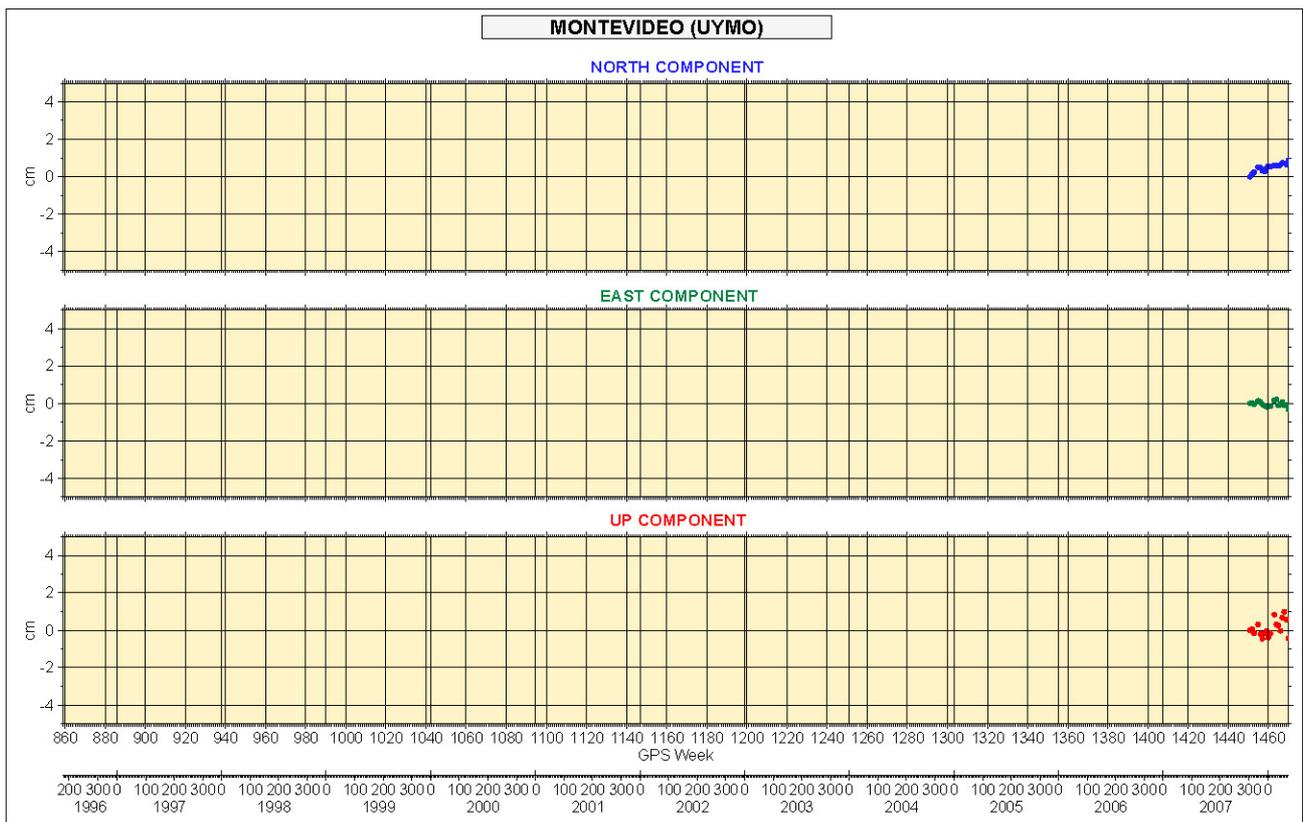
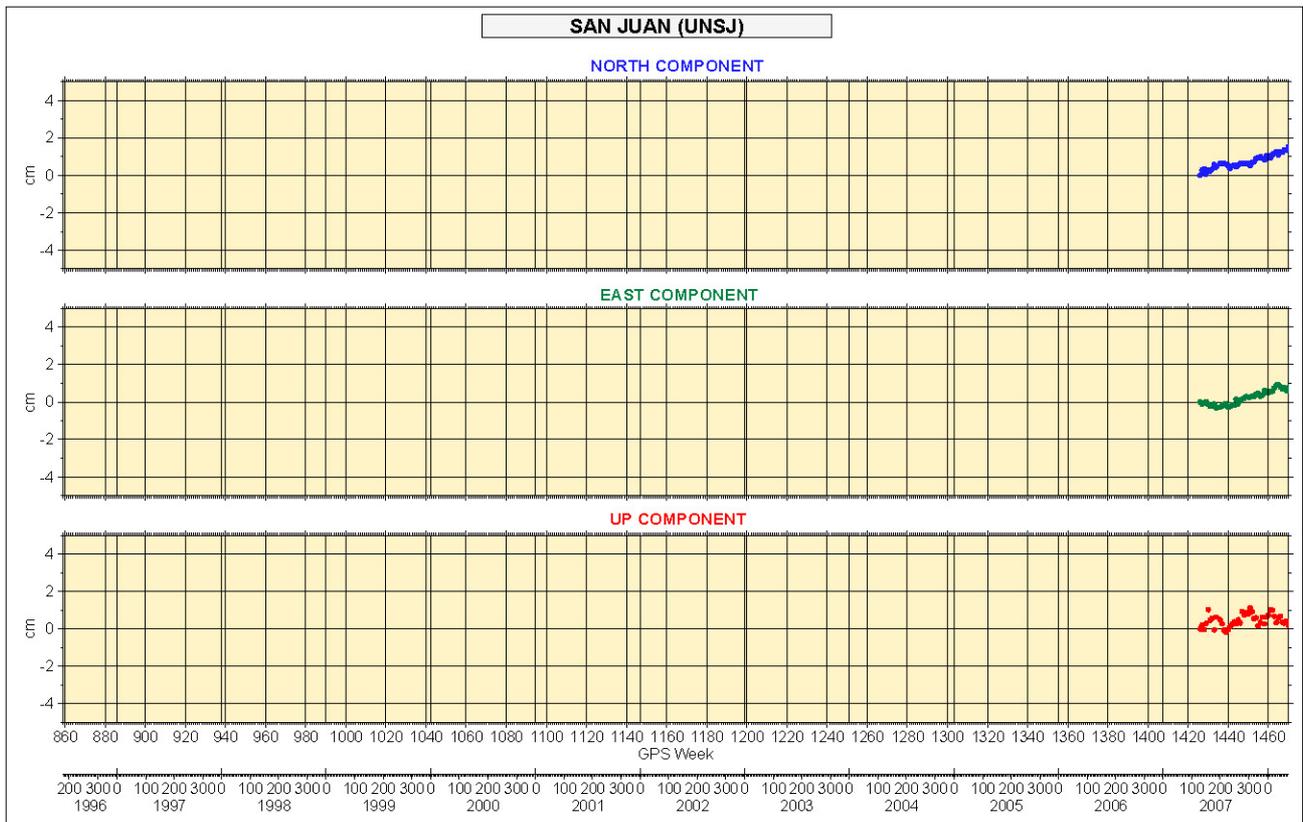
## EAST COMPONENT



## UP COMPONENT







# Conclusion

- The DGF08P01 solution is the first reliable station and velocity solution with reprocessed weekly solutions based on the IGS05 reference system and absolute phase centre corrections
- All corresponding files of DGF08P01 solution will be available at the DFGI server  
<ftp://ftp.dgfi.badw-muenchen.de/pub/gps/DGF>  
(e.g. DGF08P01.SNX, DGF08P01.CRD, DGF08P01.VEL, DGFI\_Report79.pdf, etc.)
- The weekly solutions of former years have to be reprocessed (GPS weeks 0860 to 1198)