

IERS Combination Workshop, December 11, 2004, Napa, USA

Analysis and Combination of weekly input data

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Outline

I. Time series analysis and combinations

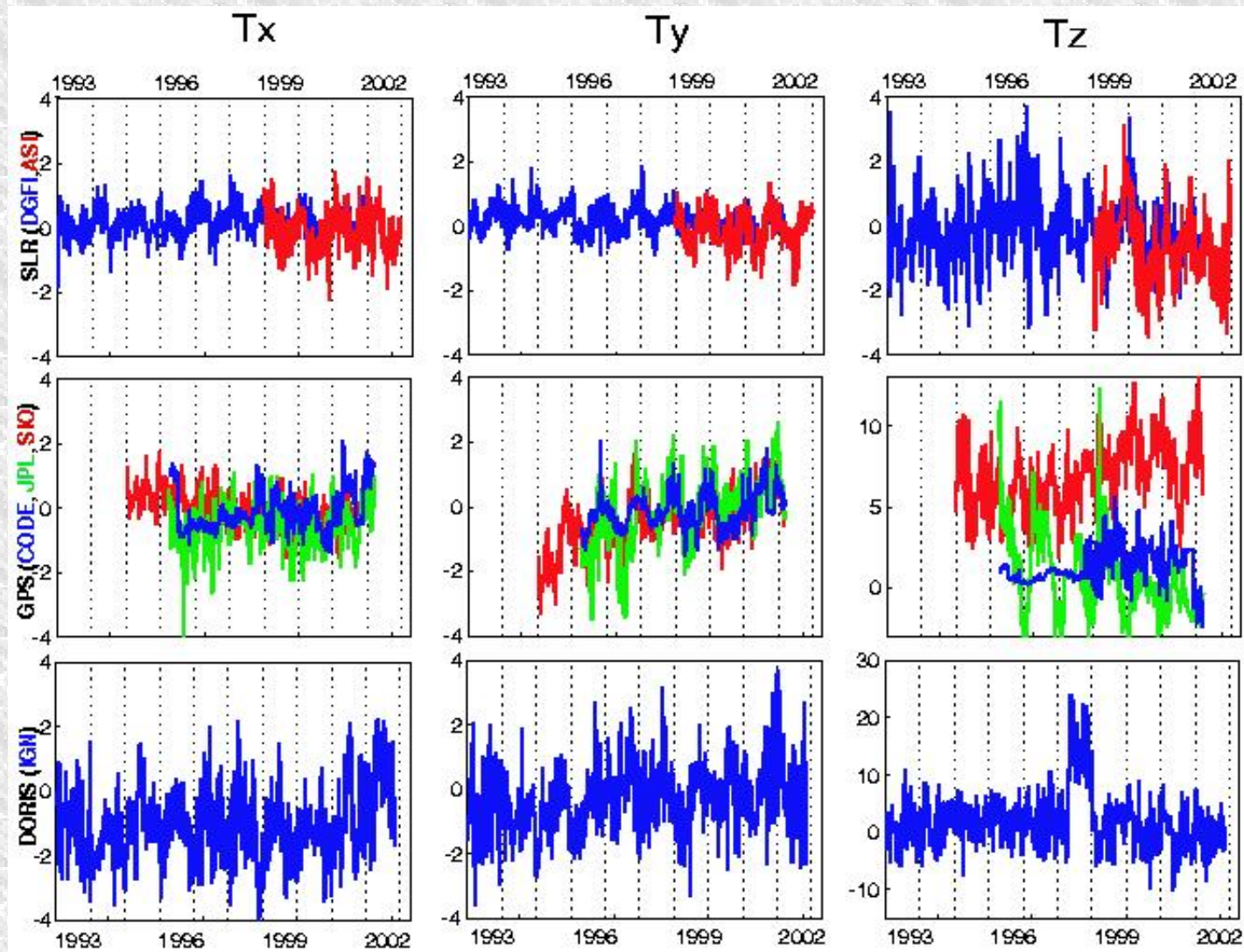
Technique	Analysis Center	Software	Data Time Span	Number of Stations	Station Coordinates Solutions
DORIS	IGN/JPL	GIPSY / OASIS	1992-2004	50	weekly SINEX files
GPS	CODE	Bernese	1996-2002	171	weekly SINEX files
GPS	JPL	GIPSY	1996-2002	172	weekly SINEX files
GPS	SIO	GAMIT	1995-2002	147	weekly SINEX files
GPS	IGS	sinex combine	1999-2004	179	weekly SINEX files
SLR	DGFI	DOGS	1985-2004	62	weekly normal equations
SLR	ASI	GEODYN	1999-2002	35	weekly SINEX files
VLBI	DGFI	OCCAM 5.0	1984-2002	47	session normal equations
VLBI	GSFC	CALC/SOLVE	1979-2003	105	session normal equations

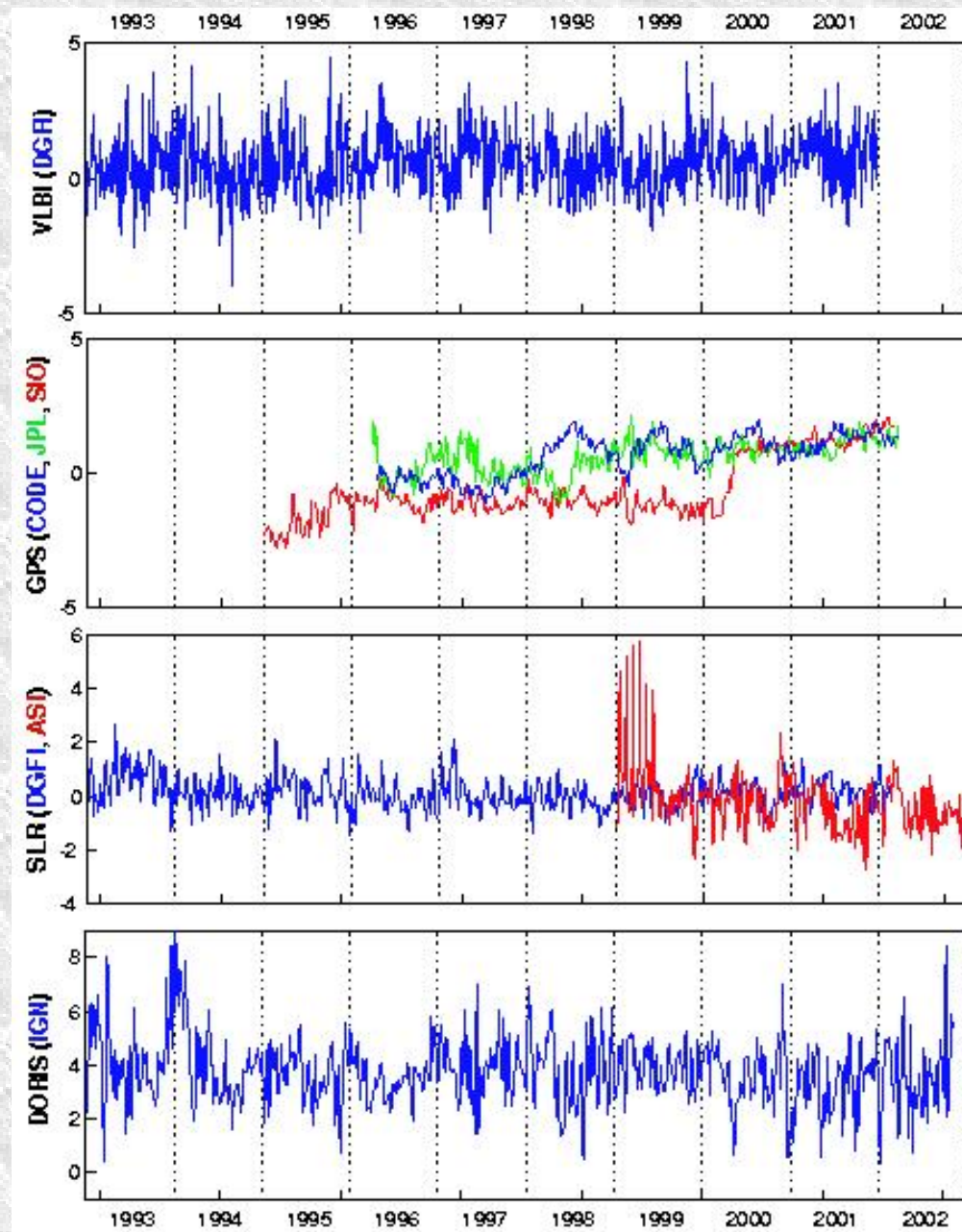
Table: Summary of weekly/daily data sets

 TRF computation from weekly input files

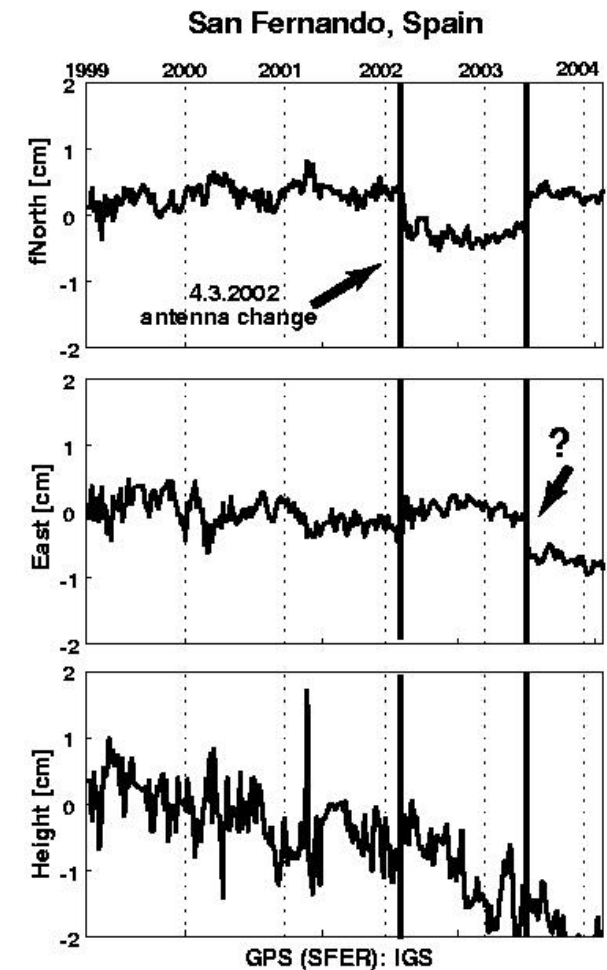
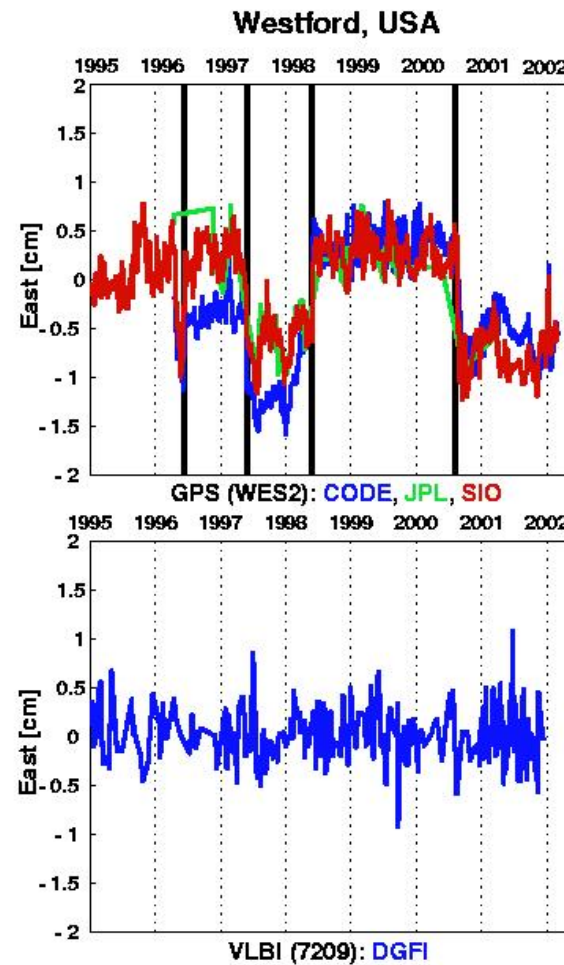
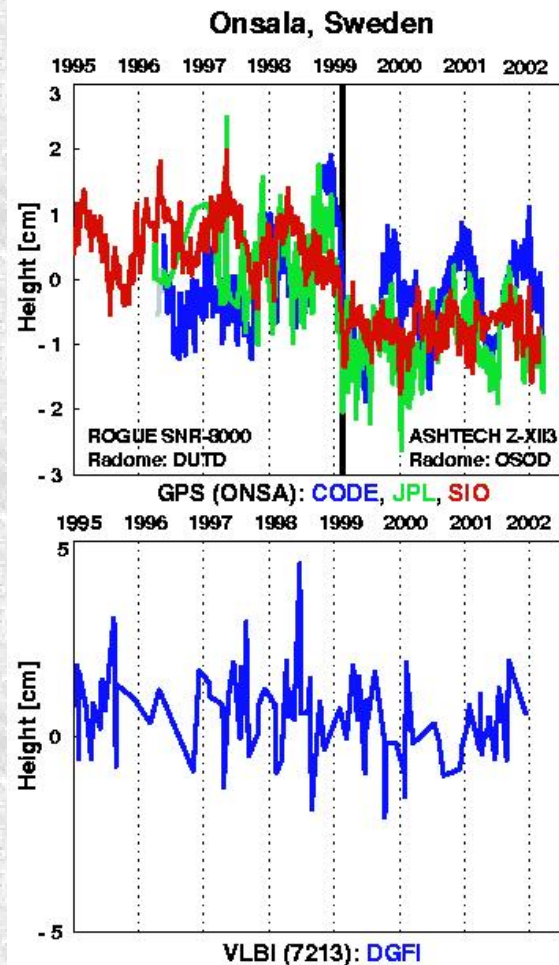
II. Analysis of SINEX files of IERS CPP

Translation [cm]

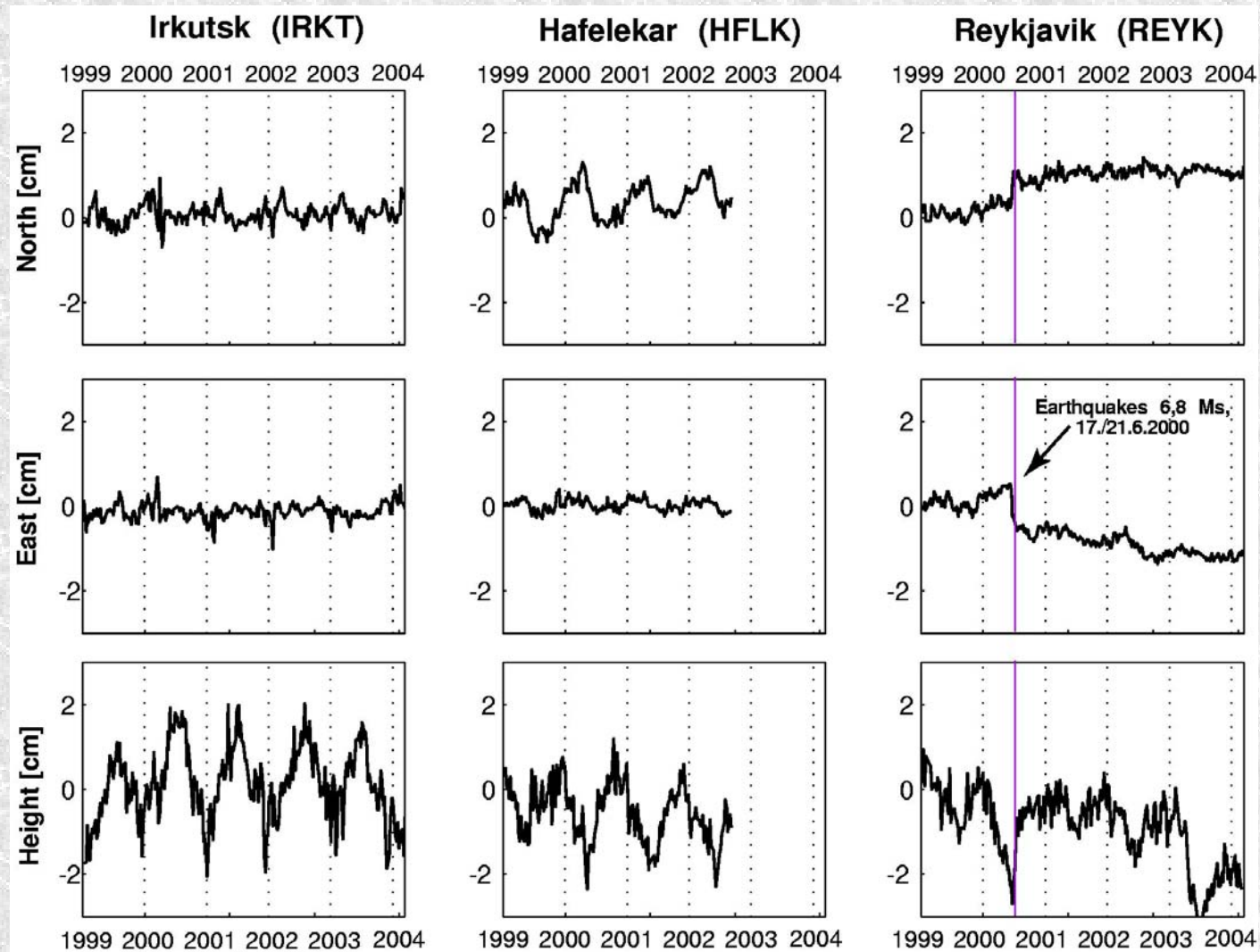




Equipment Changes

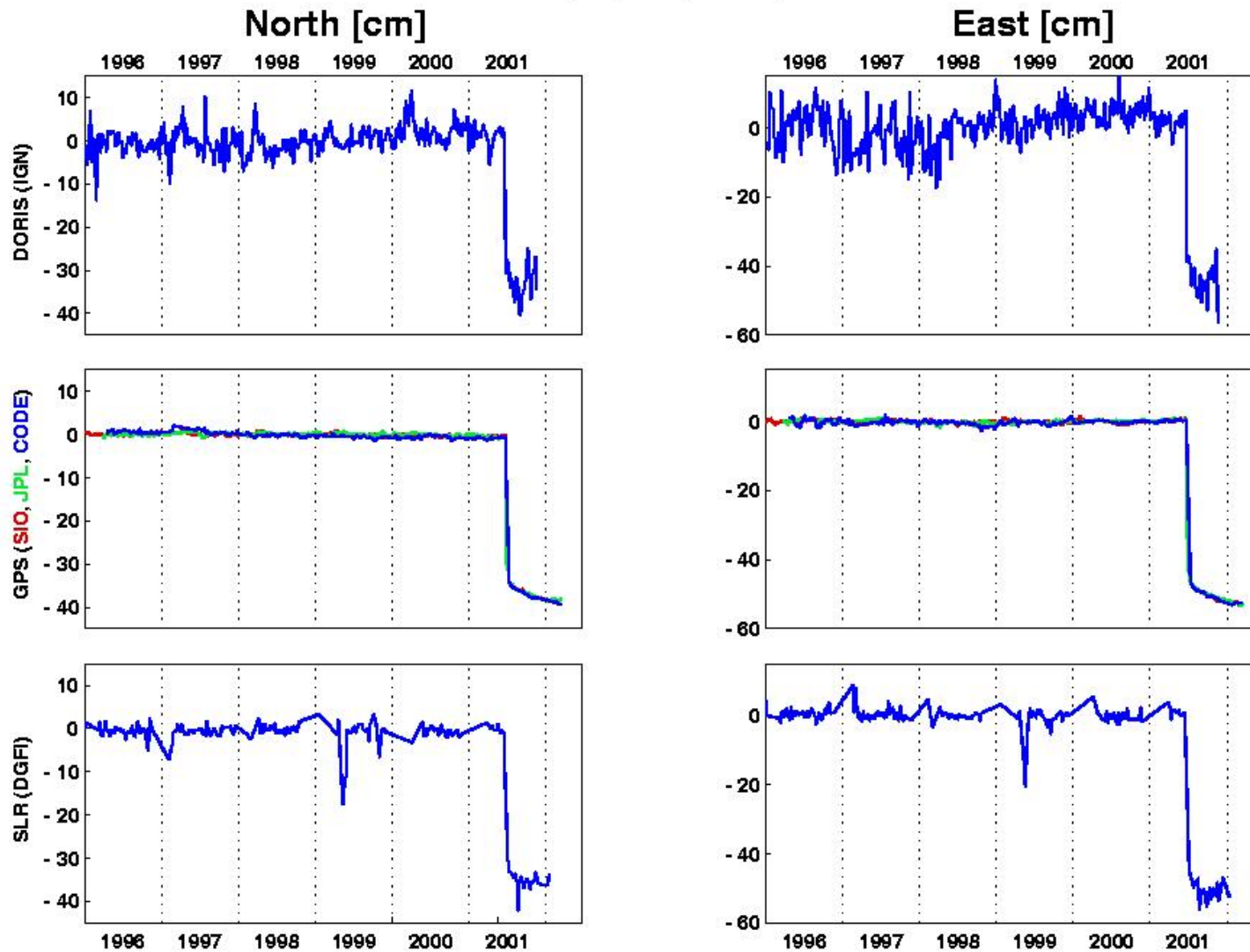


Seasonal Signals

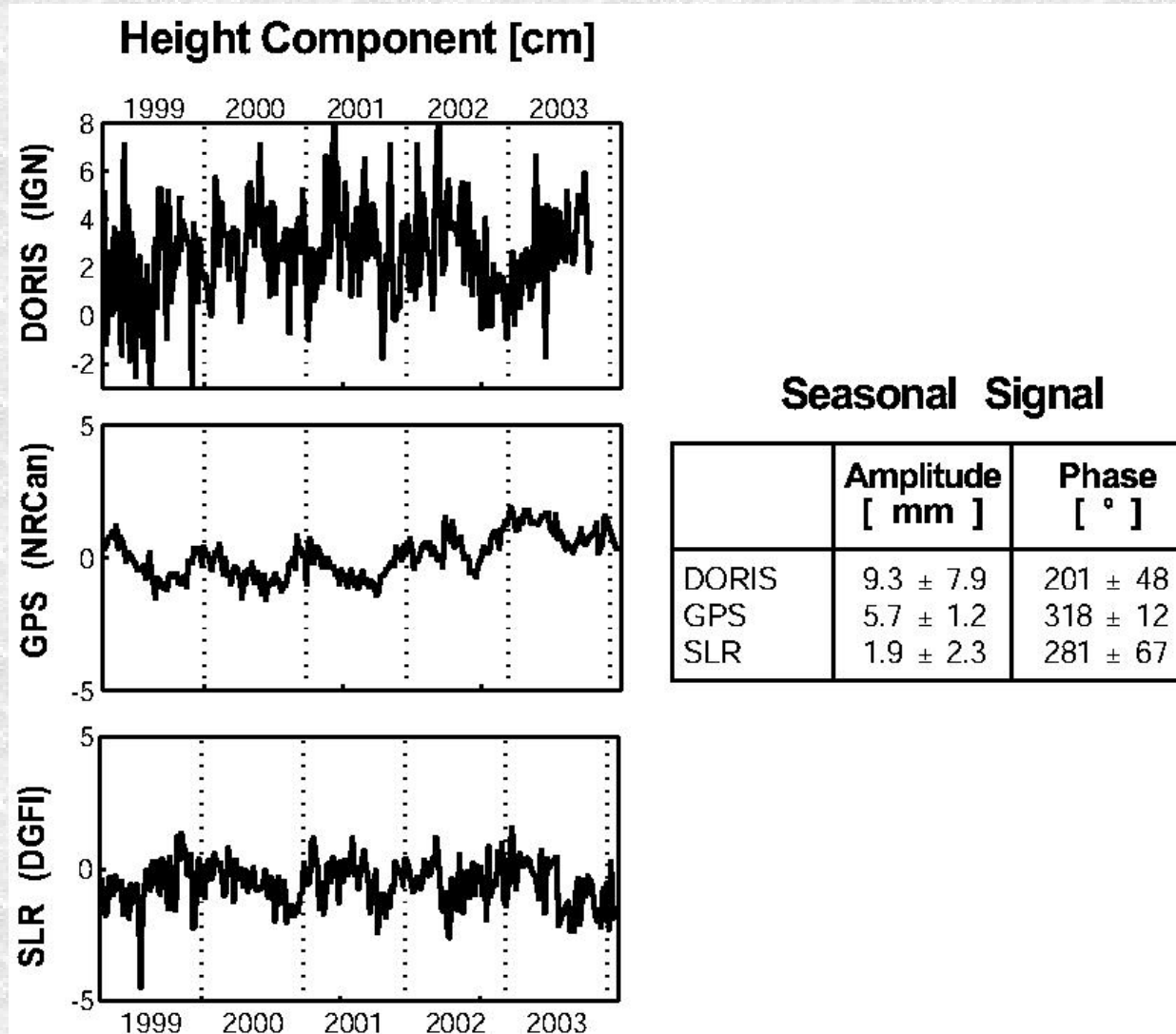


Earthquake at Arequipa, Peru

Arequipa (Peru)



Co-location Site Yarragadee



Issues concerning position time series

1. Equipment changes:
 - Unique (and updated) log files for all IERS stations are required (responsibility, ... ?).
2. Effect of earthquakes:
 - Events should be document (how, responsibility, ... ?)
 - How to handle postseismic deformations ?
3. Seasonal signals:
 - Discrepancies at co-locations sites exist
 - Geophysical signals or technique-specific effects ?
 - How to model seasonal signals in the combination ?

IERS CPP SINEX files

	<i>Parameter</i>	<i>Coordinates</i>	<i>XPOL</i>	<i>YPOL</i>	<i>UT1-UTC</i>	<i>XPOL</i> <i>rate</i>	<i>YPO</i> <i>rate</i>	<i>LODR</i>	<i>Nutation</i>
<i>Technique</i>	<i>Solution</i>								
<i>DORIS</i>	<i>IGN/JPL</i> <i>IDS</i> <i>CNES</i>	X	X	X	X	X	X	X	
<i>GPS</i>	<i>IGS</i> <i>NCL</i>	X X	X X	X X		X	X	X X	
<i>SLR</i>	<i>NCL</i> <i>ILRS</i> <i>JCET</i>	X X	X X	X X				X X	
<i>VLBI</i>	<i>IVS</i> <i>AUSLIG</i>	X	X	X	X				X

Technique	Institution	Parameters	Epoch	Constraints	A priori Datum information (*)	Remarks		
DORIS	IGN/JPL	coordinates,	12:00	10m	Transl: x:1.3 mm	in SINEX block SOL/STAT:		
		XPOL, YPOL	12:00	5m	y: 15 mm	only variance factor is available		
		Pole rates	12:00	5 msec/d	z: 44 mm	SINEX blocks SOL/APRIORI:		
		UT1-UTC	12:00	0.01 mm	Rotation 60cm	both blocks not available		
		UT1 rate	12:00	3 msec/d	Scale:1mm			
	IDS							
	CNES							
GPS	IGS	coordinates,	Epoch of min.	NNR, NNT, NNS	Transl: 1mm	SINEX block SOL/STAT not available		
			variance		Rotat:1-1.5mm		constraints are only given in	
		XPOL, YPOL	12:00		Scale:1mm			form of Helmert parameters
		Pole rates	12:00					(not removeable)
		UT1-UTC	12:00					
		UT1 rate	12:00					
	NCL	coordinates,	12:00	indiv. 3-10mm	Transl: 1mm			
		XPOL, YPOL	12:00		Rotat: 1-1.5mm			
		LOD	12:00		Scale:0.2mm			

(*) solution with loose constraints (10 m for station coordinates)

Technique	Institution	Parameters	Epoch	Constraints	A priori Datum information	Remarks
SLR	NCL	coordinates,	12:00	indiv. 2-10mm	Transl: 1-2 mm	
		XPOL, YPOL	12:00		Rotat: 2-3mm (if	
		LOD	12:00		EOP constrained)	
			Scale:1mm			
JCET						
	ILRS	coordinates,	12:00	circa: 1m/AC(6) 40mas/AC 2.6ms/AC	Transl: X: 1 mm	SINEX blocks SOL/APR, SOL/MAT_APR not available
		XPOL, YPOL	12:00		y: 1 mm	
		LOD	12:00		z: 2 mm	
			Rot: rx: 0.13 m			
			ry: 0.12 m			
			rz: 0.26 m			
			Scale:0.7mm			
VLBI	IVS	Coordinates	~ 5:00	free normal equations	Transl: 5-7 m	epoch transformation necessary
		XPOL, YPOL	~ 5:00		Rotat: 6-8m	
		UT1-UTC	~ 5:00		Scale: 1mm	
		NUTL, NUTO	~ 5:00			
AUSLIG						

(*) solution with loose constraints (10 m for station coordinates)

Remarks concerning IERS CPP SINEX files

SINEX files (Blocks specified as mandatory should be provided):

- The „SOLUTION/STATISTIC“ block should be provided with the information specified in SINEX 2.0.
- „SOLUTION/APRIORI“ and „SOLUTION/MATRIX_APRIORI“ blocks are necessary to reconstruct free normal equations

EOP representation:

- In the case of different reference epochs it is helpful, if offset and rates are provided (realized by the IVS)
- A short description about the modeling of the EOP is useful, such as the interpolation of a-priori values