Analysis of Terrestrial Reference Frame results from the IDS Analysis Campaign

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IDS Analysis campaign

History

Participation

Means and method

Results

Preliminary analysis

Future

IDS analysis : history

1999-2000	*IDS call for participation : 10 Analysis Center propositions* *but no analysis coordinator*
Nov. 2001	*IGN/CLS proposition to initiate the analysis with station coord./veloc.* *call for participation to an IDS analysis campaign (TRF) : 5 propositions* *preparation : Doris info (IDS ftp server), sinex and time series spec.,* *data centers coordination*
March 2002	*Martine Feissel is named as the coordinator* *other newly analysis initiatives :* *- orbits : Henno Boomkamp (ESA)* *- EOP : Daniel Gambis* ***(OBSPM)*** ***10 series on line (*****http://hpiers.obspm.fr/eop-pc*****/)*** ***J. Ray and M. Rothacher*** ***geocenter : ?***

IDS analysis campaign : participation

Group	Team – contact	Contribution to the station coordinates analysis
IGN-JPL (France-USA)	Pascal Willis (IGN) Yoaz Bar-Sever (JPL)	Multi-satellites Weekly solutions Monthly – global solutions
INASAN (Russia)	Suriya Tatevian Kuzin Sergey	Weekly solutions
University of Texas/CSR (USA)	John Ries	Topex/Poseidon satellite
LEGOS/CLS (France)	Jean-François Crétaux (LEGOS/GRGS) Laurent Soudarin (CLS)	Multi-satellites Montlhy solutions (from 1993 until now) Global solution

For operational use only

SOD/CNES (France)	Jean-Paul Berthias Alfred Piuzzi, Adèle Guitar	3 days multi-satellites solution a few days delay for station network control
SSALTO/CLS-CNES (France)	Jean-Jacques Valette	Monthly/weekly multi-satellites solutions (routine process 48 h delay) for station network control

IDS analysis campaign : submitted solutions

Analysis Center		*Data Span*	*Solution**	*Satellites*	*Constraints*
IGN-JPL	*(IGN)*	*1993-2001*	*w/m*	*Spot2/3/4 Topex*	*Minimum*
INASAN	*(INA)*	*1999-2001*	*w*	*Spot2/3/4 Topex*	*Minimum*
LEGOS-CLS	*(LCA)*	*1993-2001*	*m/g*	*Spot2/3/4 Topex*	*Loose (1 m)*
[CSR	*(CSR)*	*2002*	*m*	*Topex - Jason*	***prepared but not submitted**]*
<u>for operational use, calculation within a week delay</u>					
SOD	*(SOD)*	*June 2001*	*w*	*Spot2/3/4 Topex*	*Loose (1-10m)*
SSALTO	*(SSA)*	*since Jan.2001*	*w/m*	*Spot2/4 Topex/Jason*	*Non removable*

**** w : week, m : month, g : global***

Means and Method

CATREF IGN/LAREG software (Z. Altamimi & P. Sillard) :

comparison/combination of stations positions and velocities (Helmert Transf.)
physical and statistical models

TRF definition for each submitted solution :

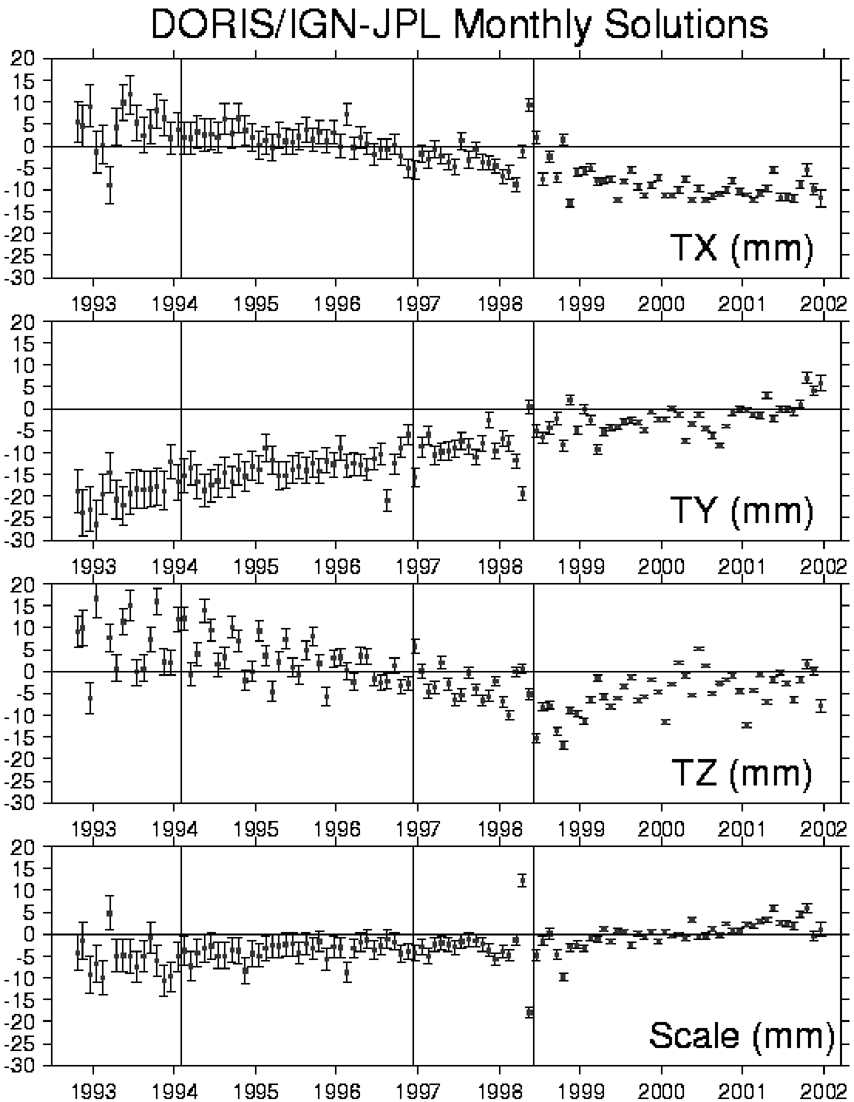
epoch is the median of data set

constraints : | **removable (10-5)**
loose (> 1 m, 10 cm/y)
minimum

Analysis work :

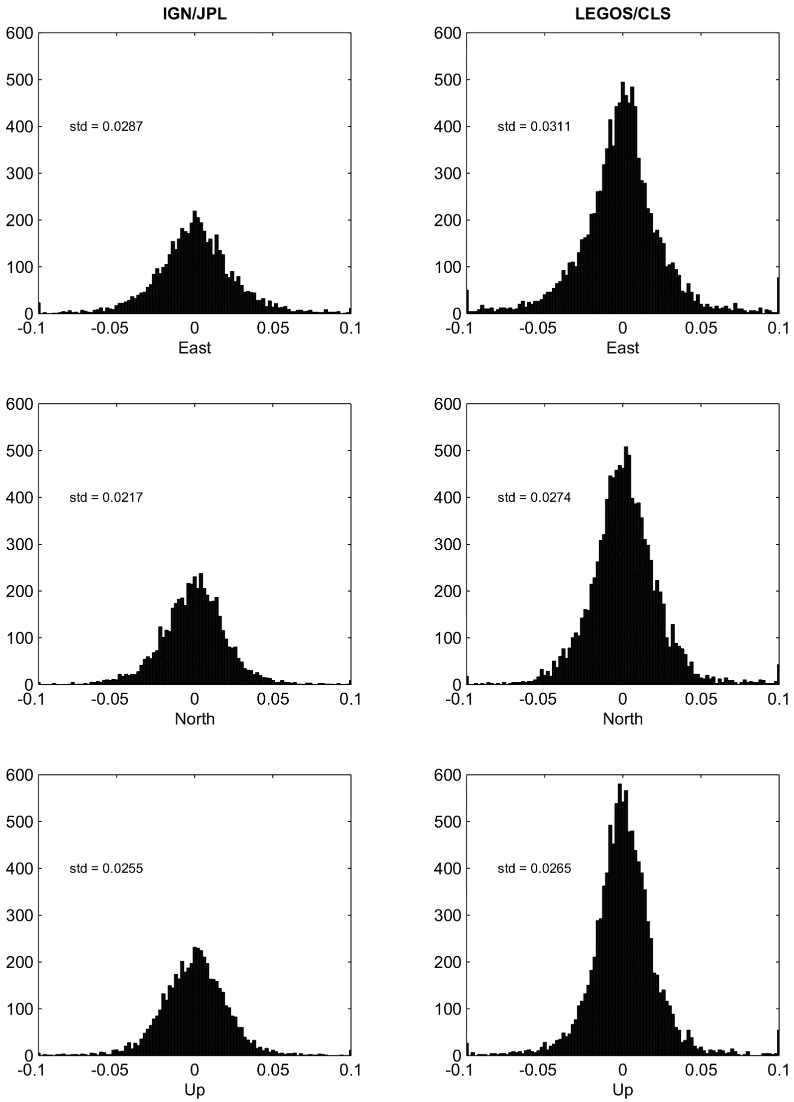
focus on internal consistency
users need (system information, new stations, Jason,...)

Transformation parameters

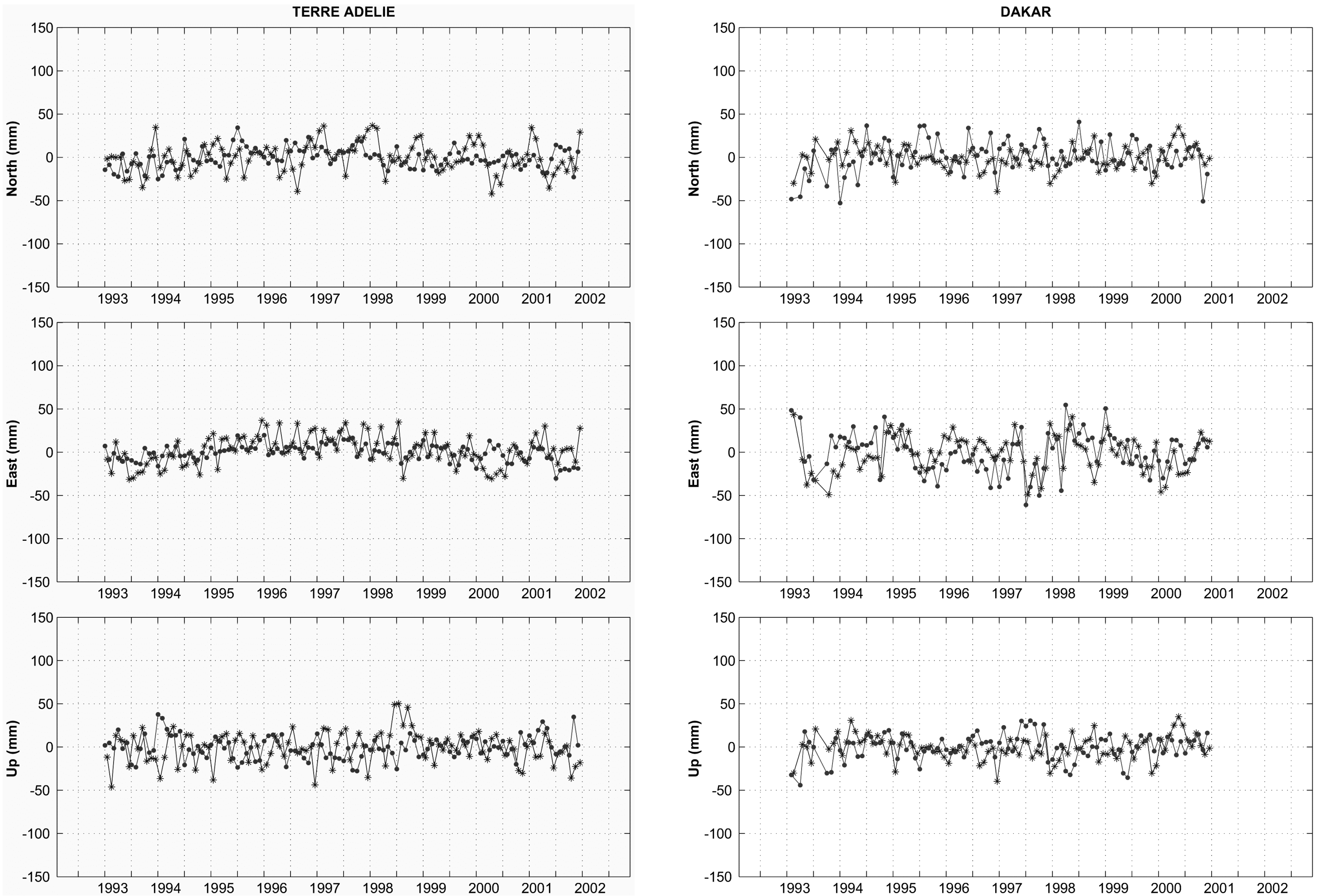


ITRF2000 projection

3D residuals histogram - monthly solutions

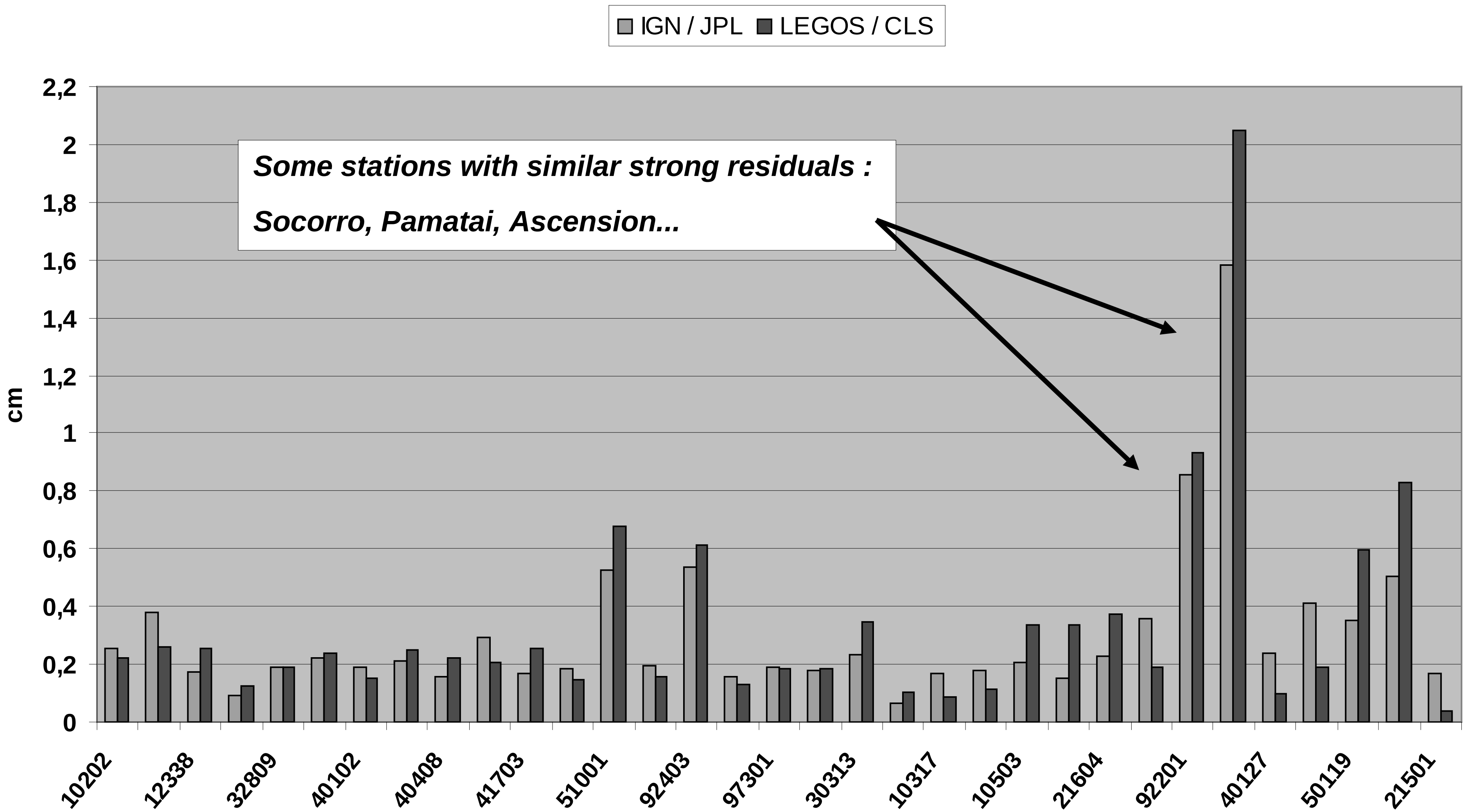


Monthly time series

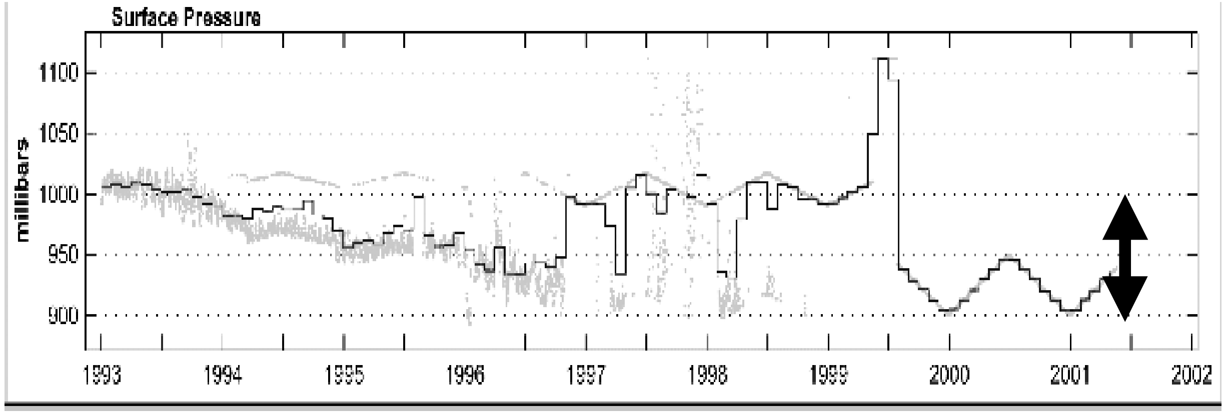


station analysis

Station monthly solutions : mean of 3D residuals



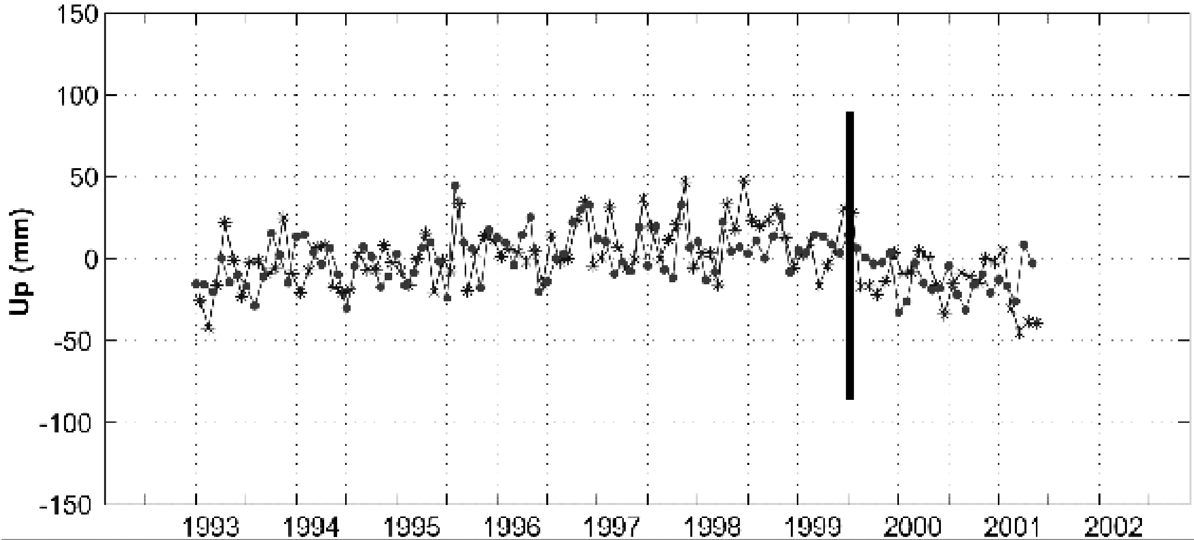
Tristan da Cunha : troposphere estimation problem?



100 mb drift of the pressure sensor from 1993 until 1998

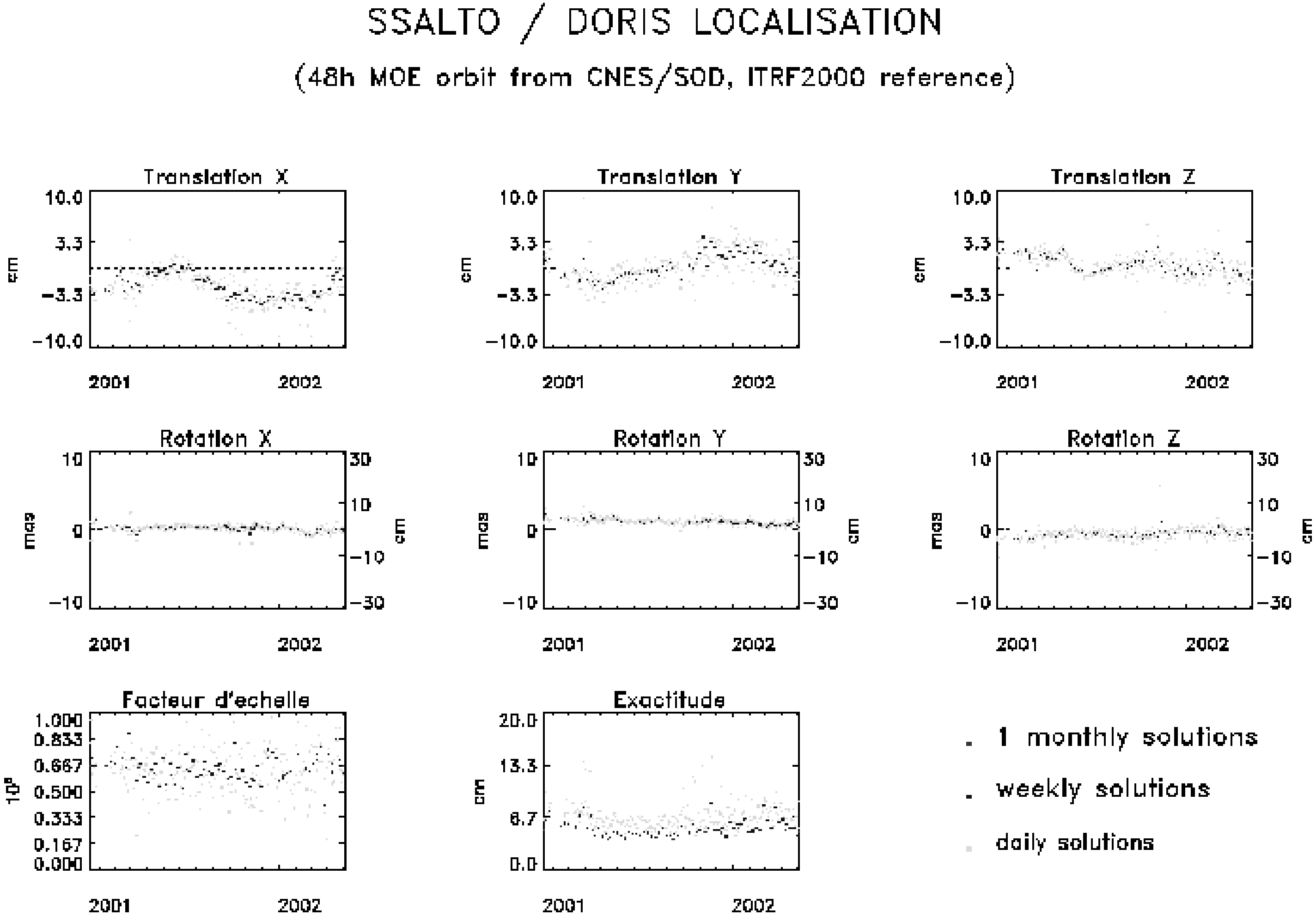
1mb is equivalent to 10 m in altitude

Mid-1999 sensor failure, corrections of the seasonal initial parameters



The zenithal bias depends on the surface pressure but also the mapping function not in the derivatives

Quick solutions - SSALTO /SOD



Useful solutions for network control, new stations, seismic activity monitoring (Arequipa), Diode navigator,...

FUTURE (1/4)

ENCOURAGING

10 years of Doris data (Spot2/3/4 and Topex)

3 more satellites with new instrument generation (JASON, ENVISAT, SPOT5)
dual channel, phase observations,...
very stable Jason orbit (cross-track)

dynamism and synergy (recent questions around Jason data processing)

possible new AC participation

FUTURE (2) : possible new AC participation

Group	Team – contact	On-going developments and needs
AIUB/IGN (Switzerland/France)	Karine Le Bail (IGN) Urs Hugentobler (AIUB) Werner Gurtner (AIUB)	Integration of Doppler equation in Bernese software Doris data format? RINEX transformation proposal?
Geodetic Obs. of Pecny (Czech Republic)	Jan Kostelecky	Software under development Interested by a DORIS data processing software
IAA-RAS (St-Petersburg)	George Krasinsky	Preliminary results of Topex/Poseidon Doppler processing Need for outputs comparisons and information about the system (satellite models,…)

No answer

Future (3)

URGENT

A NEW DORIS DATA FILE SPECIFICATION :

- content (uso, time ref,new observation type,ionosp.)
- format
- delay

Old data conversion

Future (4)

to be discussed

More DORIS system information and better access

(uso behaviour, station events, satellite attitudes models,...)

TRF products specifications

(multi-satellites, mature monthly and global solutions)

Products validation process

Combination

Participation ?

Active contributors

P. Willis
J. Ries
JP. Berthias
C. Noll
J.M. Lemoine
A. Guitart
M. Feissel
P. Sillard
S. Kuzin
K. Le Bail
J.F. Crétaux
G. Beziat
F. Arib
Urs Hugentobler
Yoaz Bar-Server
...

Sinex file naming convention

Station network coordinates (sinex format)

1/ Global sinex solutions (cf IERS convention)

CCCYYDVV.snx.Z
CCC = the center acronym 3 characters
YY = the 2-digit year of the solution submission
D for DORIS

2/ Periodic sinex solutions

CCCYYDDDTVV.snx.Z
CCC = the center acronym 3 characters
YY = the 2-digit year of the first observation
DDD = the 3-digit day of year of the first observation.
T = the type of the solution with
m/w/d for monthly/weekly/daily solutions
VV = the version number of the solution

Note that there is no inclusion of the satellites name but the information may be found in the headers of each file.
The sinex files are compressed (unix) for storage and lower caps are used for filemames.

Time series

CCCYYTVVAAAA

CCC = the center acronym 3 characters

YY = the 2-digit year of the solution submission

T = the type of the solution with

m/w/d for monthly/weekly/daily solutions

VV = the version number of the solution

AAAA = the 4-letter identification of the station (unicity)

```
* Head lines cf selected sinex blocs
*
+ File/reference
+ File/comment      (reference system, ellipsoid)
+ Site/id
+ Solution/apriori   (XYZ initial coordinates with the reference epoch)
*
*   Solutions given in both cartesian and geographical coordinates systems
*   Data description below (offset are versus the XYZ initial coordinates)
*
* format
*
*        Year  Day   dx sx  dy sy  dz sz    dlat slat  dlon slon  dh sh
```