



# POD Evaluation of DPOD2014 solution by CNES/CLS IDS Analysis Center

Hugues Capdeville, Jean-Michel Lemoine,  
Adrien Mezerette  
**CNES/CLS AC (GRG)**

**IDS AWG meeting, London 23-24 May 2017**

# DPOD2014 EVALUATION

## PROCESSING CONTEXT

Impact of the position and velocity coordinates of the DORIS stations from DPOD2008 (DPOD2008 v1.14) and DPOD2014 v1.0

**No use of the periods to reject with DPOD2014**

Orbits computed:

- DORIS TOPEX orbits (January 1993 to July 2004)
- DORIS Jason-1 orbits (July 2004 to October 2008)
- DORIS Jason-2 orbits (October 2008 to December 2014)

## Evaluation of DORIS POST-FIT RMS RESIDUALS and orbit comparison / DPOD2008

DORIS post-fit residuals global and per station

DORIS-only orbit independent SLR RMS residuals

RMS of radial differences between DPOD2014 and DPOD2008

Mean of Z orbit differences between DPOD2014 and DPOD2008

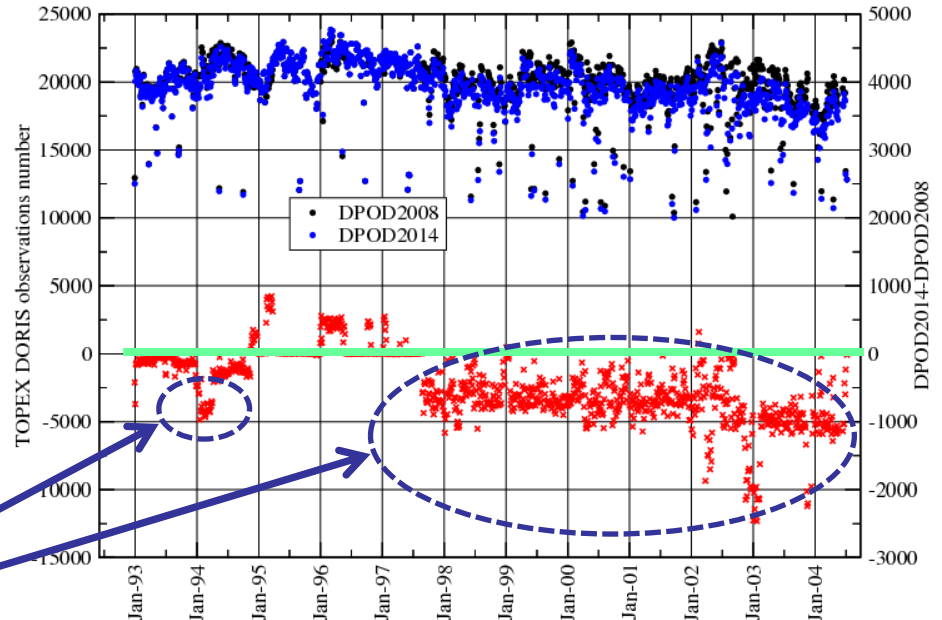
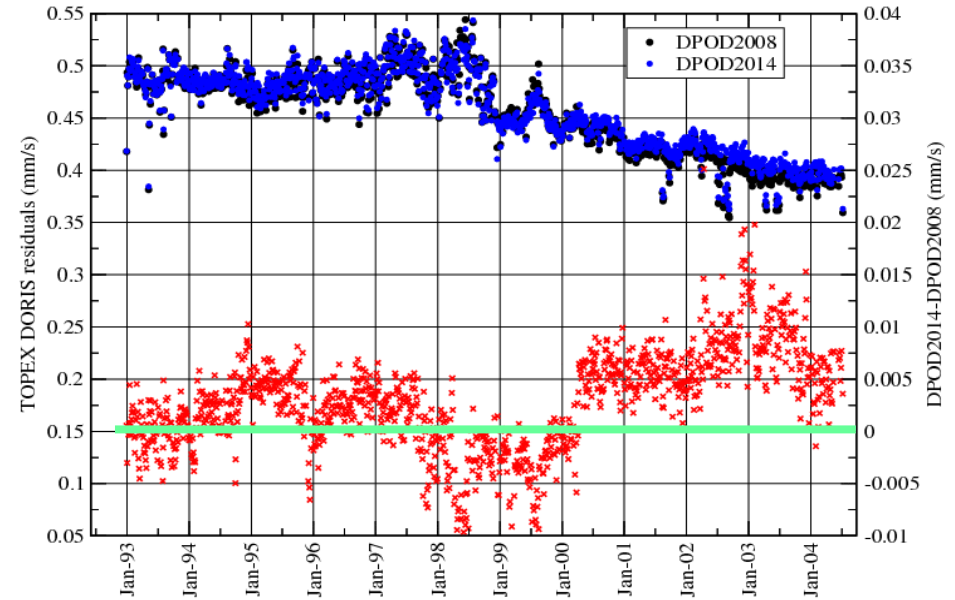
# DPOD2014 EVALUATION ON TOPEX POD

## TOPEX DORIS post-fit residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008)

(DORIS data from Jan. 1993 to Jul. 2004)

DPOD Solutions	DORIS stations Number	DORIS points	DORIS RMS residuals (mm/s)
DPOD2008	39.8	19339	0.454
DPOD2014	39.8	18887	0.457

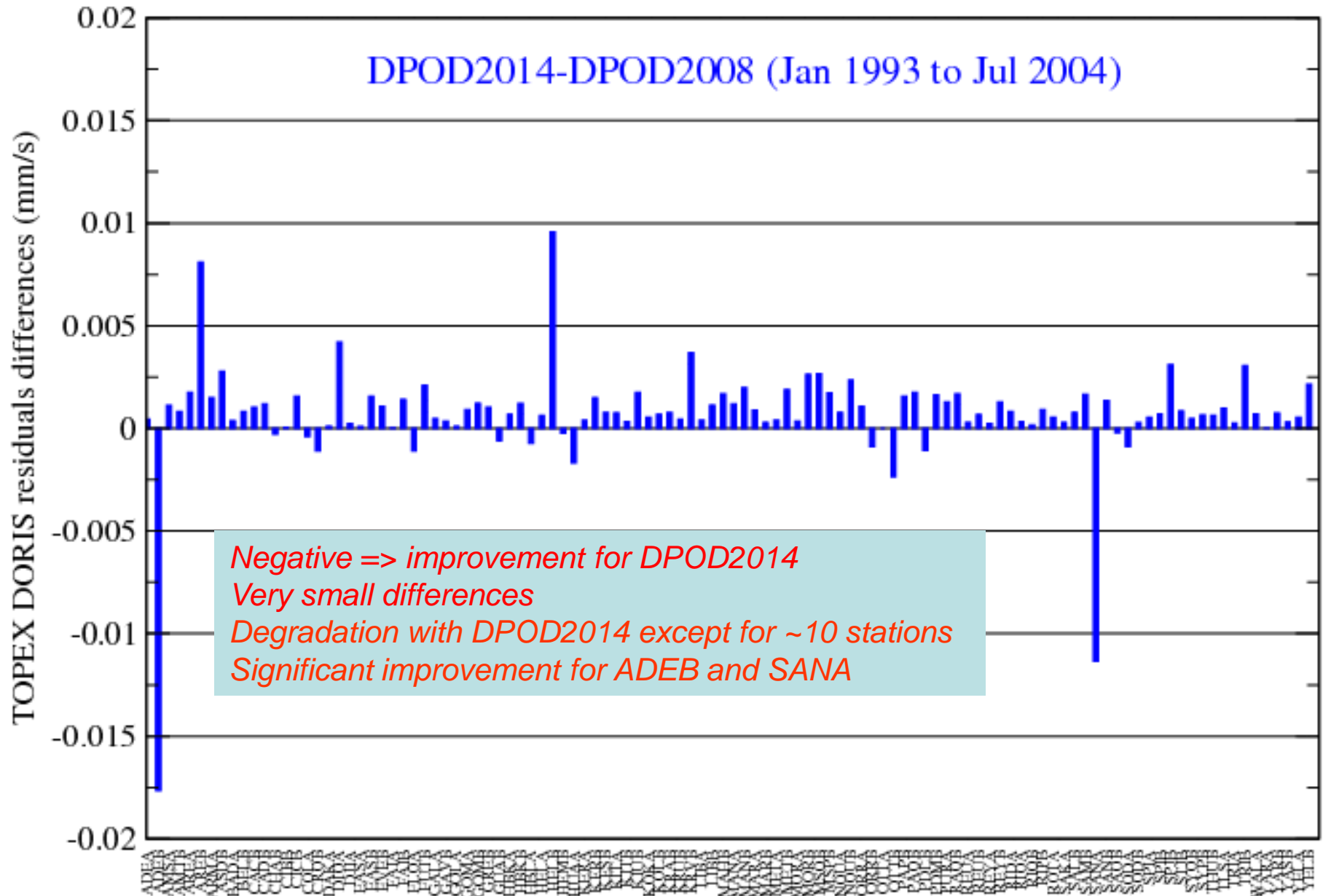
*Negative => improvement for DPOD2014*  
*Very small differences*  
*Three periods for TOPEX:*  
 - from Jan. 1993 to Jan. 1998: results slightly better with DPOD2008  
 - from Jan. 1998 to Jan. 2000: improvement with DPOD2014  
 - from Jan. 2000 to mid-2004: degradation with DPOD2014 but less measurements (one or two stations less)



*One or two stations less for DPOD2014*

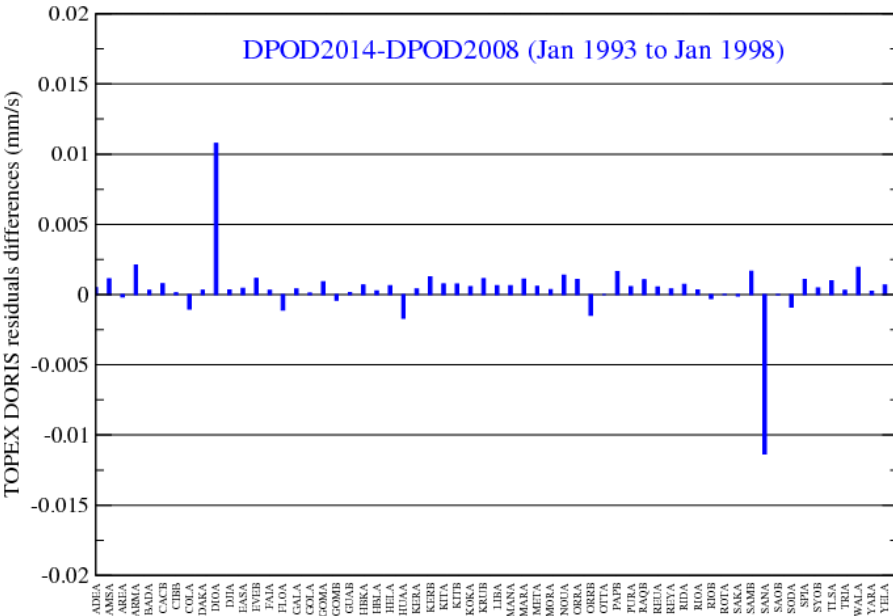
# DPOD2014 EVALUATION ON TOPEX POD

TOPEX DORIS post-fit residuals differences (DPOD2014-DPOD2008)



# DPOD2014 EVALUATION ON TOPEX POD

## TOPEX DORIS post-fit residuals differences (DPOD2014-DPOD2008)



Negative => improvement for DPOD2014

Very small differences

Three periods for TOPEX:

- from Jan. 1993 to Jan. 1998:

results very close

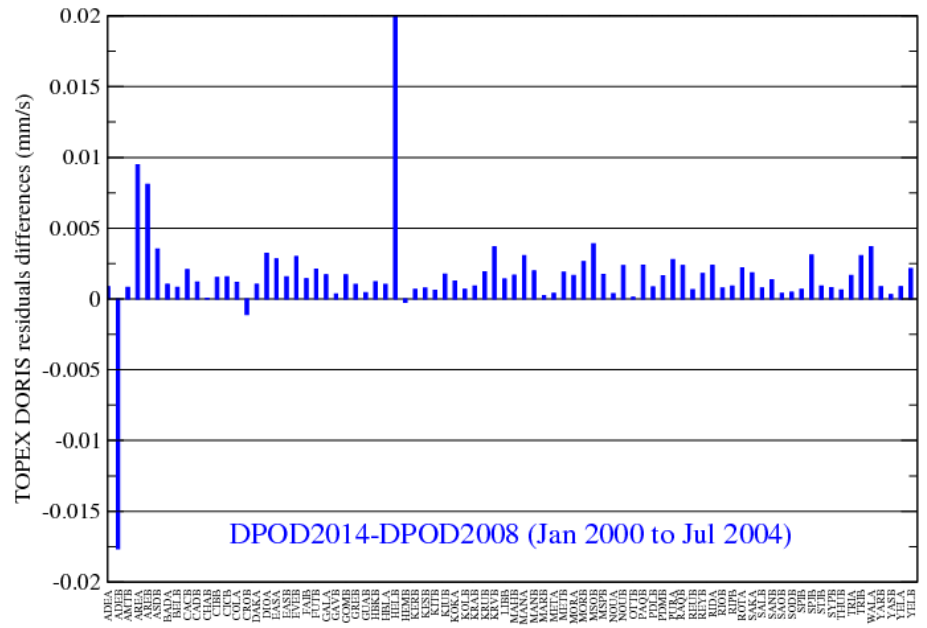
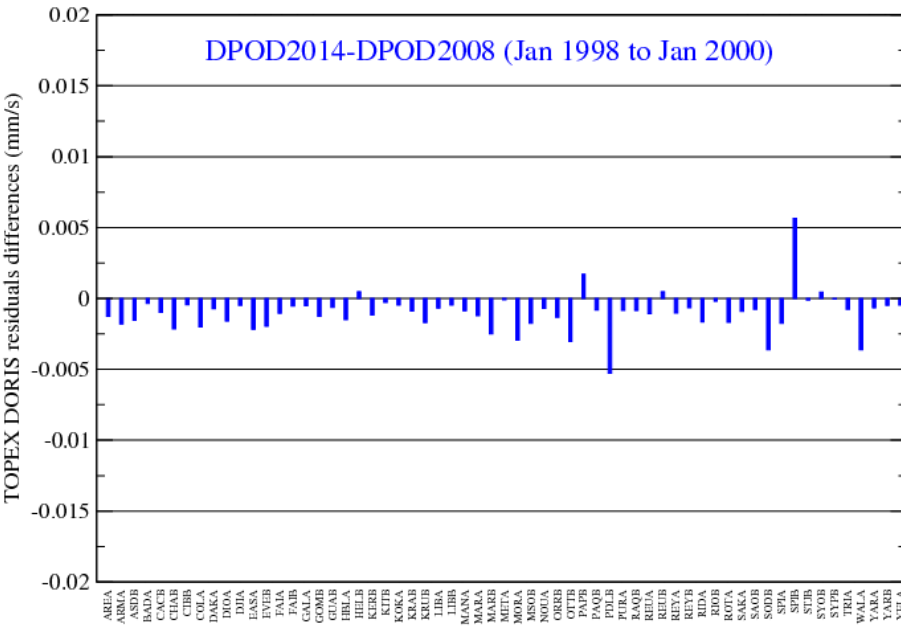
with DPOD2014 significant degradation for DIOA and improvement for SANA

- from Jan. 1998 to Jan. 2000:

improvement with DPOD2014 except for SPIB

- from Jan. 2000 to mid-2004:

except for ADEB degradation with DPOD2014, in particular for HELB



# DPOD2014 EVALUATION ON TOPEX POD

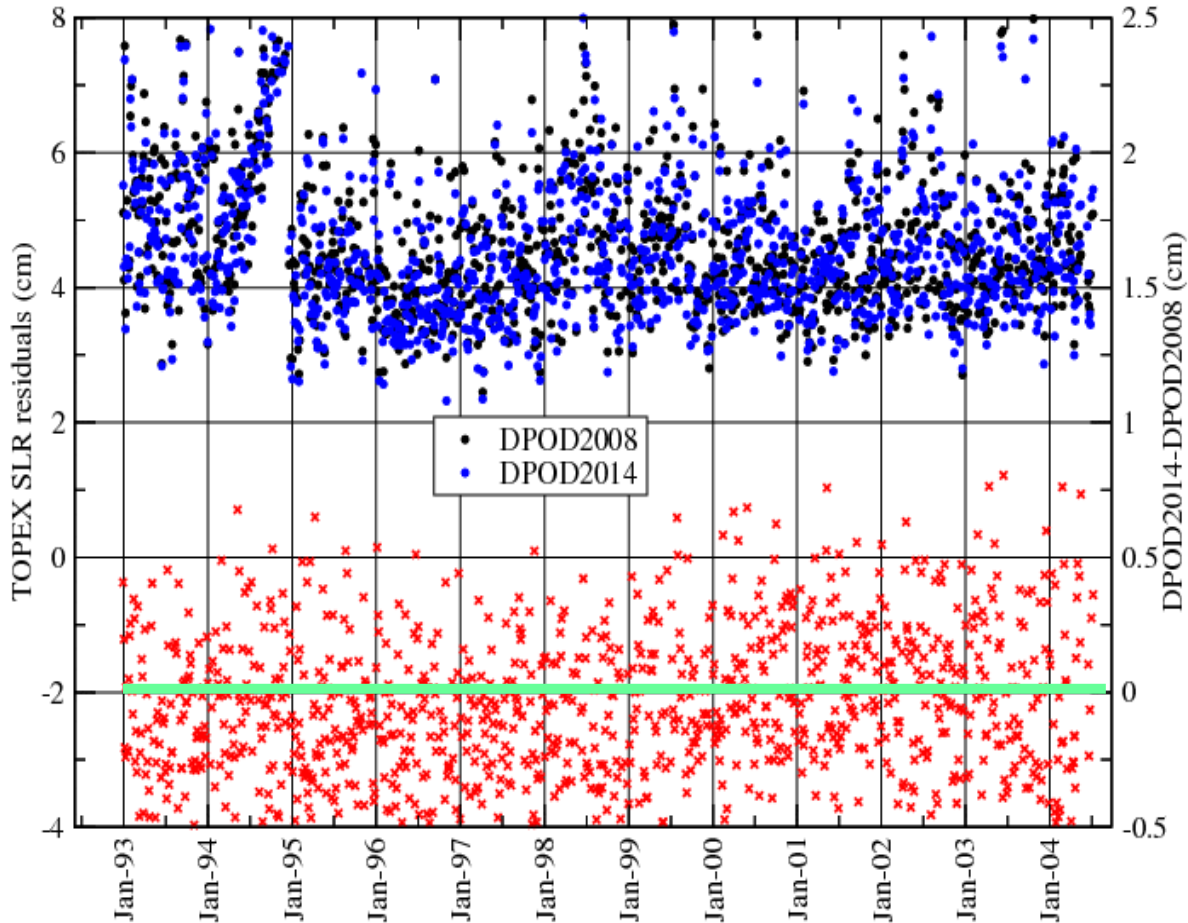
## TOPEX DORIS-only orbit independent SLR RMS residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008) (DORIS data from Jan. 1993 to Jul. 2004)

(DORIS data from Jan. 1993 to Jul. 2004)

DPOD Solutions	SLR points	SLR RMS residuals (cm)
DPOD2008	1662	4.70
DPOD2014	1659	4.63

*Negative => improvement for DPOD2014*

*Very small differences but slight improvement from DPOD2014*



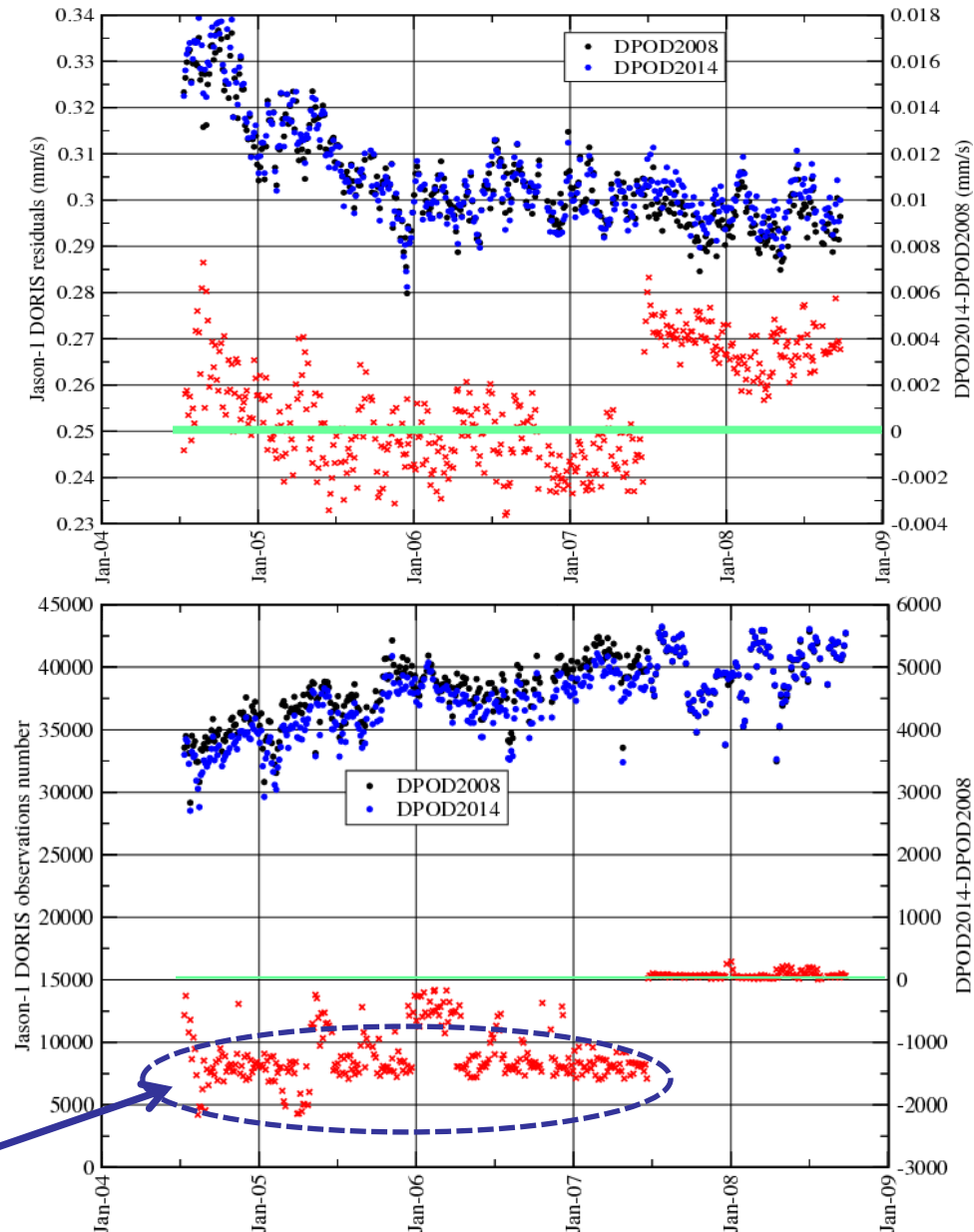
# DPOD2014 EVALUATION ON JASON-1 POD

## Jason-1 DORIS post-fit residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008)

(DORIS data from Jul. 2004 to Oct. 2008)

DPOD Solutions	DORIS stations Number	DORIS points	DORIS RMS residuals (mm/s)
DPOD2008	43.9	36952	0.304
DPOD2014	43.8	36129	0.305

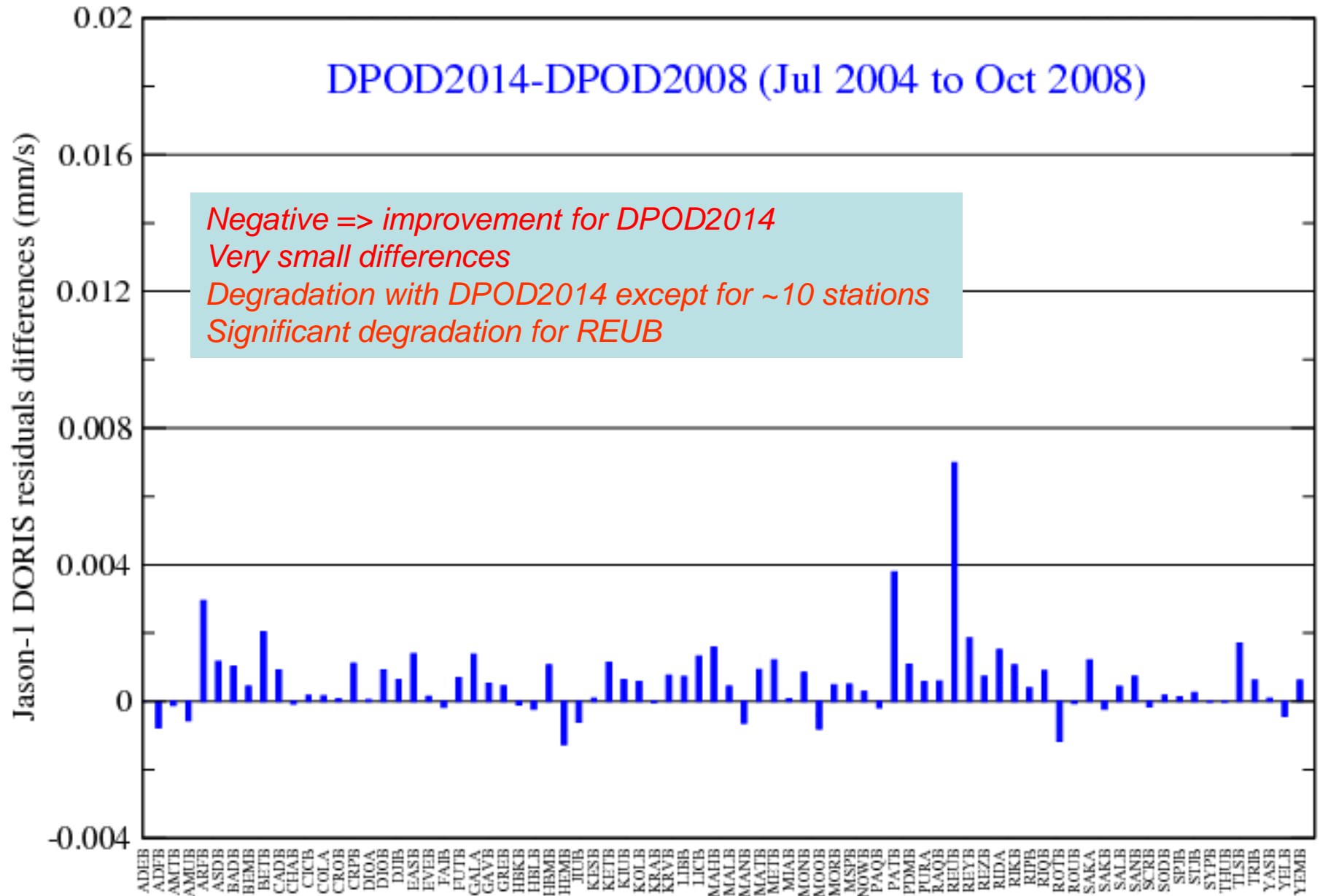
*Negative => improvement for DPOD2014*  
*Very small differences*  
*Two periods for Jason-1:*  
 - from Jul. 2004 to Jul. 2007: results close slightly better with DPOD2014  
 - from Jul. 2007 to Oct. 2008: degradation with DPOD2014



*One or two stations less for DPOD2014*

# DPOD2014 EVALUATION ON JASON-1 POD

Jason-1 DORIS post-fit residuals differences (DPOD2014-DPOD2008)







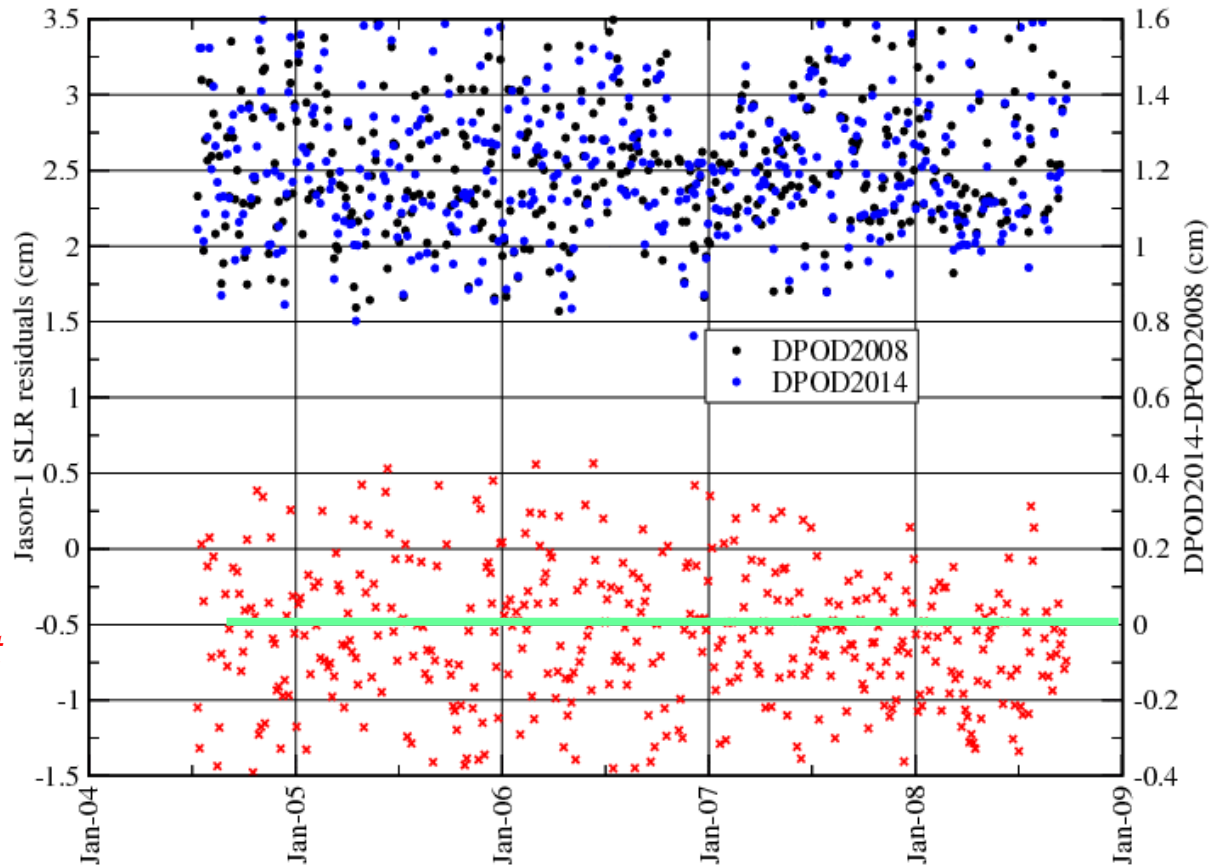
# DPOD2014 EVALUATION ON JASON-1 POD

## Jason-1 DORIS-only orbit independent SLR RMS residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008)

(DORIS data from Jul. 2004 to Oct. 2008)

DPOD Solutions	SLR points	SLR RMS residuals (cm)
DPOD2008	1464	2.61
DPOD2014	1464	2.58

*Negative => improvement for DPOD2014*  
*Very small differences but slight improvement from DPOD2014*



# DPOD2014 EVALUATION ON JASON-2 POD

## Jason-2 DORIS post-fit residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008)

(DORIS data from Oct. 2008 to Dec. 2014)

DPOD Solutions	DORIS stations Number	DORIS points	DORIS RMS residuals (mm/s)
DPOD2008	46.3	52038	0.314
DPOD2014	45.9	51770	0.314

*Negative => improvement for DPOD2014*

*Very small differences*

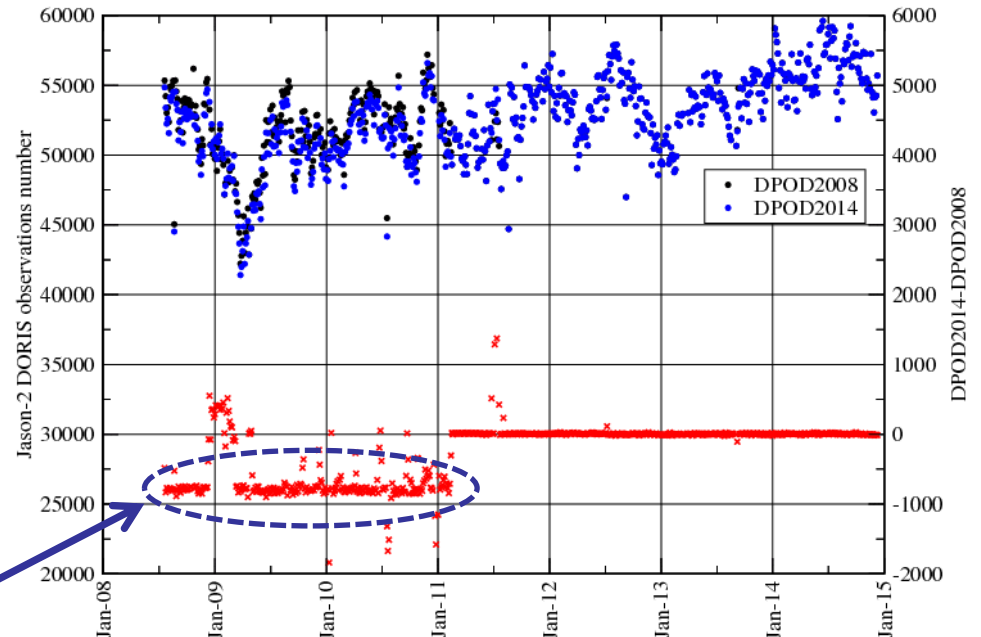
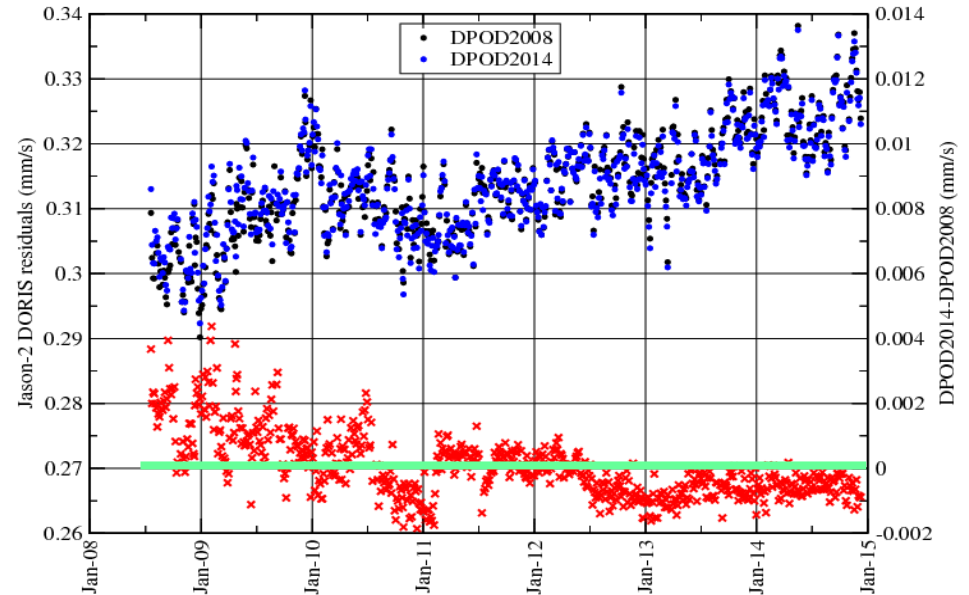
*Two periods for Jason-2:*

*- from Oct. 2008 to Jan. 2011:*

*results close slightly worse with DPOD2014*

*- from Jan. 2011 to Dec. 2014:*

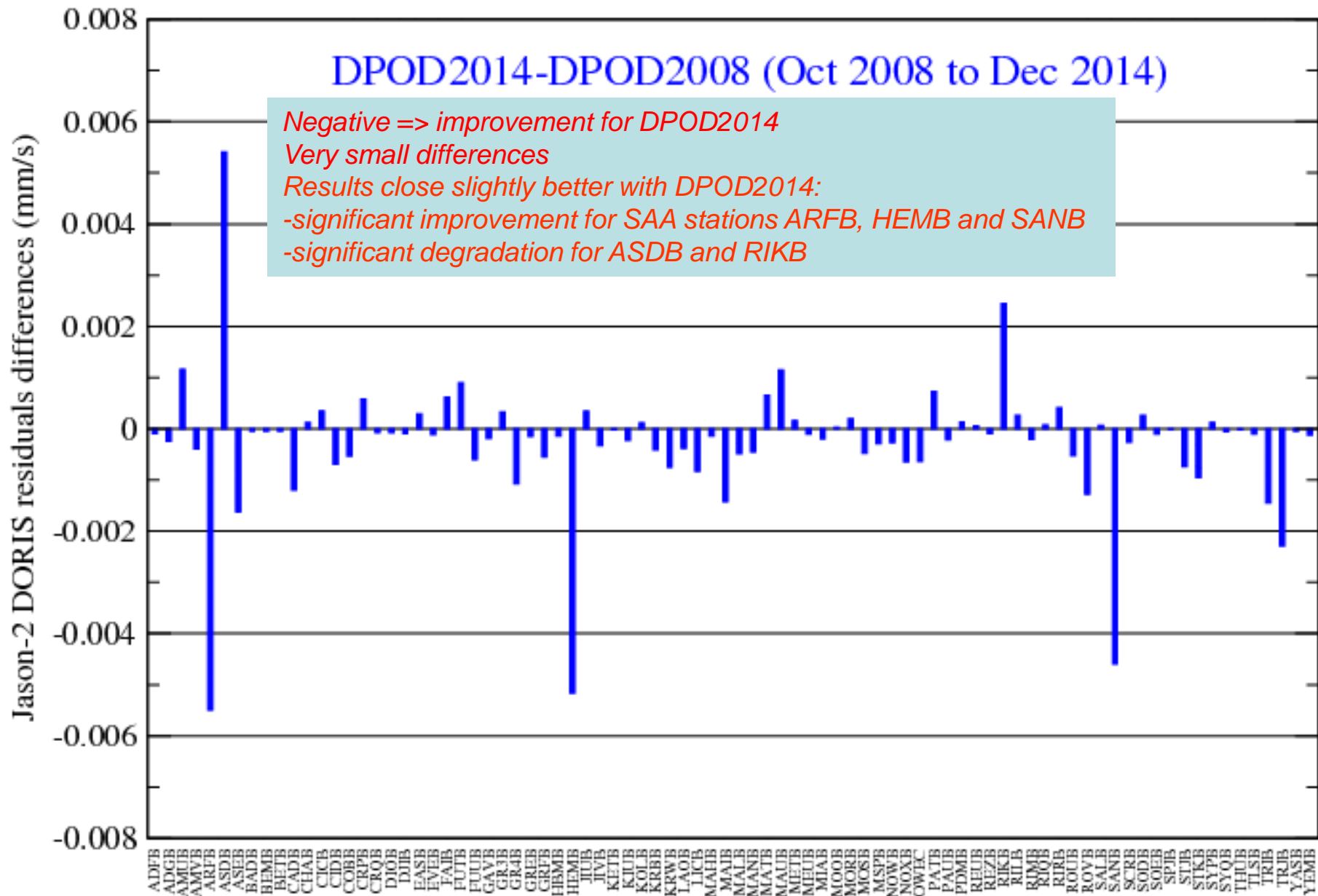
*results close slightly better with DPOD2014*



*One station less for DPOD2014*

# DPOD2014 EVALUATION ON JASON-2 POD

Jason-2 DORIS post-fit residuals differences (DPOD2014-DPOD2008)





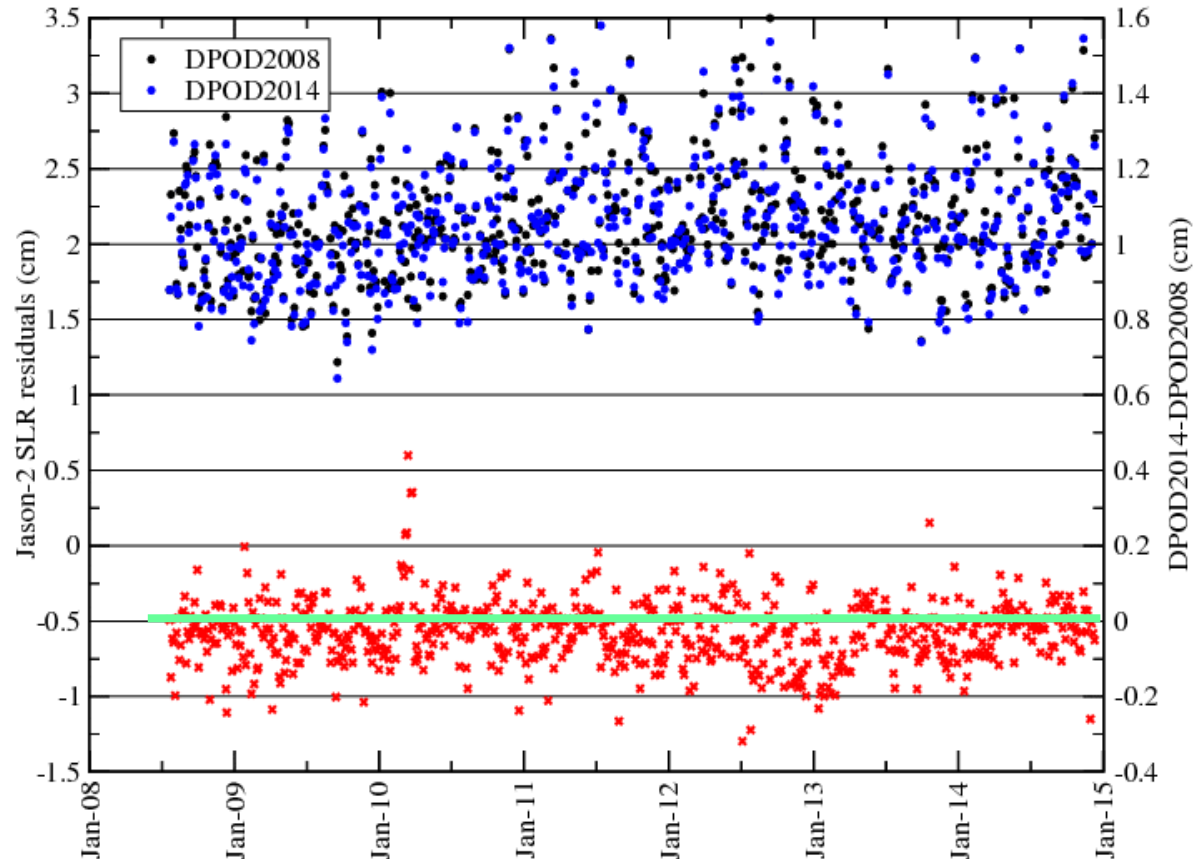
# DPOD2014 EVALUATION ON JASON-2 POD

## Jason-2 DORIS-only orbit independent SLR RMS residuals from DPOD2008 and DPOD2014 and differences (DPOD2014-DPOD2008)

(DORIS data from Oct. 2008 to Dec. 2014)

DPOD Solutions	SLR points	SLR RMS residuals (cm)
DPOD2008	1646	2.18
DPOD2014	1646	2.15

*Negative => improvement for DPOD2014*  
*Very small differences but slight improvement from DPOD2014*



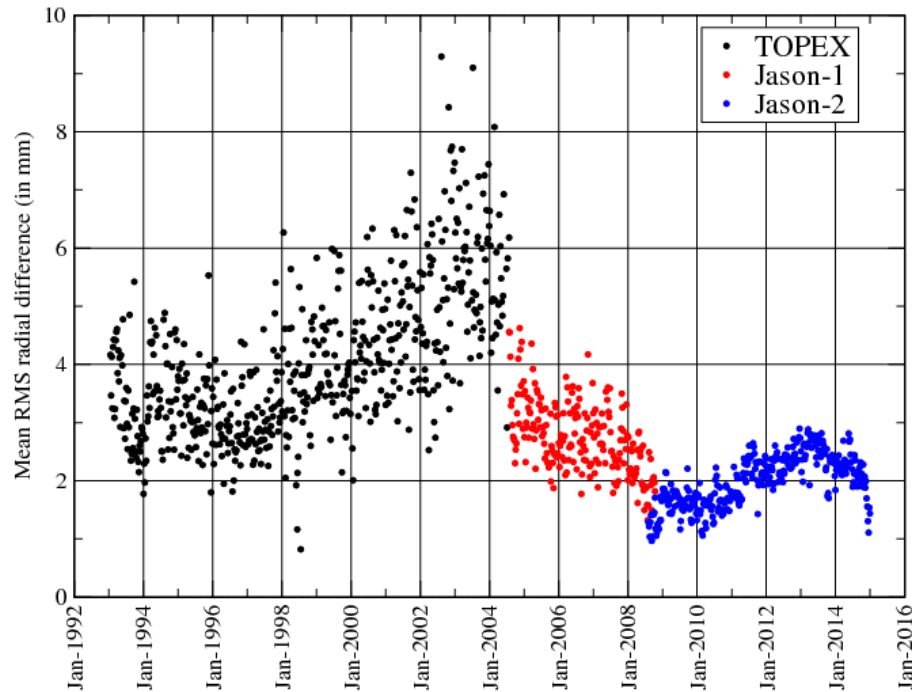
# DPOD2014 EVALUATION

## ORBIT COMPARISON / DPOD2008

### RMS of radial differences and mean Z differences

DORIS orbits: TOPEX from Jan. 1993 to Jul. 2004, Jason-1 from Jul. 2004 to Oct. 2008, Jason-2 from Oct. 2008 to Dec. 2014

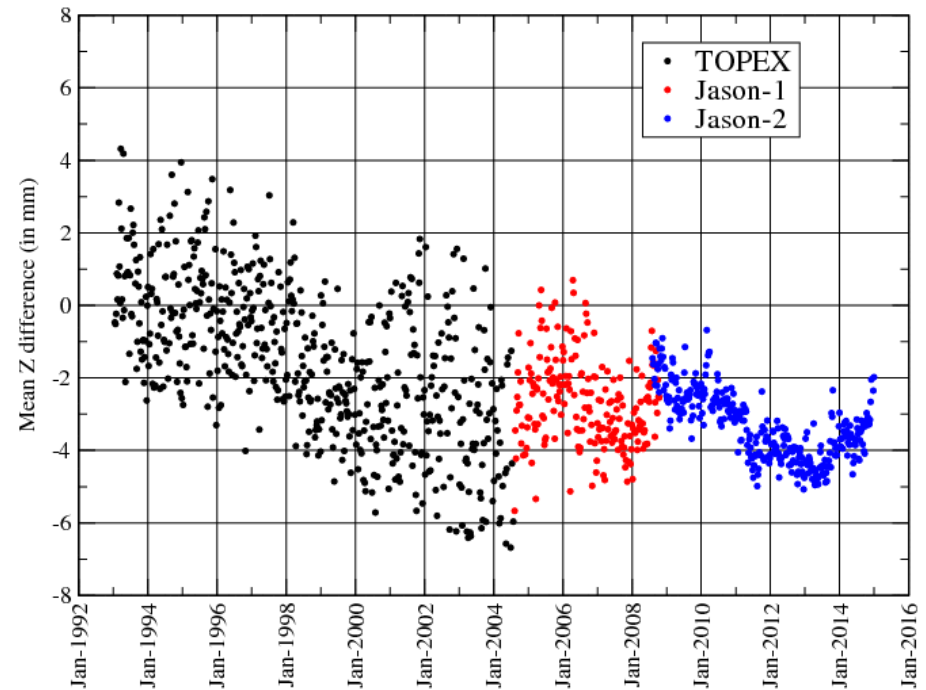
#### Mean RMS of radial differences per arc



#### **Mean RMS radial differences:**

- dispersion and level of RMS higher (and different) between 1993 and 2004
- important drift from 1993 to 2001 for DTRF2014
- a few mm after 2004

#### Mean of Z orbit differences per arc



#### **Orbit centering difference in the Z direction:**

- different geocenter than those of DPOD2008

# CONCLUSIONS

## **DORIS post-fit residuals differences global and per station / DPOD2008**

- Differences are at a very low level in particular for the Jason-1 and Jason-2 results
- With DPOD2014, the results are close or better to those obtained with DPOD2008 except for the following periods:
  - from Jul. 2007 to Oct. 2008
  - from Jan. 2000 to Jul. 2004
- Significant improvement for SAA stations ARFB, HEMB and SANB

## **Orbit Comparison wrt DPOD2008 orbit**

- The orbits are very close in particular before 2004
- The geocenter is different than those of DPOD2008