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# Assessment of systematic error estimation



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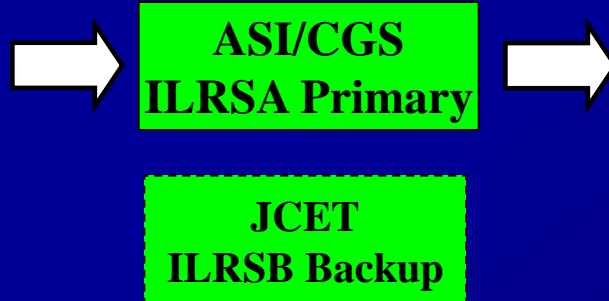
# Official ILRS analysis products

ILRS provides on a routine basis weekly station coordinates, daily EOP (X, X and LOD) and orbits, estimated from 7-day arcs of Lageos and Etalon data. The solutions are produced following the **ILRS/ASC guidelines, bias policy included**

## ILRS ACs



## ILRS CCs



## Combined products:

- Weekly Site coordinates
- Daily EOP
- Lageos and Etalon Orbits

# *ILRS ASC approach for range biases*

The ASC strategy was to limit application and estimation of biases to real events occurred and documented at the station

Engineering bias report from CDDIS database and from the stations through SLRMail

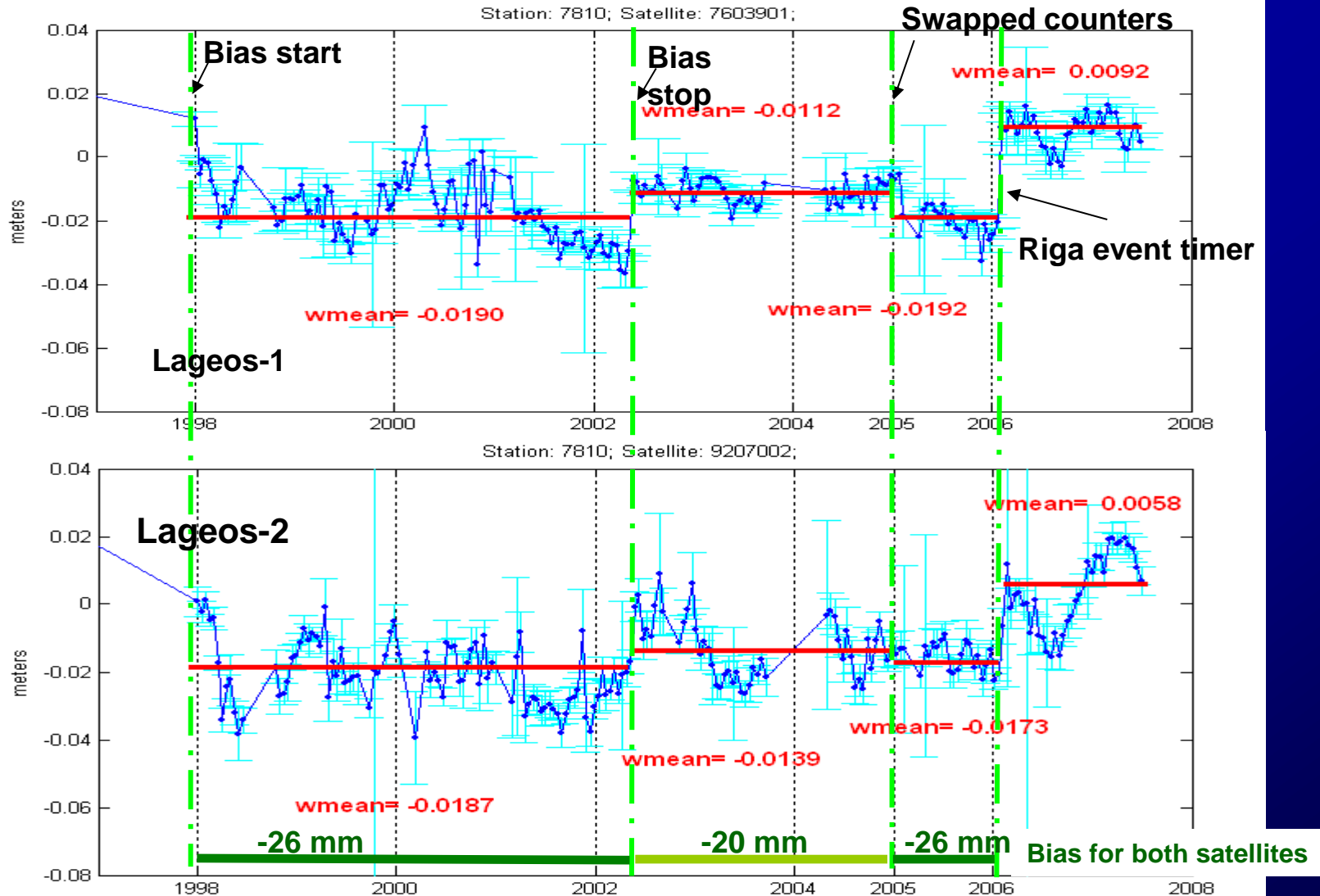
Rapid, daily bias analysis report from the ILRS ACs

Bias time series estimated from a multi-year solution

ILRS Data handling file adopted by the Analysis Standing Committee listing:

- bias to be applied
- sites requiring bias estimation (to be kept at minimum)
- unrecoverable data to be edited

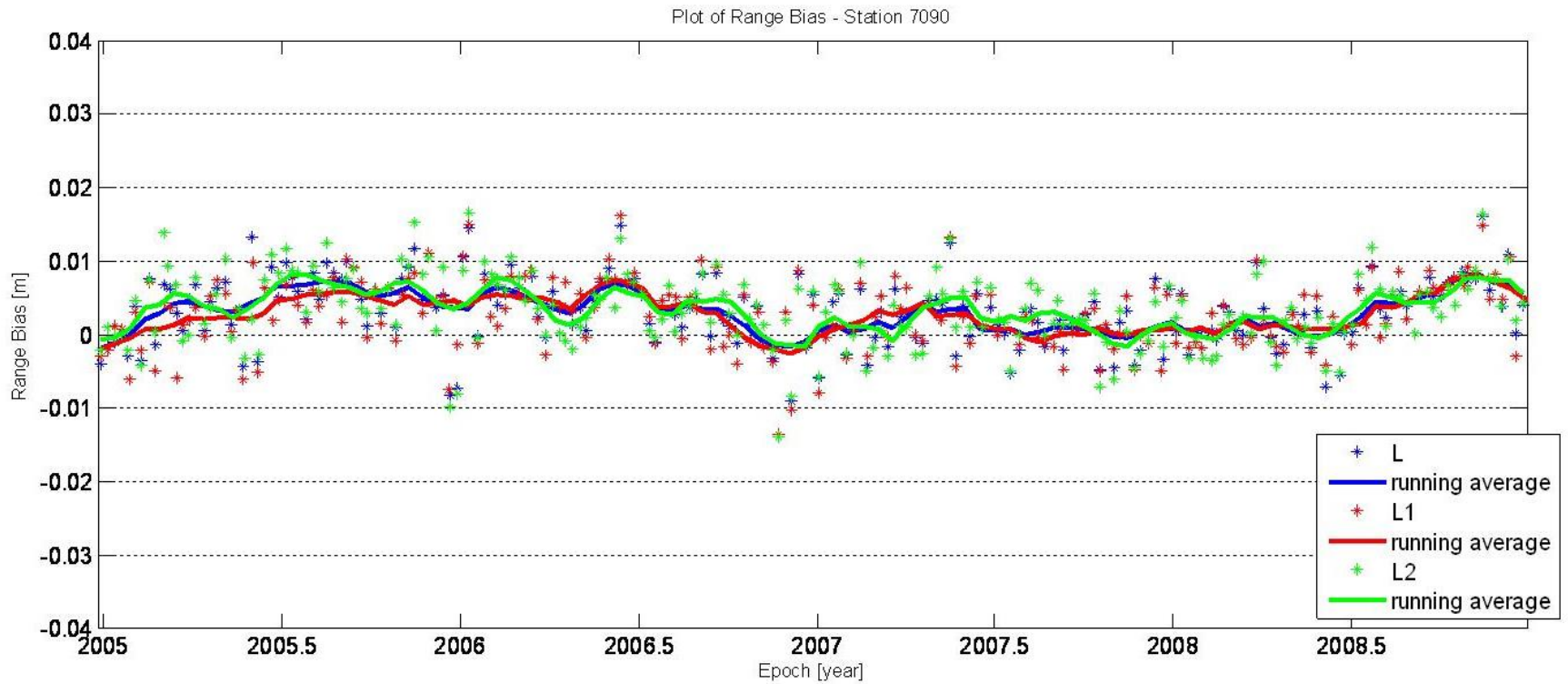
# Zimmerwald: estimated range biases



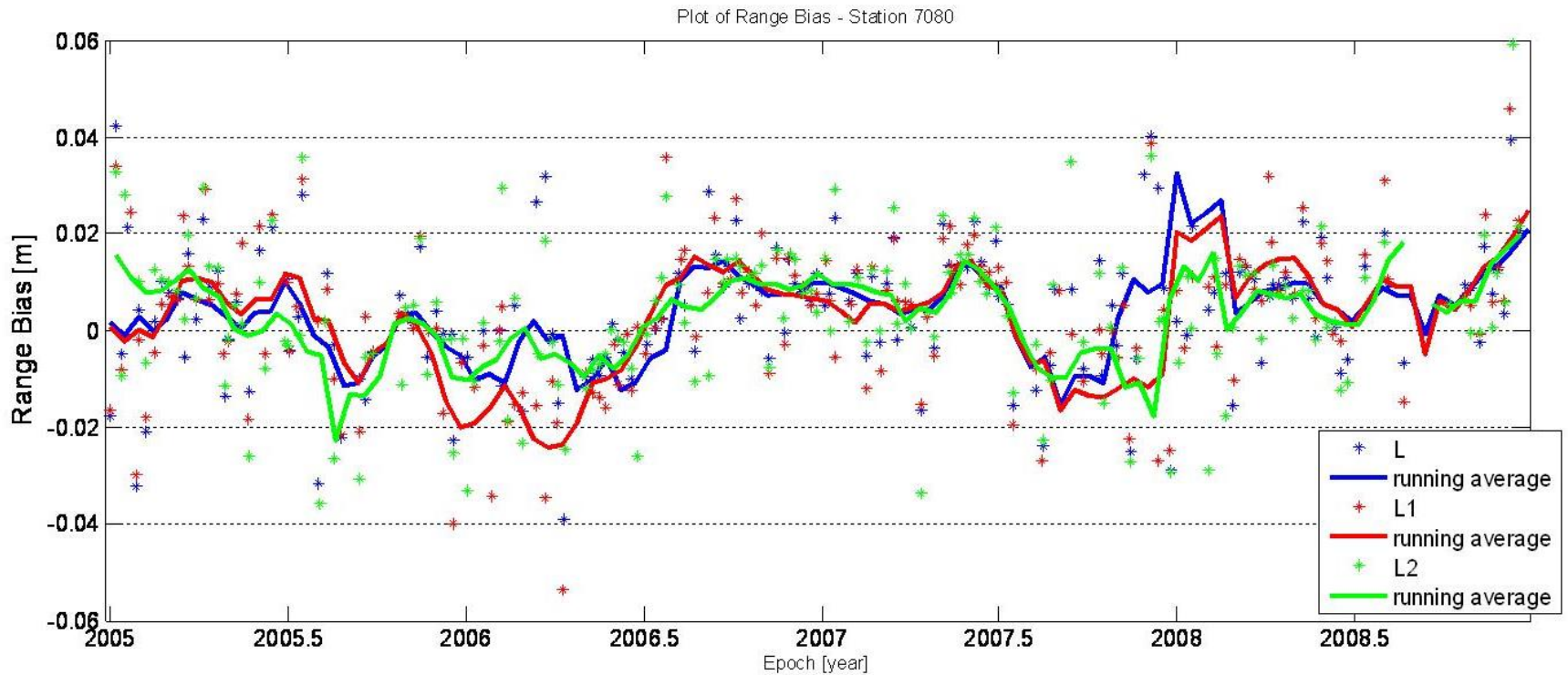
# *ILRS Pilot Project on systematic errors*

- Weekly estimation of coordinates, EOP and range biases
- Time frame: 2005-2008
- Data: L1 and L2
- 2 time series: unique and separate range biases
- Available time series from 5 Acs: ASI, DGFI, GFZ, JCET, NSGF

# Yarragadee range biases



# McDonald range biases

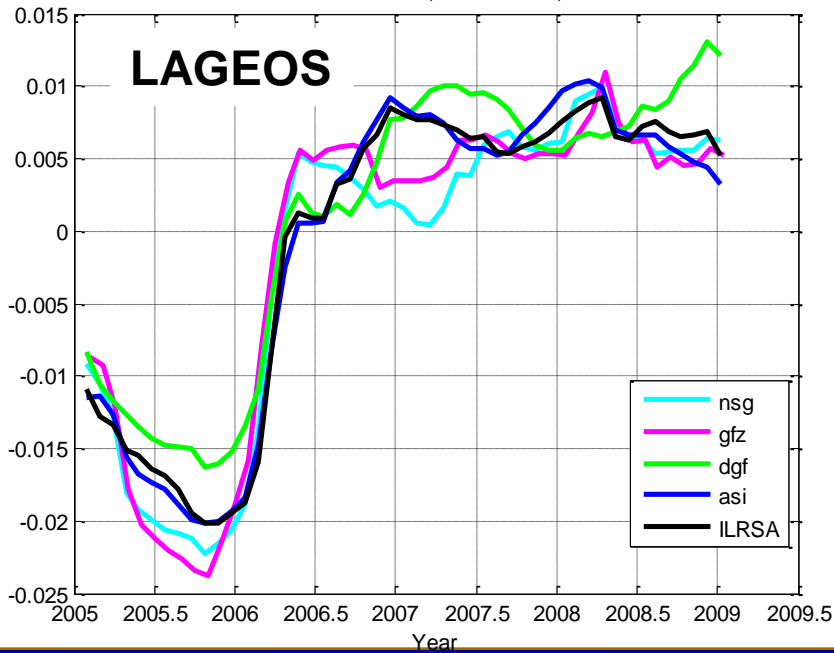


# Combined range biases

## Zimmerwald

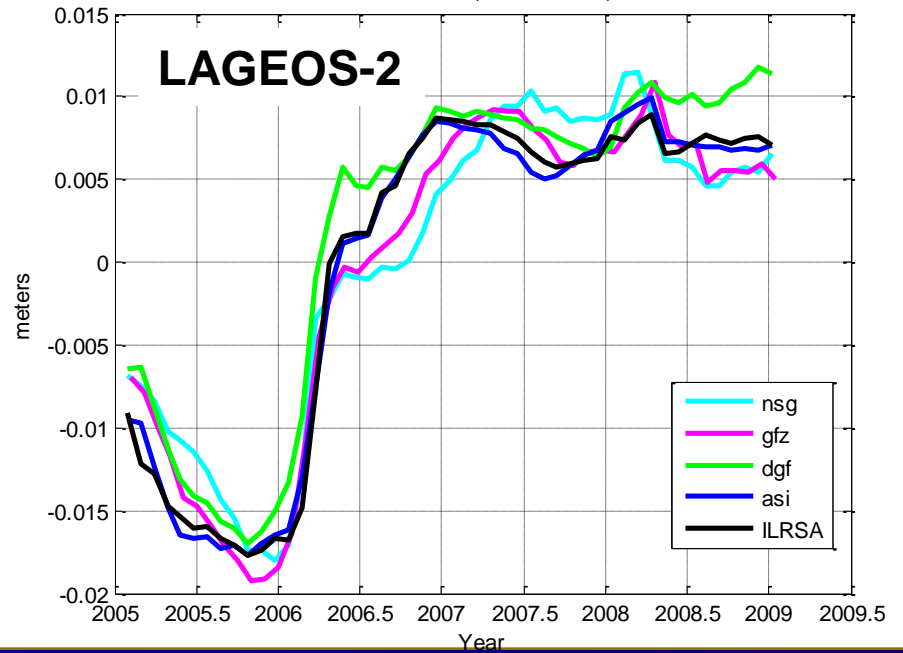
Station: 7810; Satellite: L1;

### LAGEOS



Station: 7810; Satellite: L2;

### LAGEOS-2



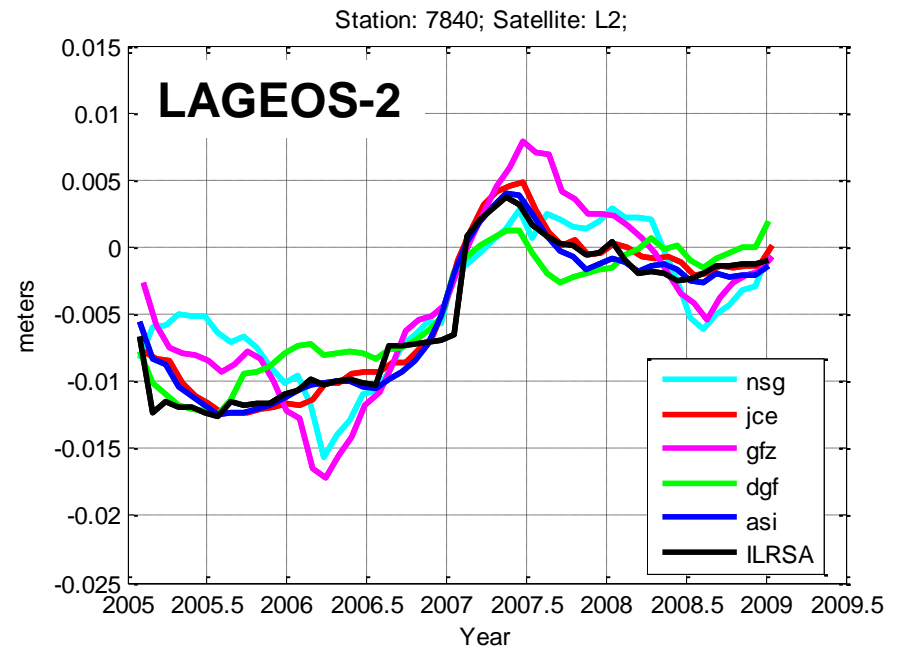
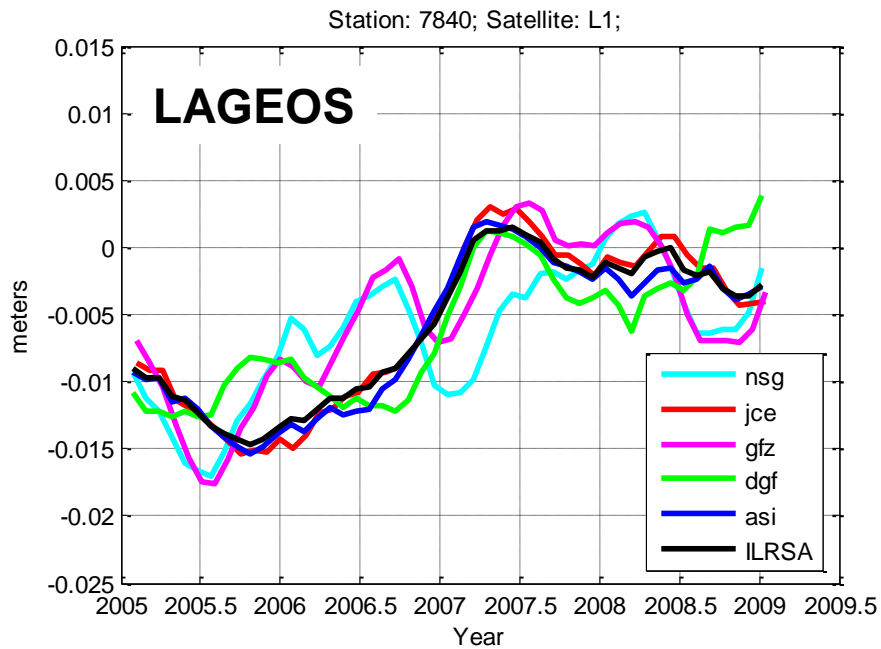
Data handling file:

7810 --- mm B 04:363:00000 06:037:00000 R -26.00



# Combined range biases

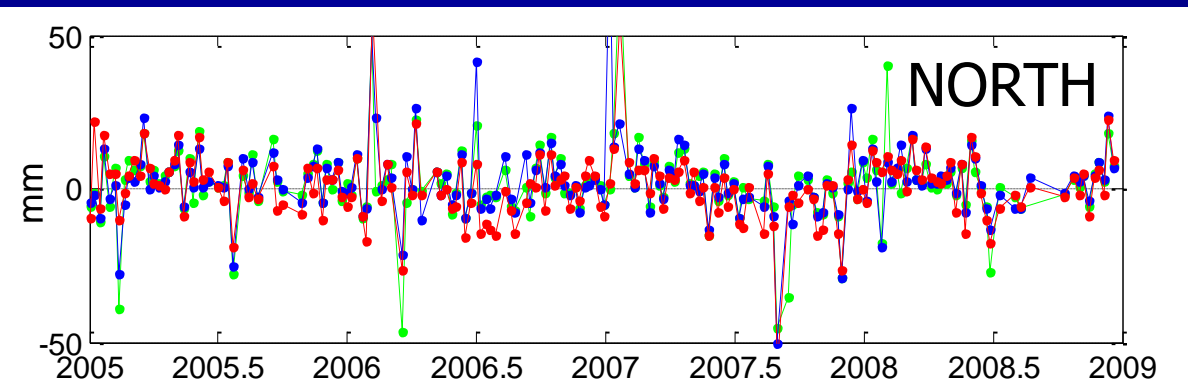
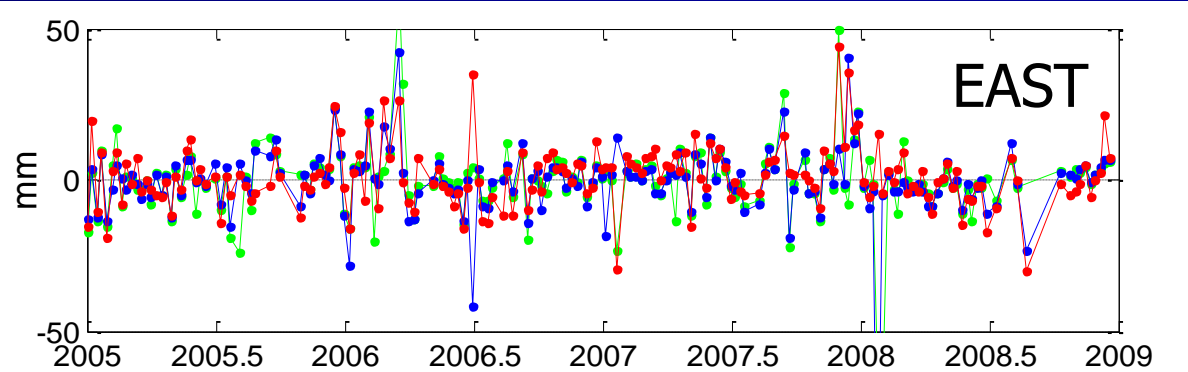
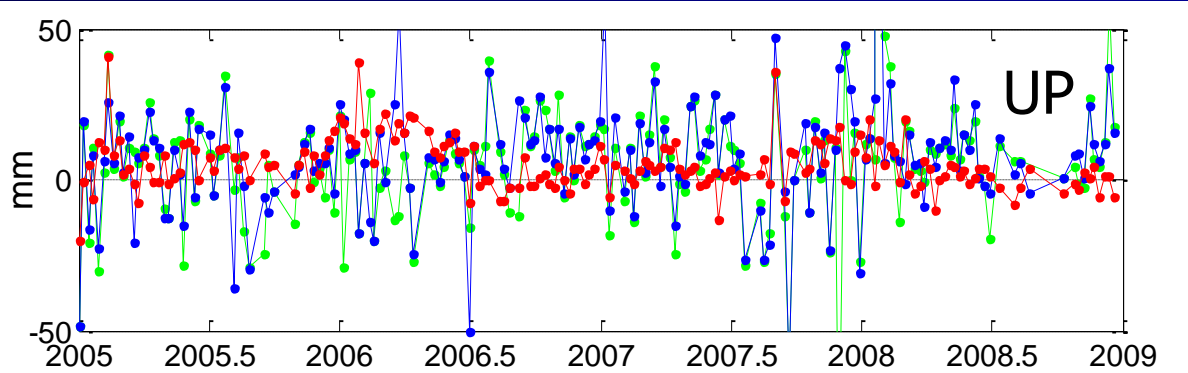
## Herstmonceux



Data handling file:

7840 --- mm A 02:032:00000 07:042:00000 R -9.00

# McDonald coordinates

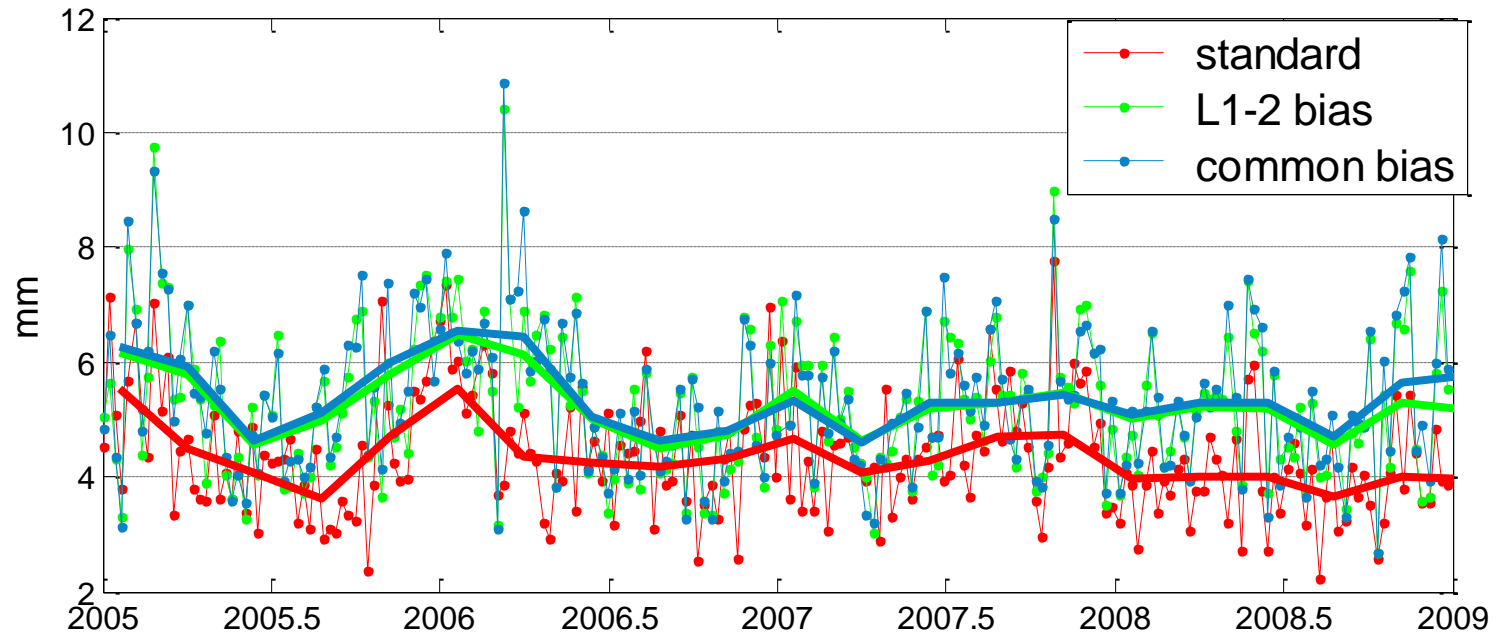


**Standard**  
**L1-2 bias**  
**Common bias**

		wrms mm	mean sig mm
<b>U</b>	<b>Std</b>	<b>6.7</b>	<b>12.0</b>
	L1-2	13.8	29.3
	comm	13.8	23.1
<b>E</b>	<b>Std</b>	<b>6.5</b>	<b>12.6</b>
	L1-2	5.4	18.5
	comm	5.4	14.3
<b>N</b>	<b>Std</b>	<b>7.8</b>	<b>12.5</b>
	L1-2	6.8	25.1
	comm	6.9	25.3

# *Impact on the site coordinates*

## 3D coordinate residual WRMS



# Impact on EOP

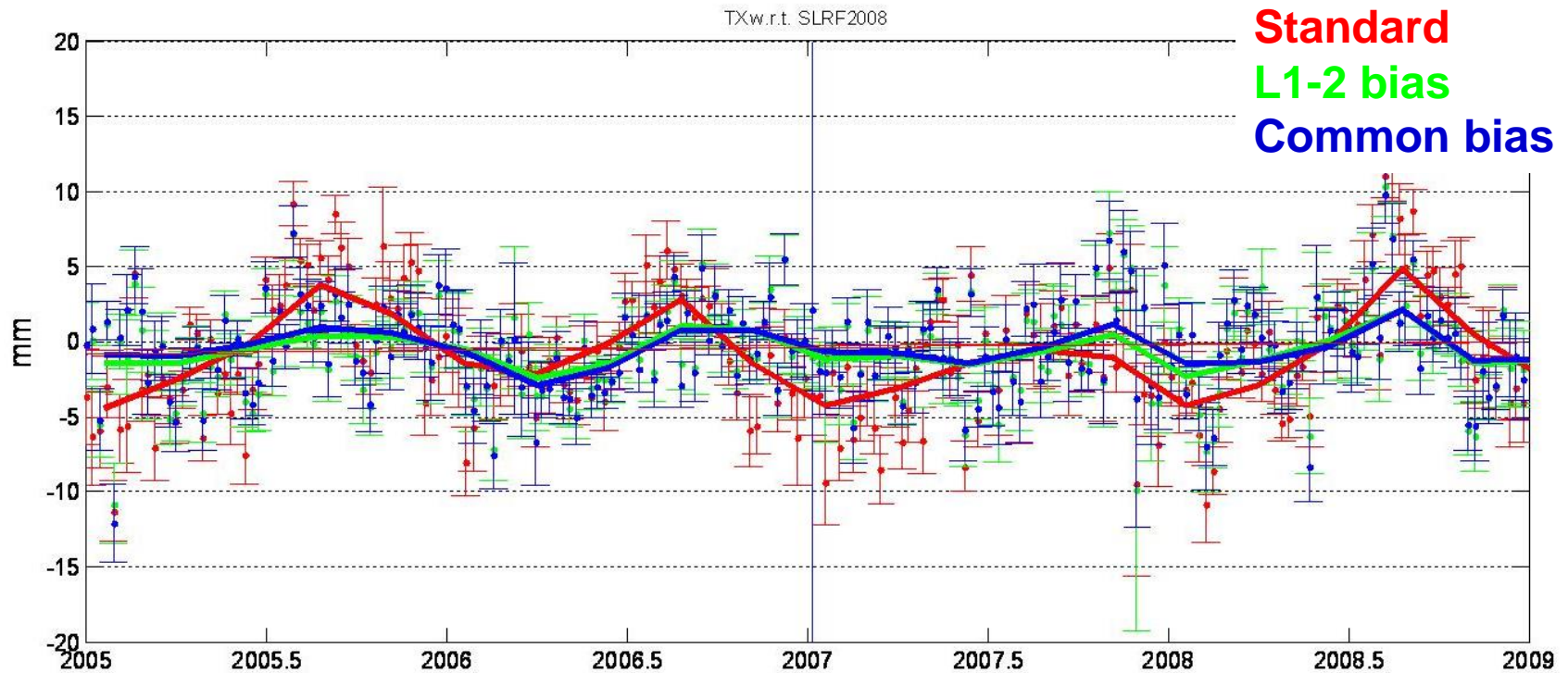
weekly mean residuals w.r.t. USNO



**Standard**  
**L1-2 bias**  
**Common bias**

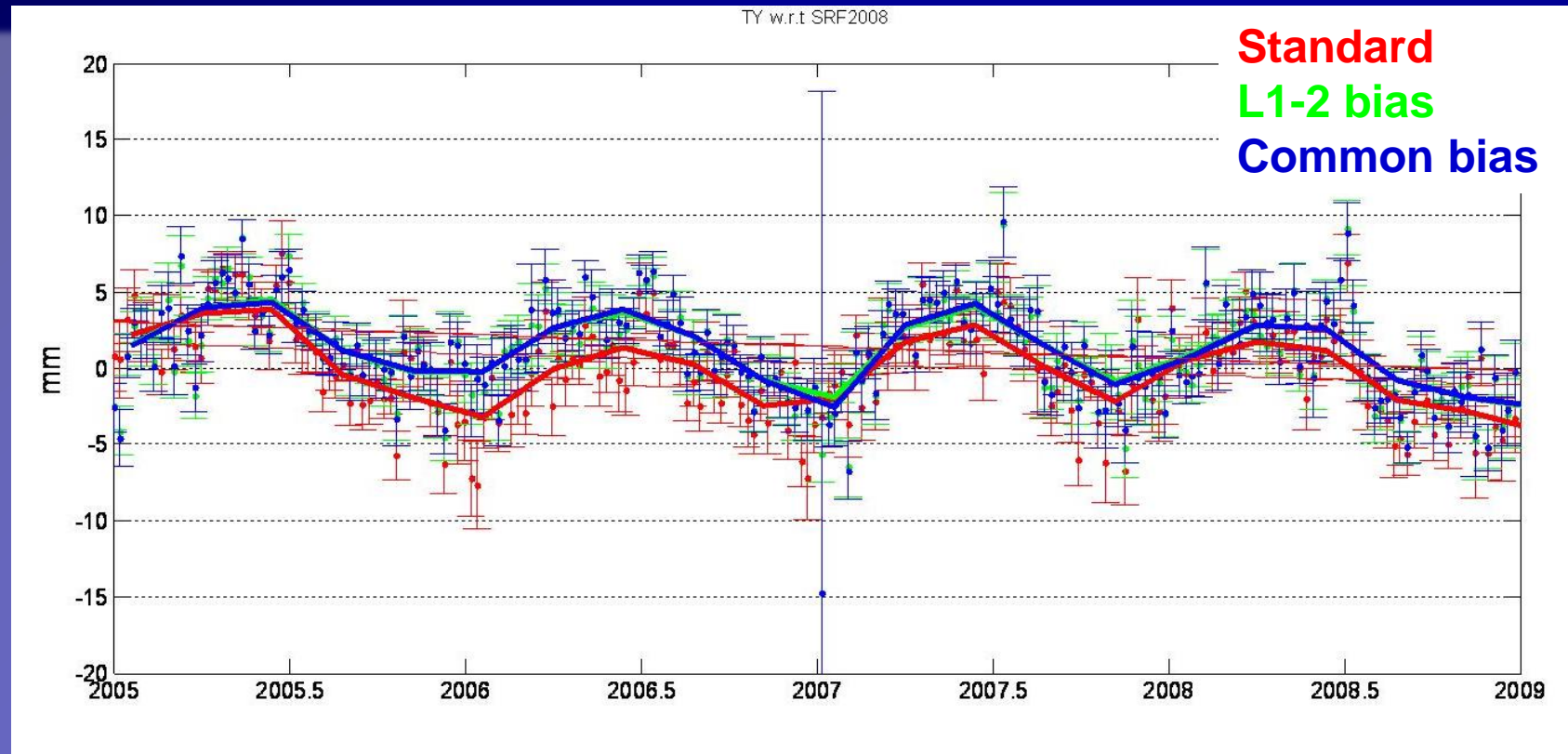
# *Impact on RF origin*

TX w.r.t. SLRF2008



# *Impact on RF origin*

TY w.r.t. SLRF2008



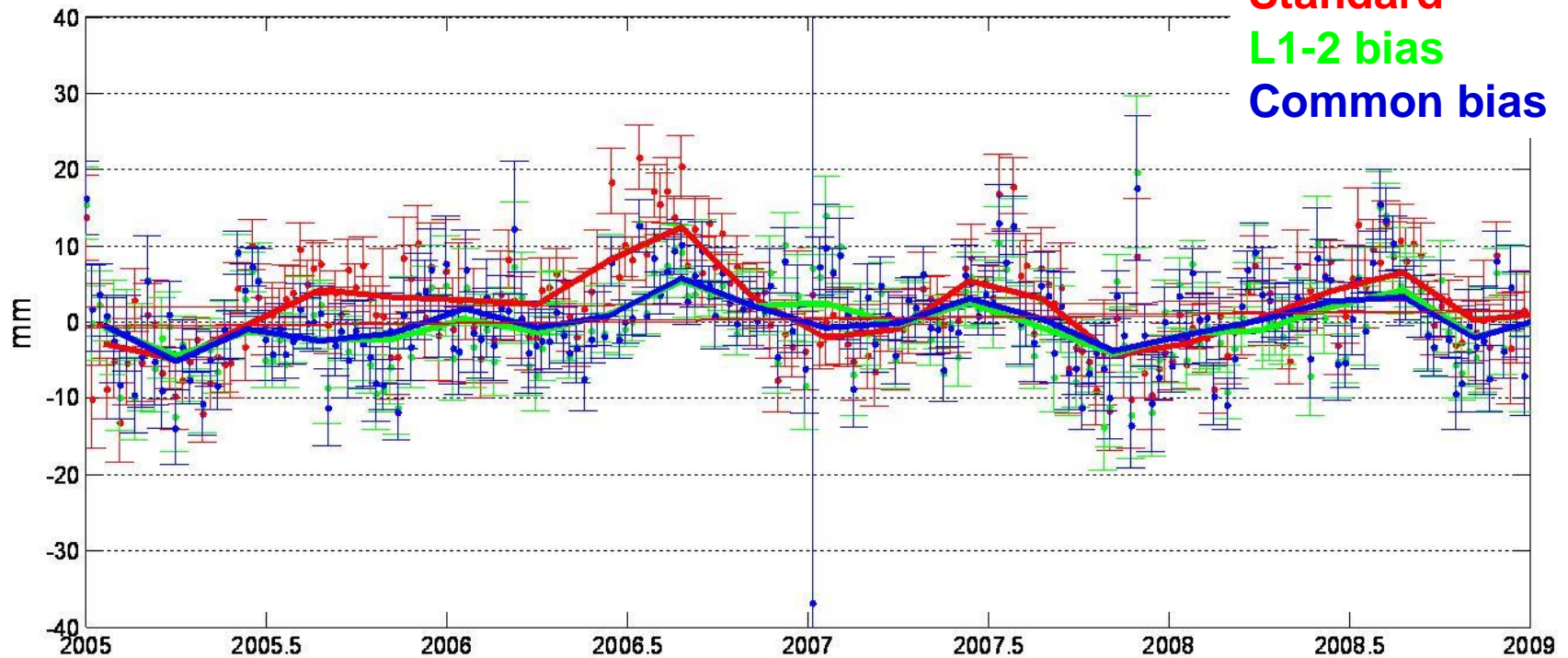


# *Impact on RF origin*

TZ w.r.t. SLRF2008

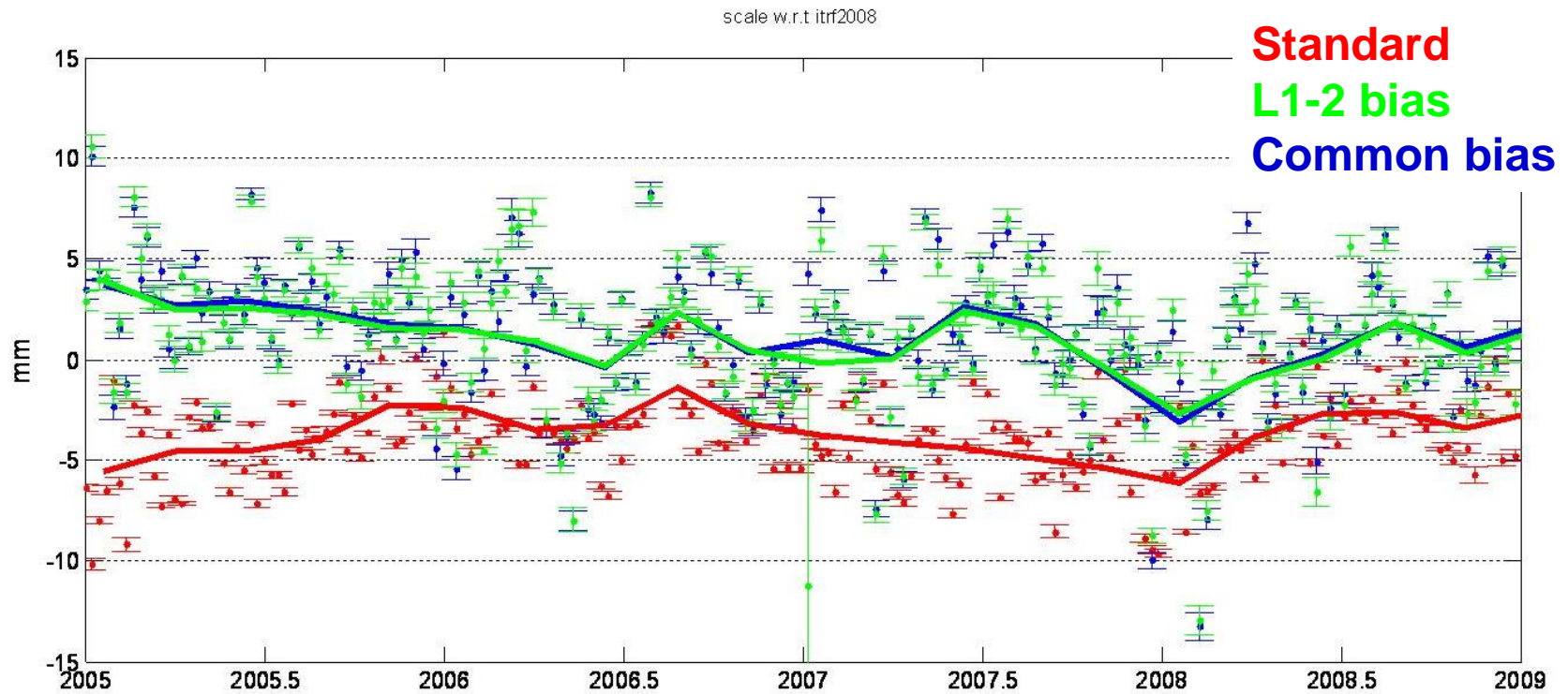
TZ w.r.t. SLRF2008

**Standard**  
**L1-2 bias**  
**Common bias**



# *Impact on the scale*

Scale w.r.t. SLRF2008





# *Path forward*

## **Points to note:**

- Estimating the biases for all the sites together with the coordinates weakens the official products
- The 7-day estimation is a medium/long term monitoring, not a quick QC
- The medium/long term monitoring is essential to trace the range biases at centimeter level

## **ASC approach under discussion:**

- make a table of biases using the time series of combined range biases from 1983 up to now
- apply the bias values in the table for the official ILRS products
- keep the table updated