

Evaluation of the present SLR tracking stations

Horst Müller

Deutsches Geodätisches Forschungsinstitut (DGFI-TUM)
Technische Universität München

2017 ILRS Technical Workshop
Riga, Latvia, October 02 2017

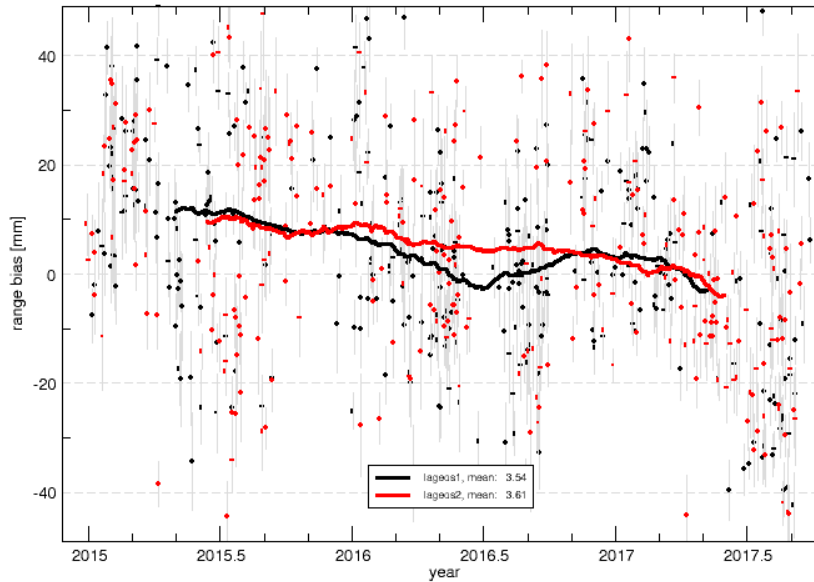
Processing

- Period January 2015 (1825) until September 2017 (1967)
 - Station coordinates fixed to SLRF2014
 - Fix EOPs to IERS C04 (2014)
 - IERS standards, non tidal loading not applied
 - Software DOGS-OC 5.4
-
- For each satellite compute weekly arcs, solving for pass biases
 - Extract biases
 - Generate running averages over 300 range bias values
 - Compute mean monthly biases
-
- Analyse remaining residuals
 - Compute monthly mean residuals
 - Generate running averages over 10000 residuals

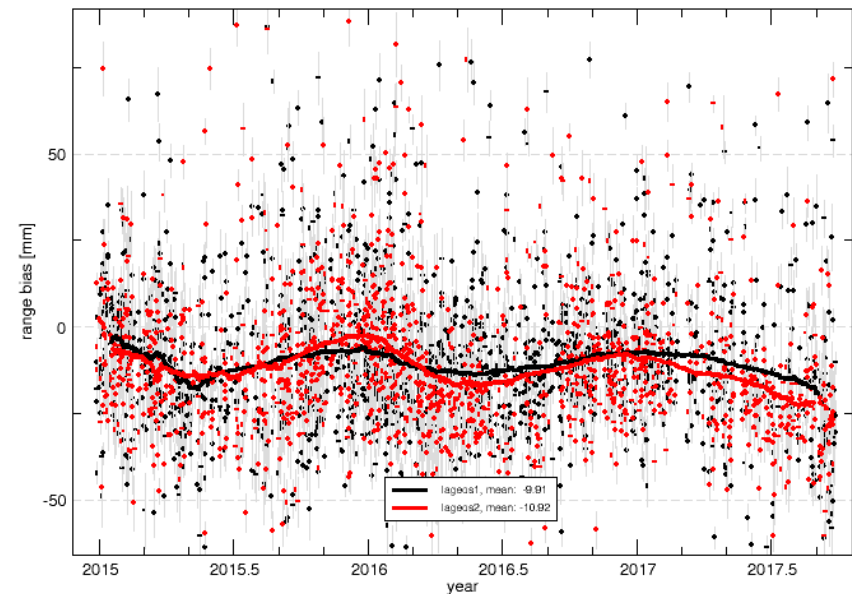
Problems during computation

- Station coordinates and velocities not precise enough for new stations
- Non tidal loading?

SLRF2014 bias analysis: one per pass and running average of 300 passes
Altay_Mountain (1879)

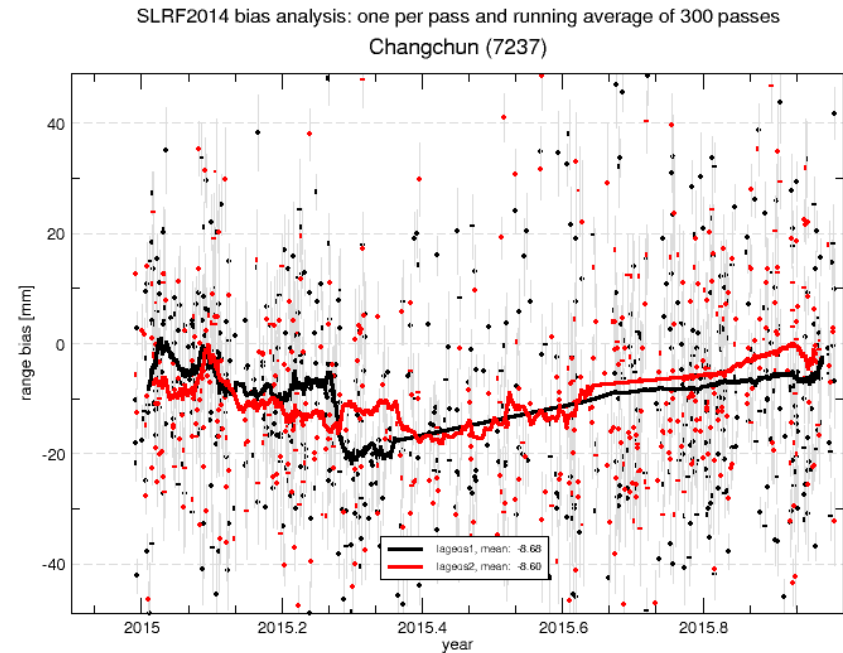
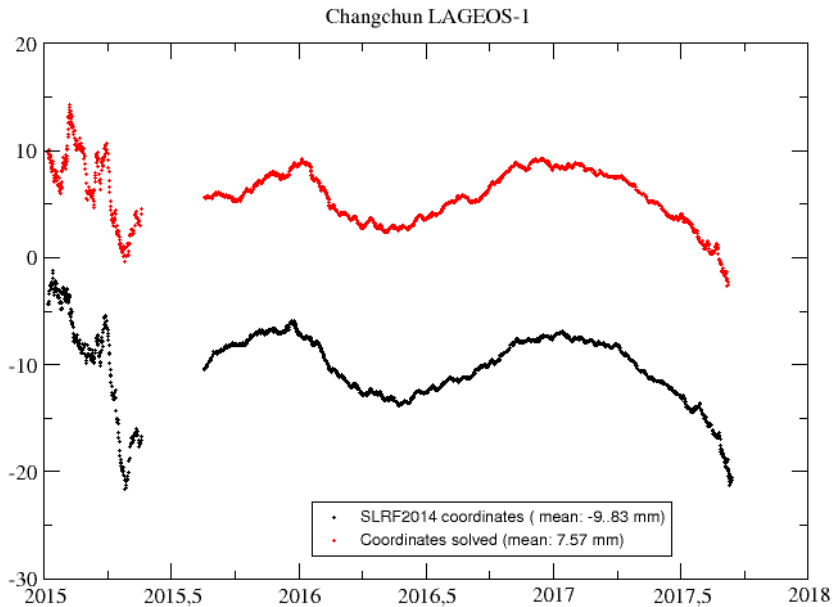


SLRF2014 bias analysis: one per pass and running average of 300 passes
Changchun (7237)



Problems during computation

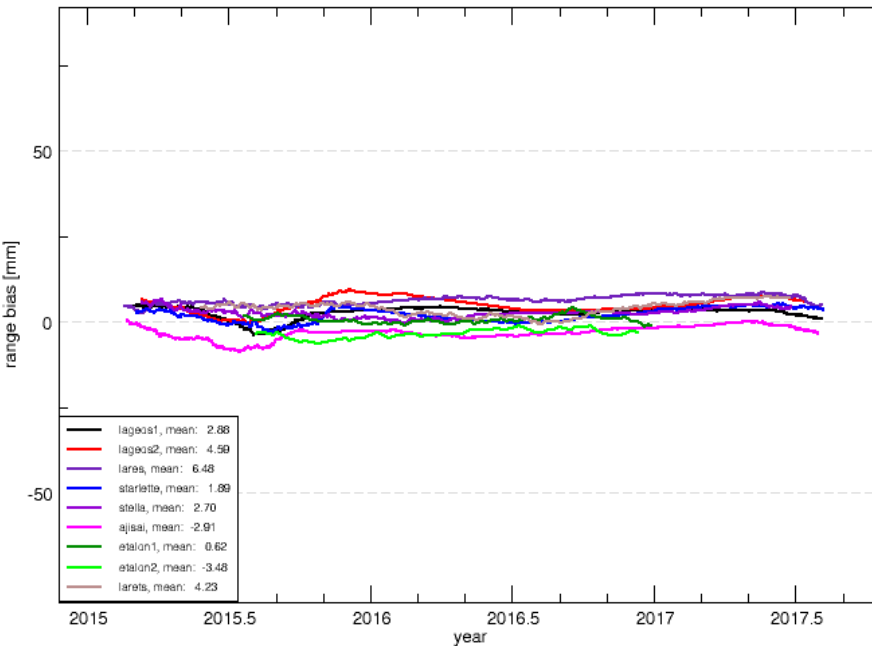
- Station coordinates and velocities not precise enough for new stations
- Non tidal loading?



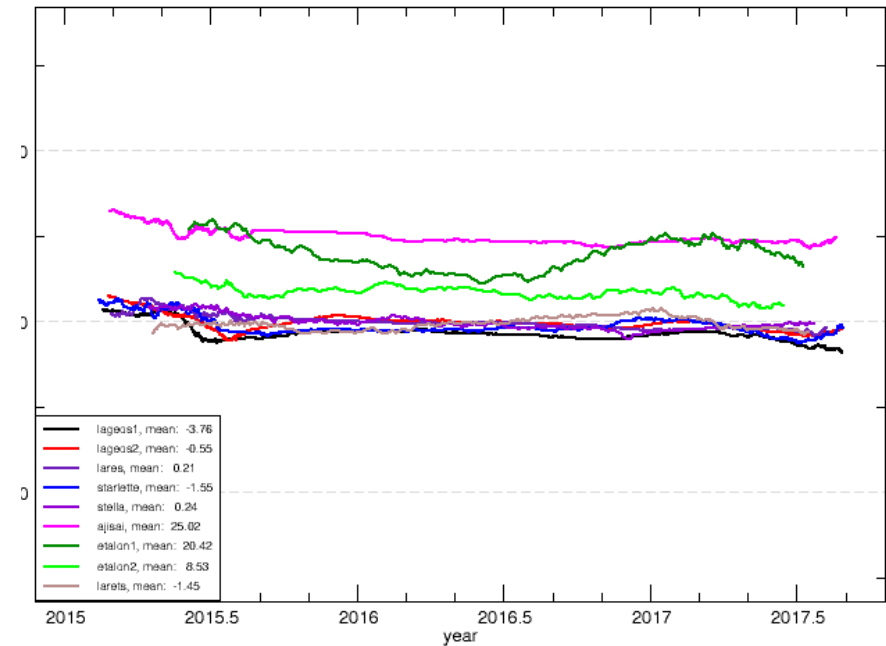
Problems during computation

- Centre of mass correction for Ajsai problematic for a few stations

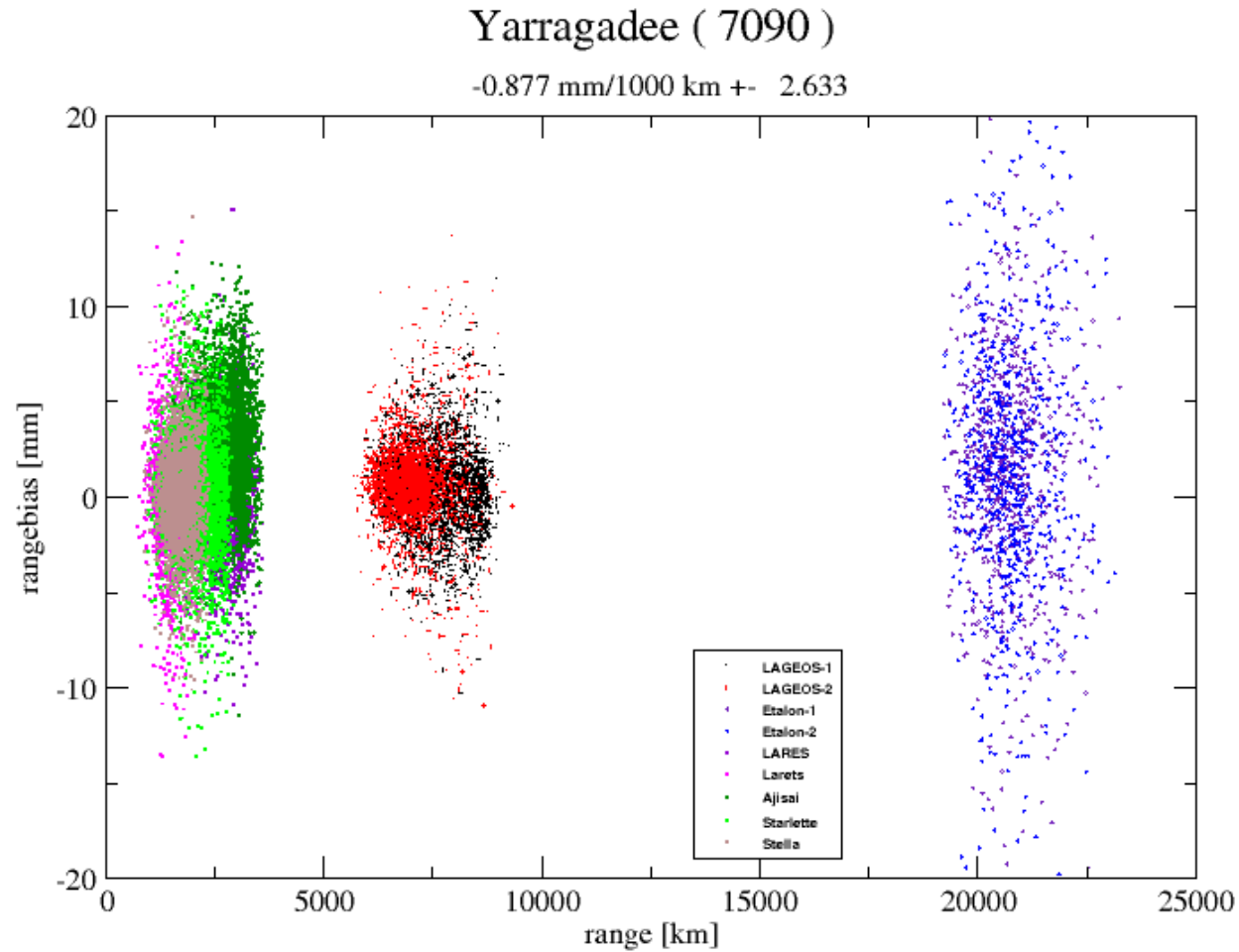
SLRF2014 bias analysis: running average of 300 passes
Graz (7839)



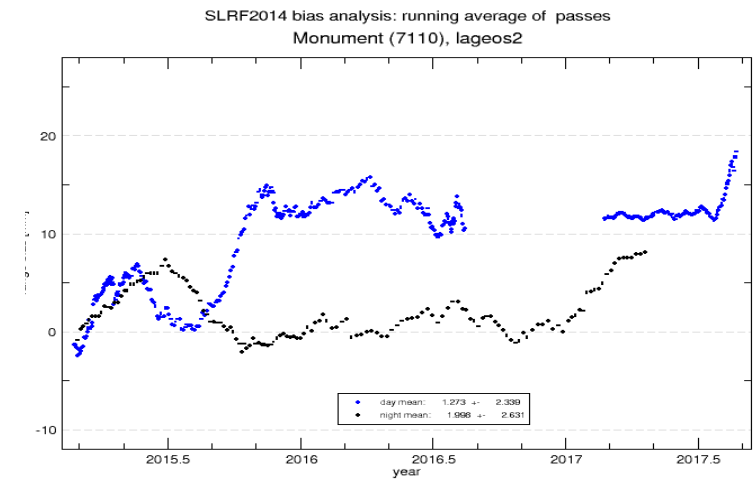
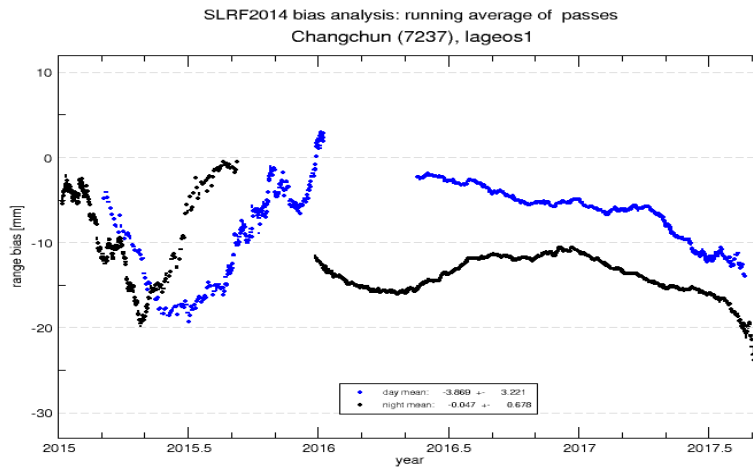
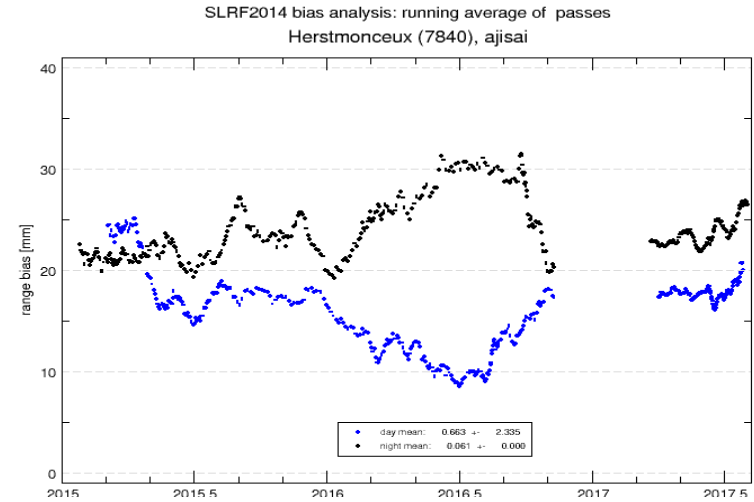
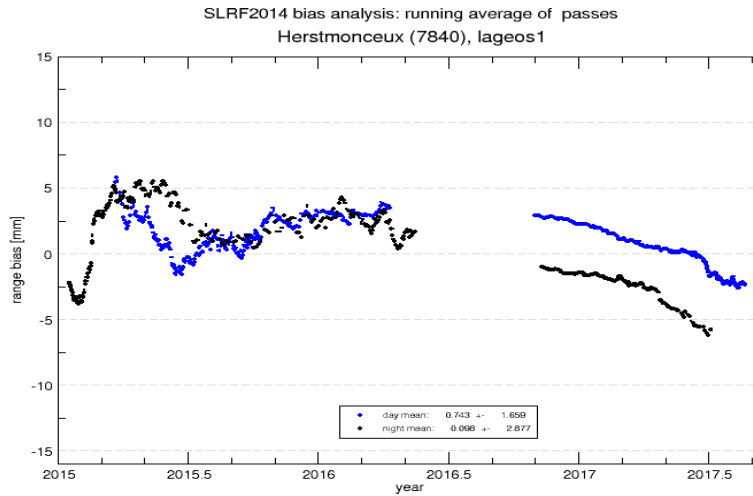
SLRF2014 bias analysis: running average of 300 passes
Matera (7941)



Range dependence of biases

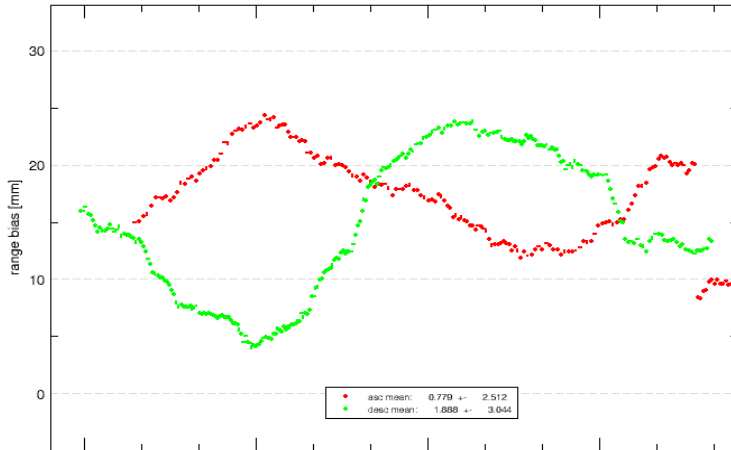


Analysing biases, day-night passes

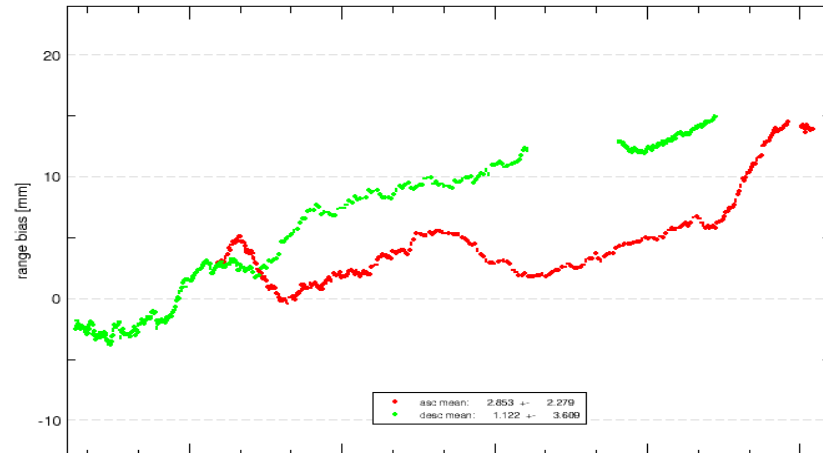


Analysing biases, ascending – descending passes

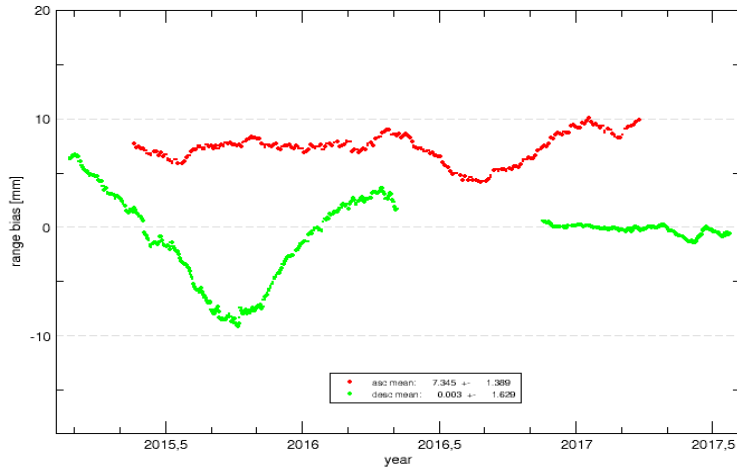
SLRF2014 bias analysis: running average of passes
Haleakala (7119), lageos2



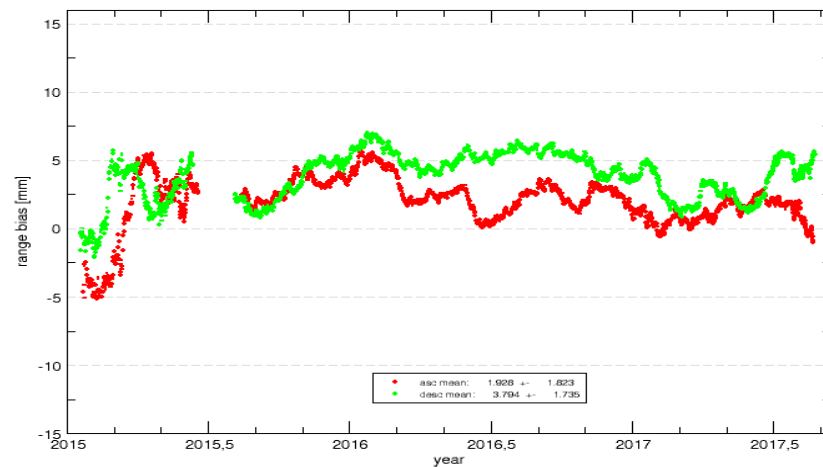
SLRF2014 bias analysis: running average of passes
Monument (7110), lageos1



SLRF2014 bias analysis: running average of passes
Washington (7105), lageos2

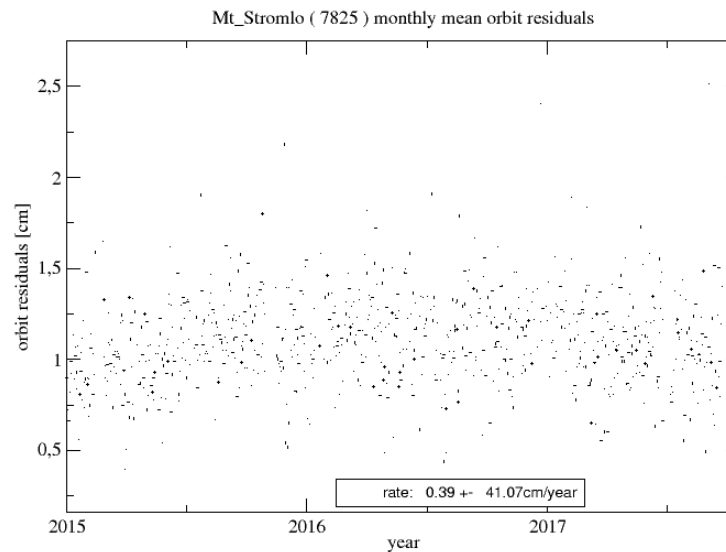
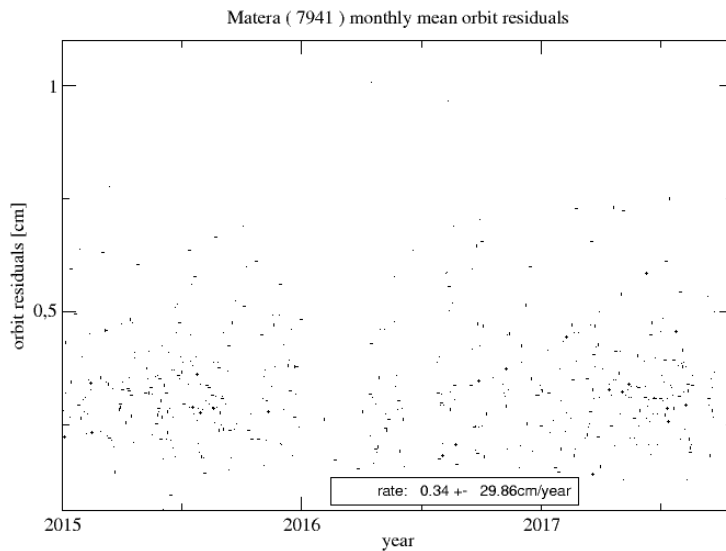


SLRF2014 bias analysis: running average of passes
Yarragadee (7090), starlette



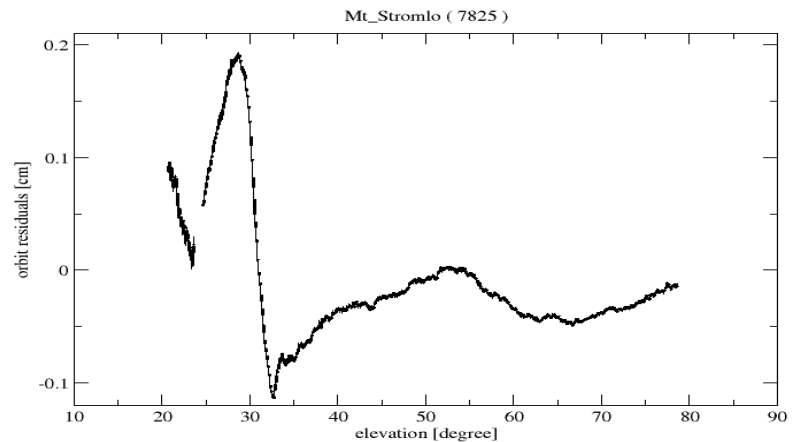
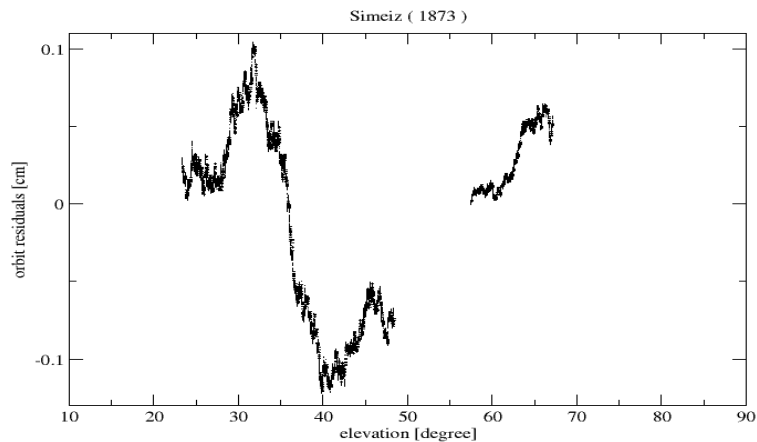
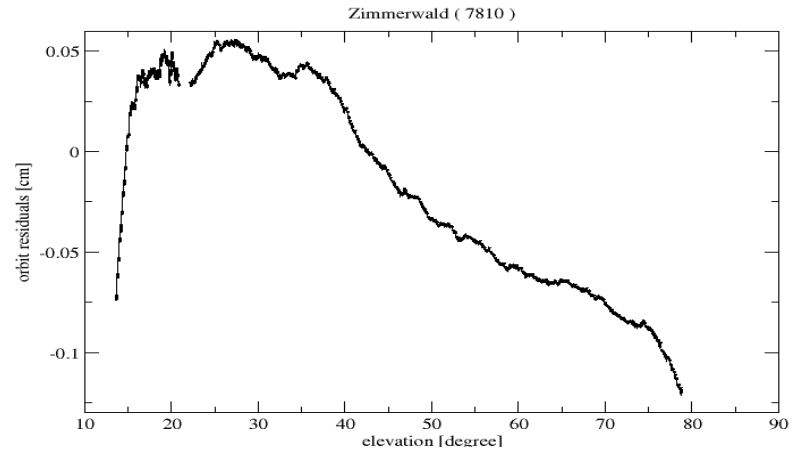
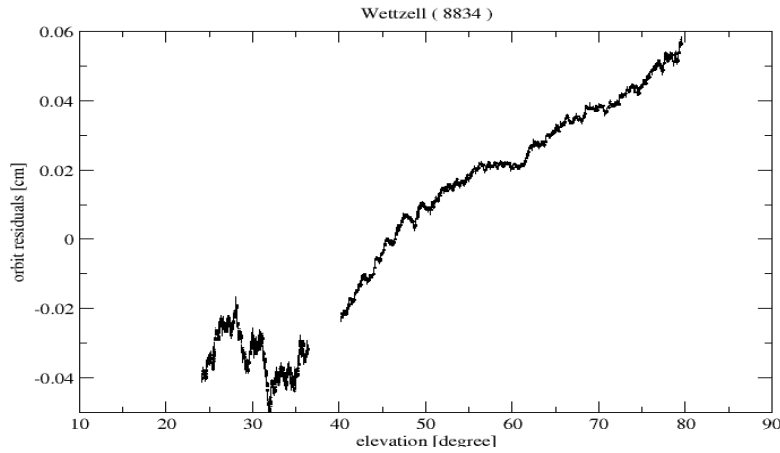
Analysis of mean orbit residuals

Time history of residuals monthly mean squared over all satellites



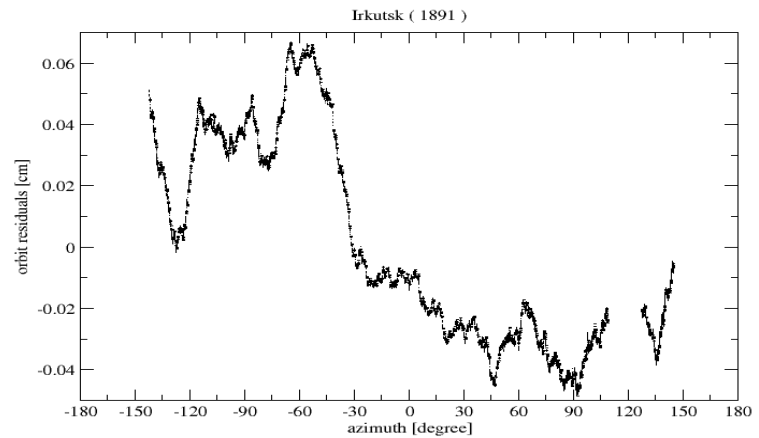
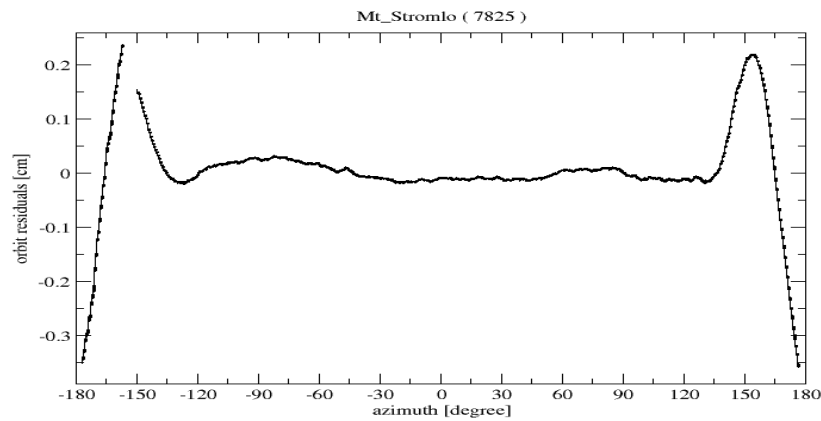
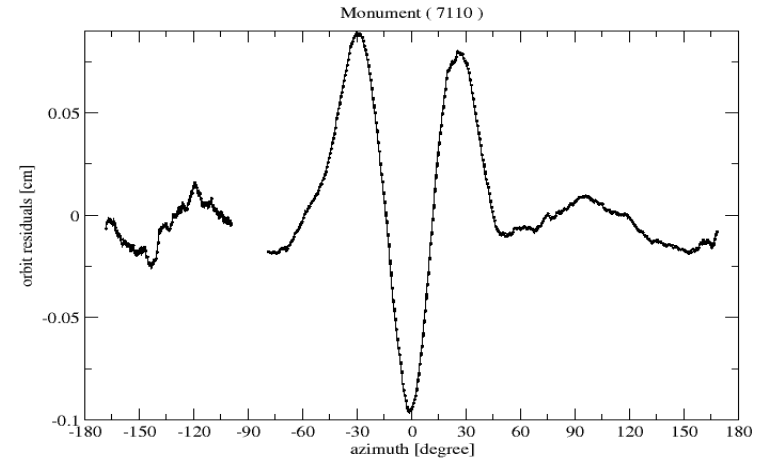
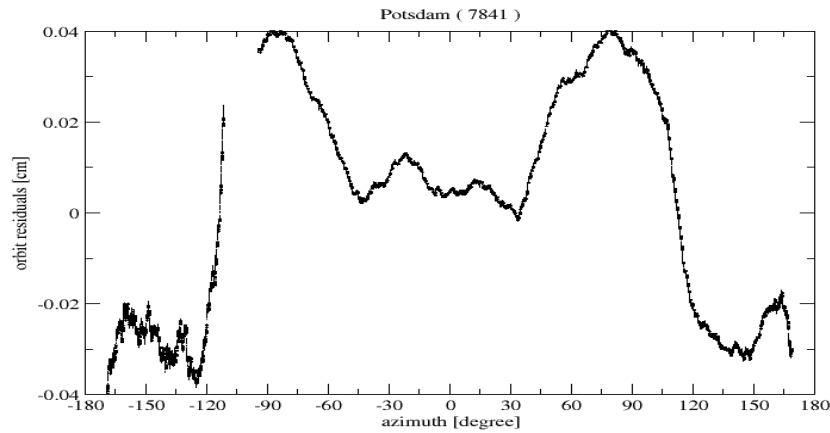
Analysis of mean orbit residuals

Elevation dependency, running averages over 10000 observations



Analysis of mean orbit residuals

Azimuth dependency



Conclusion

- Station coordinates and velocities need a more often update
 - Satellite Centre of Mass corrections should be redefined
 - Stations do not show change in station precision in the last years
 - There is no range dependency in the tracking data but CoM corrections need update
 - There are differences in day-night resp. ascending-descending arcs
 - Small dependencies on azimuth and elevation exist for few stations
-
- Results can be found on DGFI-TUM Webpage:
https://ilrs.dgfi.tum.de/quality/weekly_biases/stations/

Thank you