Status of the ELT data center
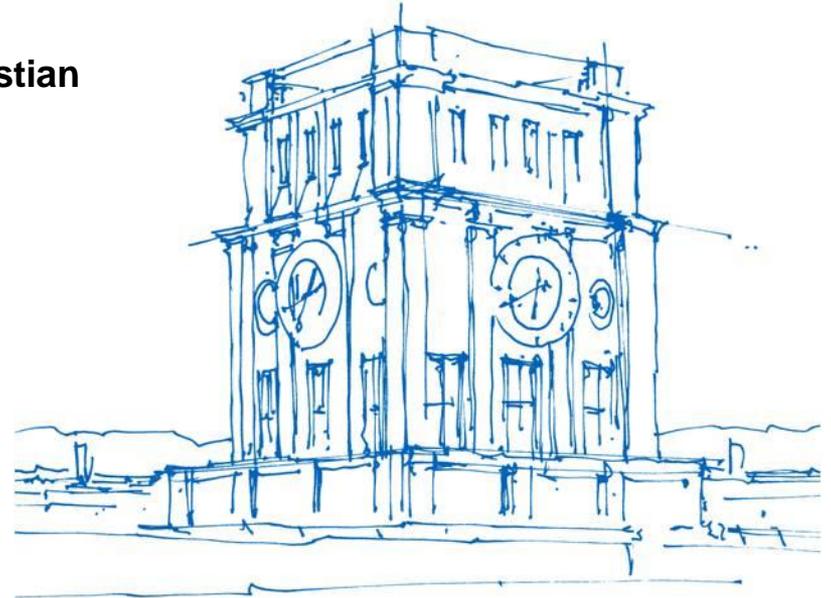
Anja Schlicht[1], Christoph Bamann[1], Stefan Marz[1], Christian Schwatke[2], Ulrich Schreiber[1], Ivan Prochazka[3]

[1] FESG, Technical University of Munich

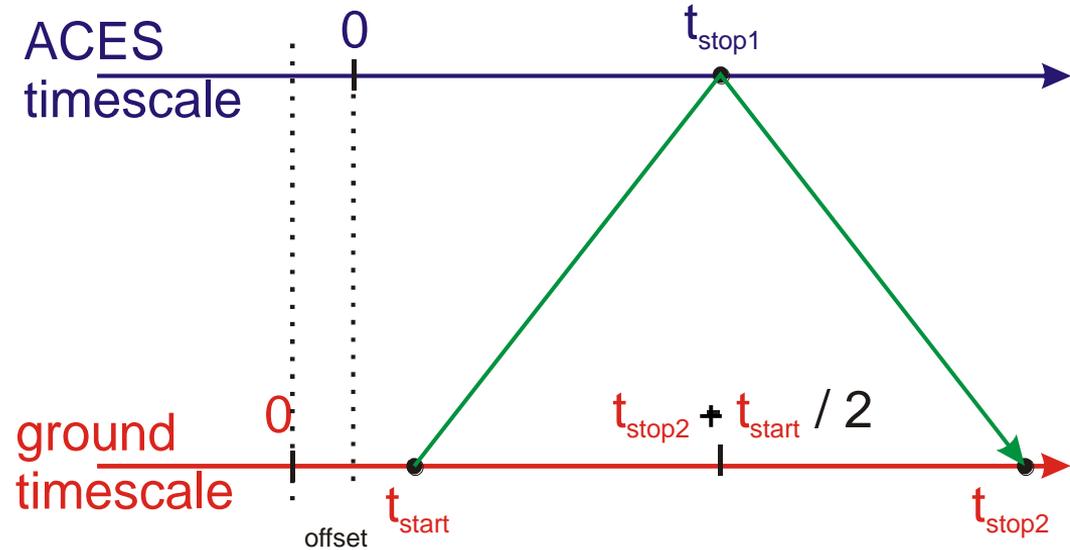[2] DGFI, Technical University of Munich

[3] Czech Technical University of Prague
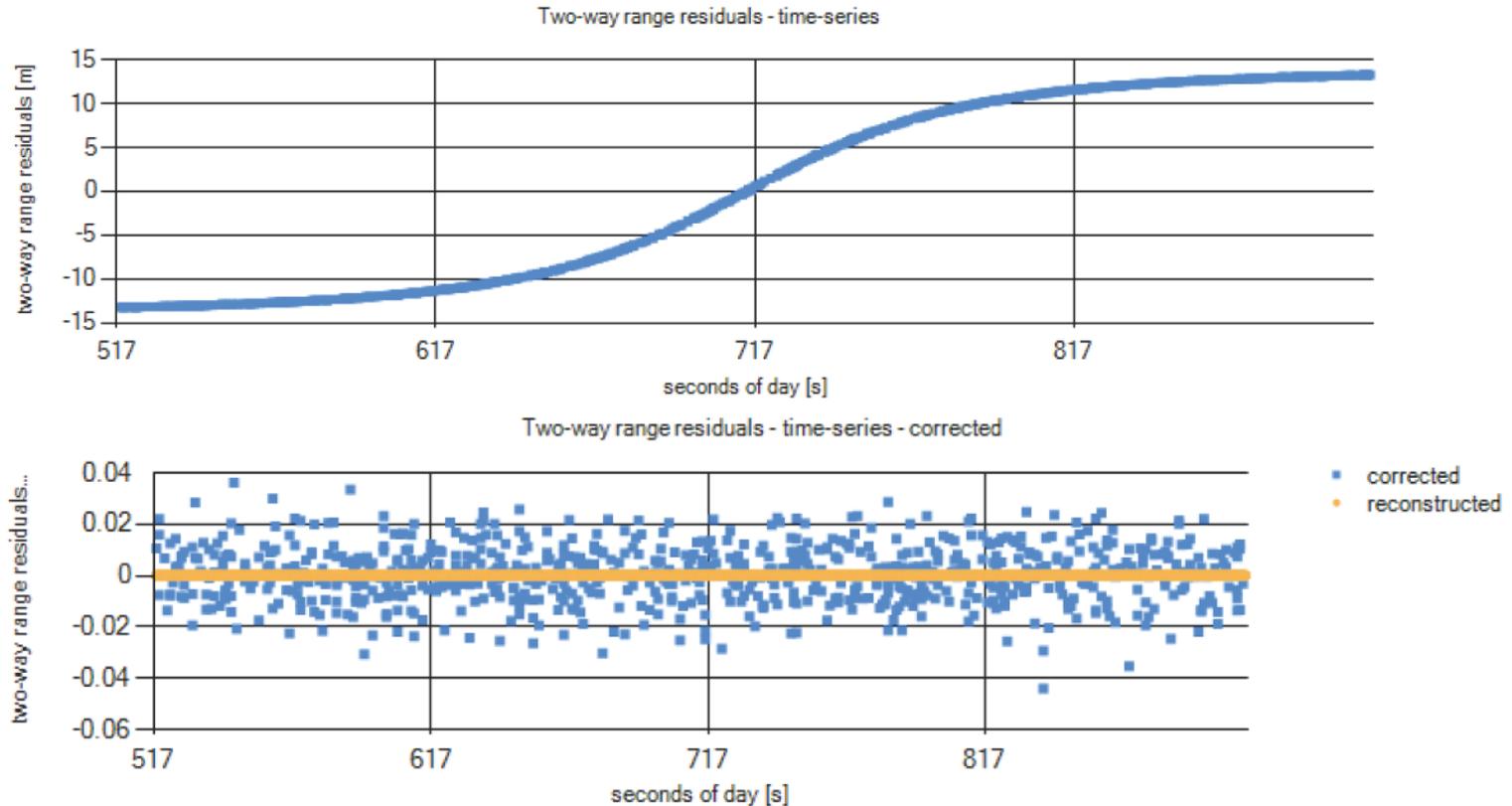
Potsdam, October 9th – 14th 2016

Uhrenturm der TUM
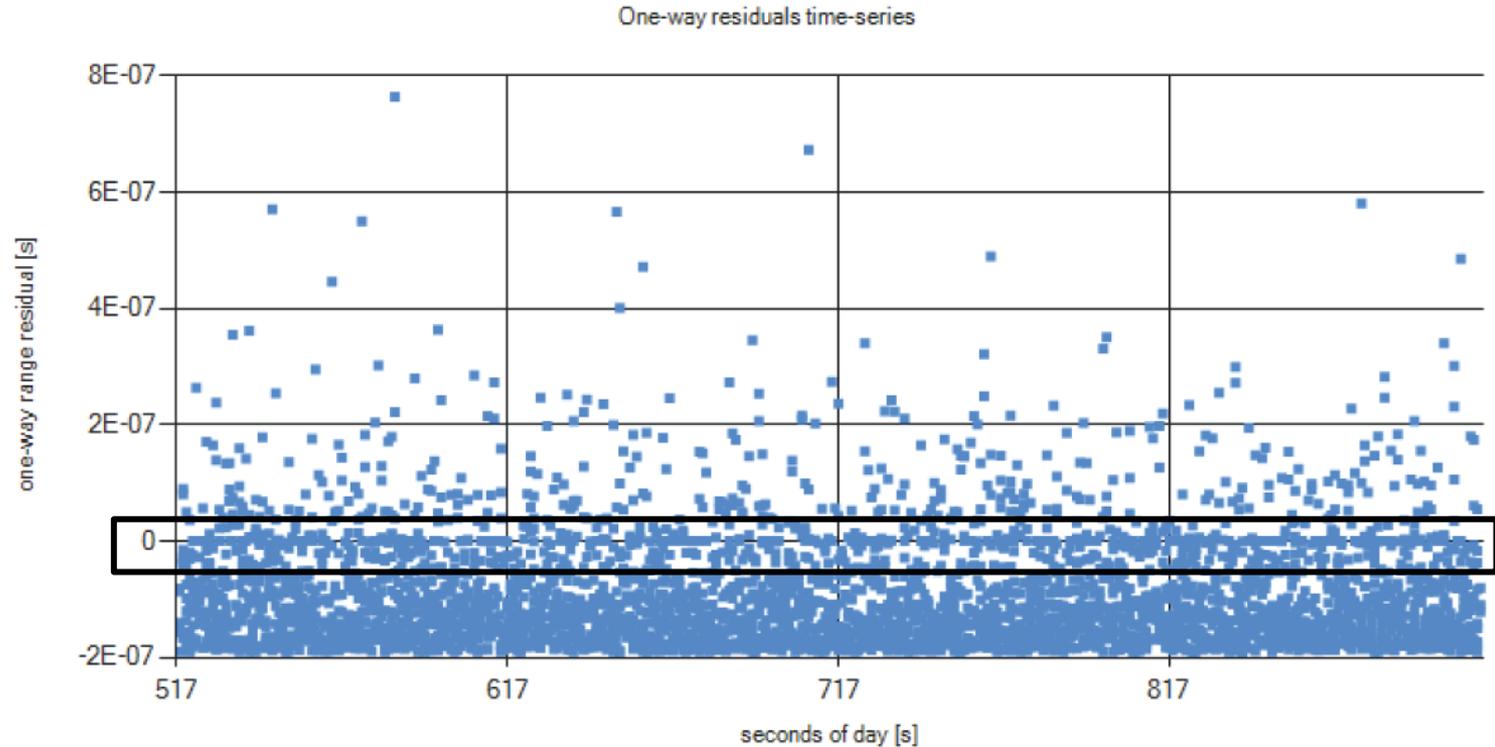
ELT time transfer principle

$$\tau_{offset} = (t_{stop2} + t_{start})/2 - t_{stop1}$$

Steps in the analysis: two-way data

Two-way range residuals - time-series
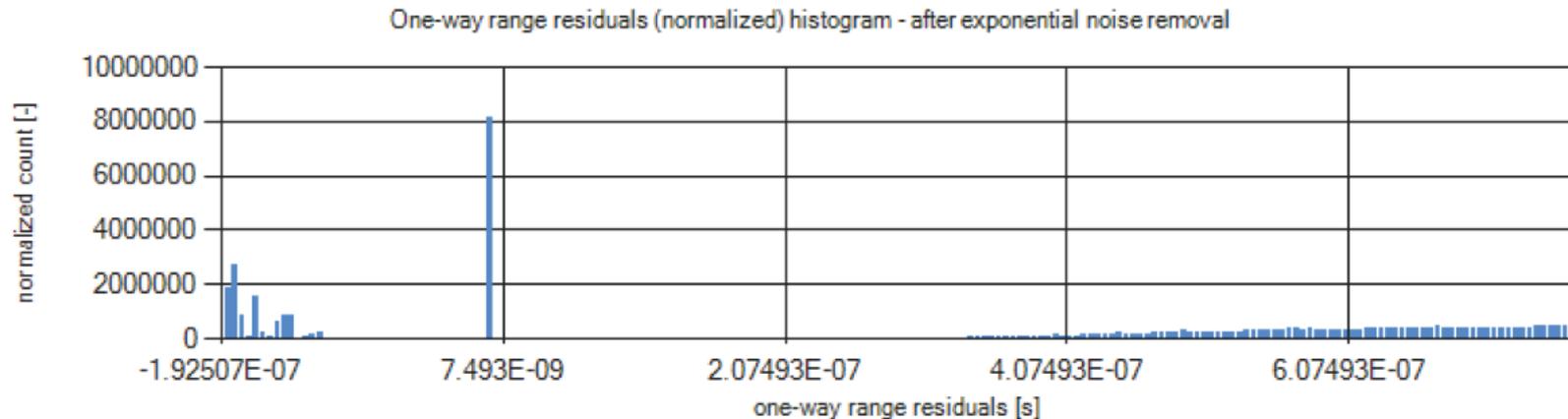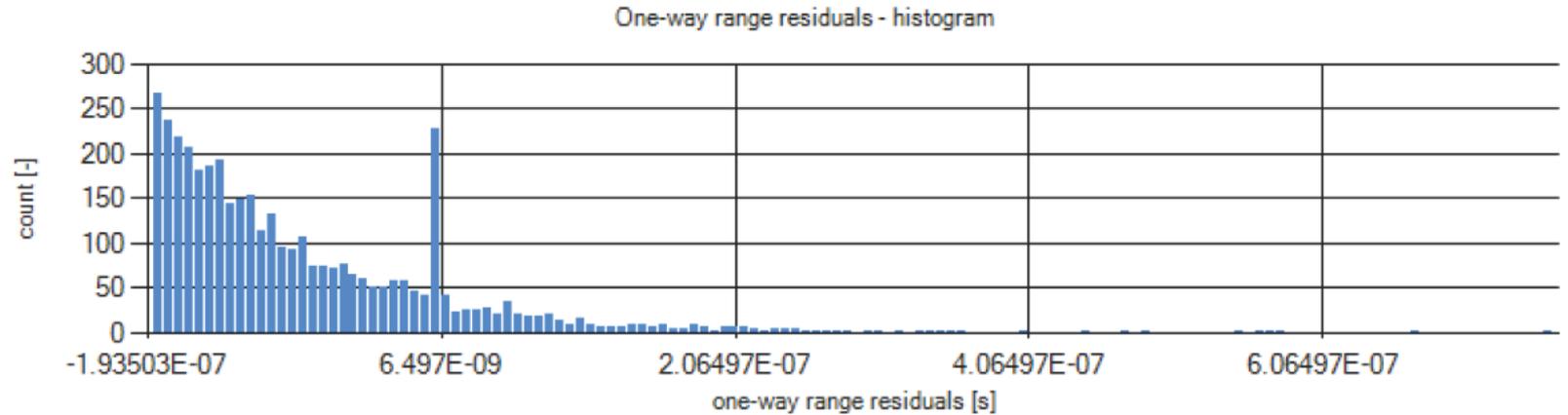
Two-way range residuals - time-series - corrected

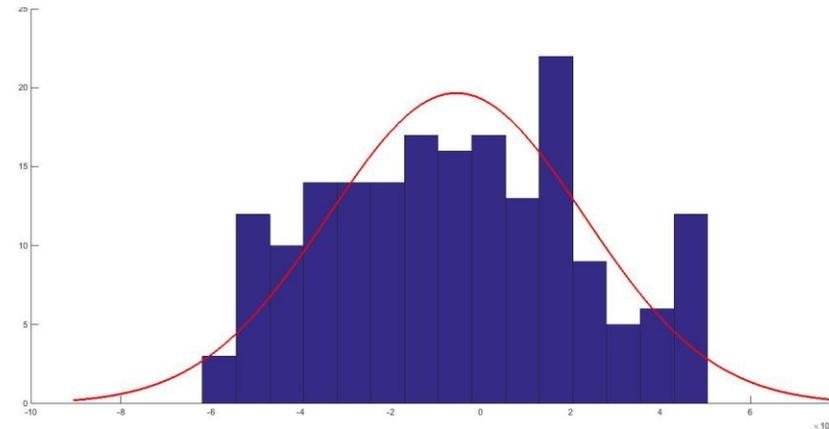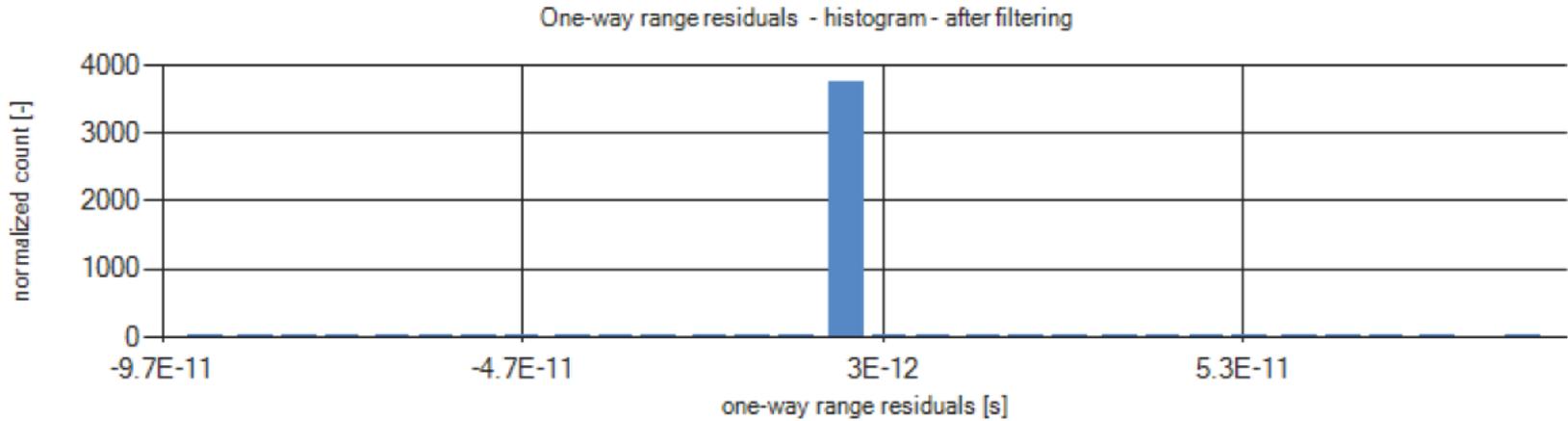# Steps in the analysis: one-way data

One-way residuals time-series

Prefiltering necessary if 100Hz data in orbit and 10Hz data on ground

Steps in the analysis: one-way data

One-way range residuals - histogram

One-way range residuals (normalized) histogram - after exponential noise removal

Steps in the analysis: one-way data

One-way range residuals - histogram - after filtering

Steps in the analysis: time transfer data

Final (corrected) triple point data - time series
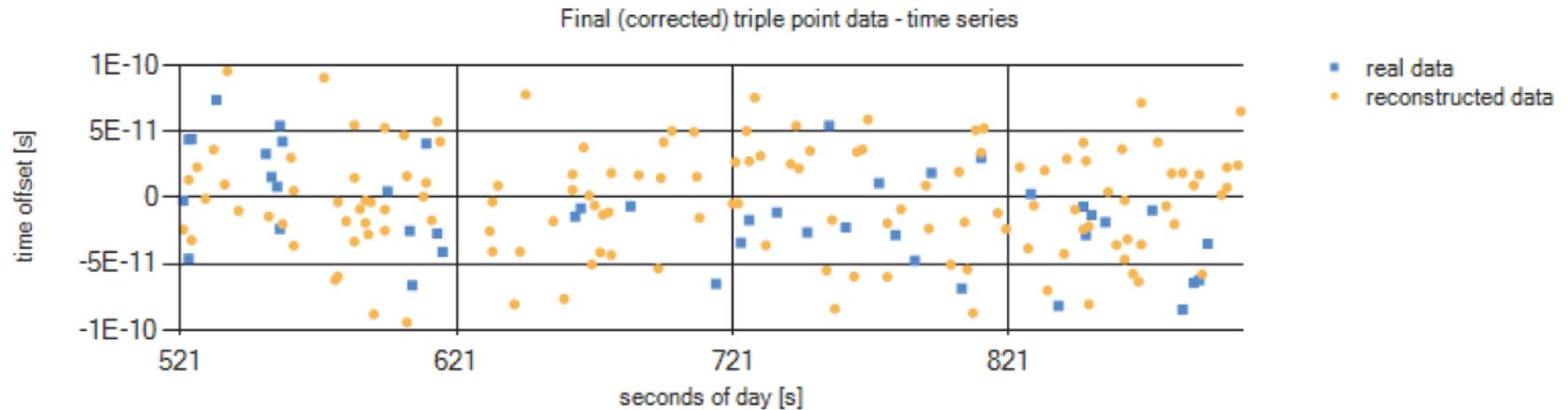
Protocol as quick-lock data

Long-term station-ACES clock offsets

ELT objectives

non common view / common view
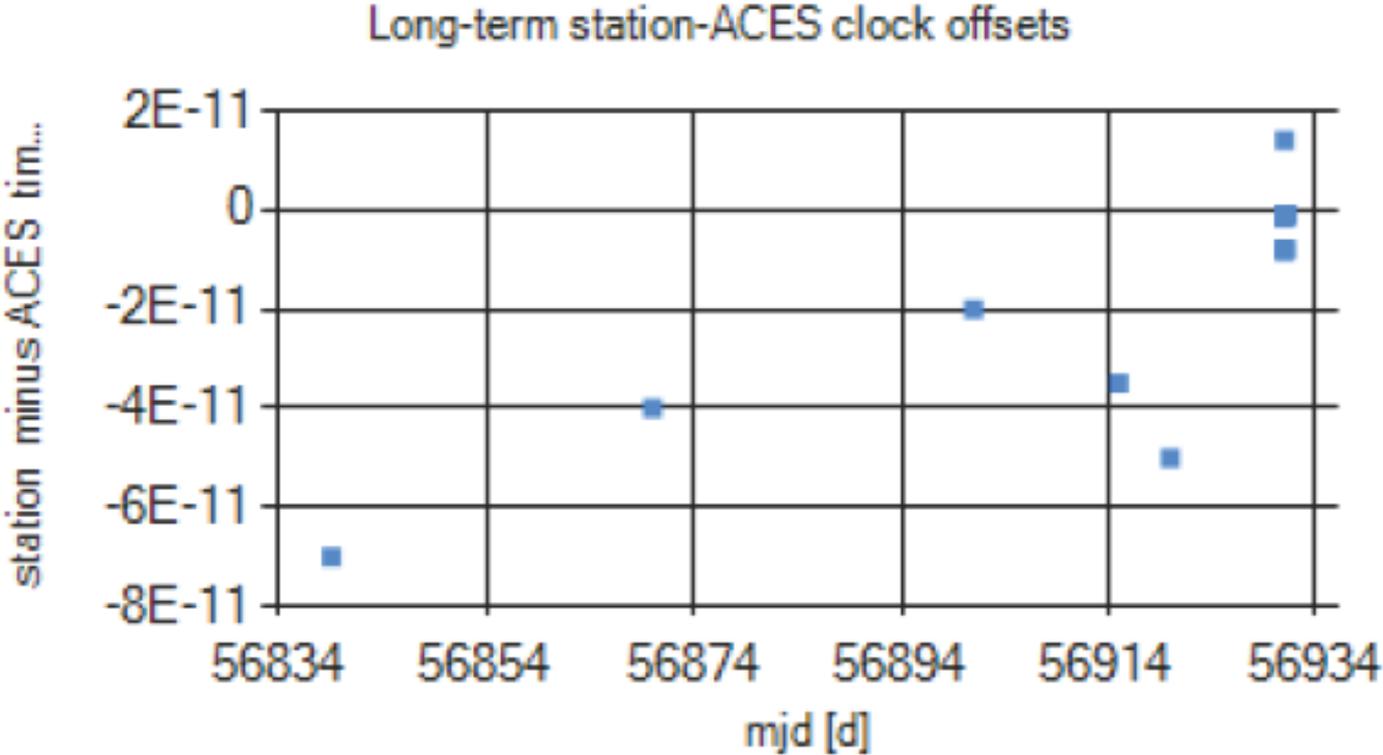
PN Code:100MChip/s
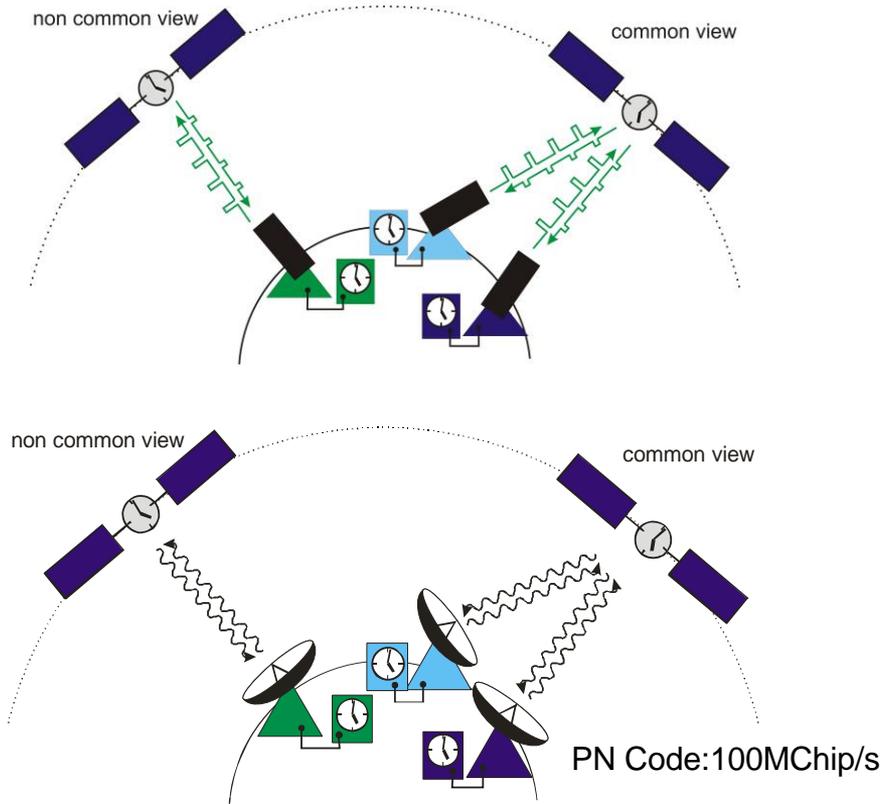
- Comparison of time transfer techniques (MWL, ELT, GNSS)

- Precision 3 ps @ 300 s ground-space
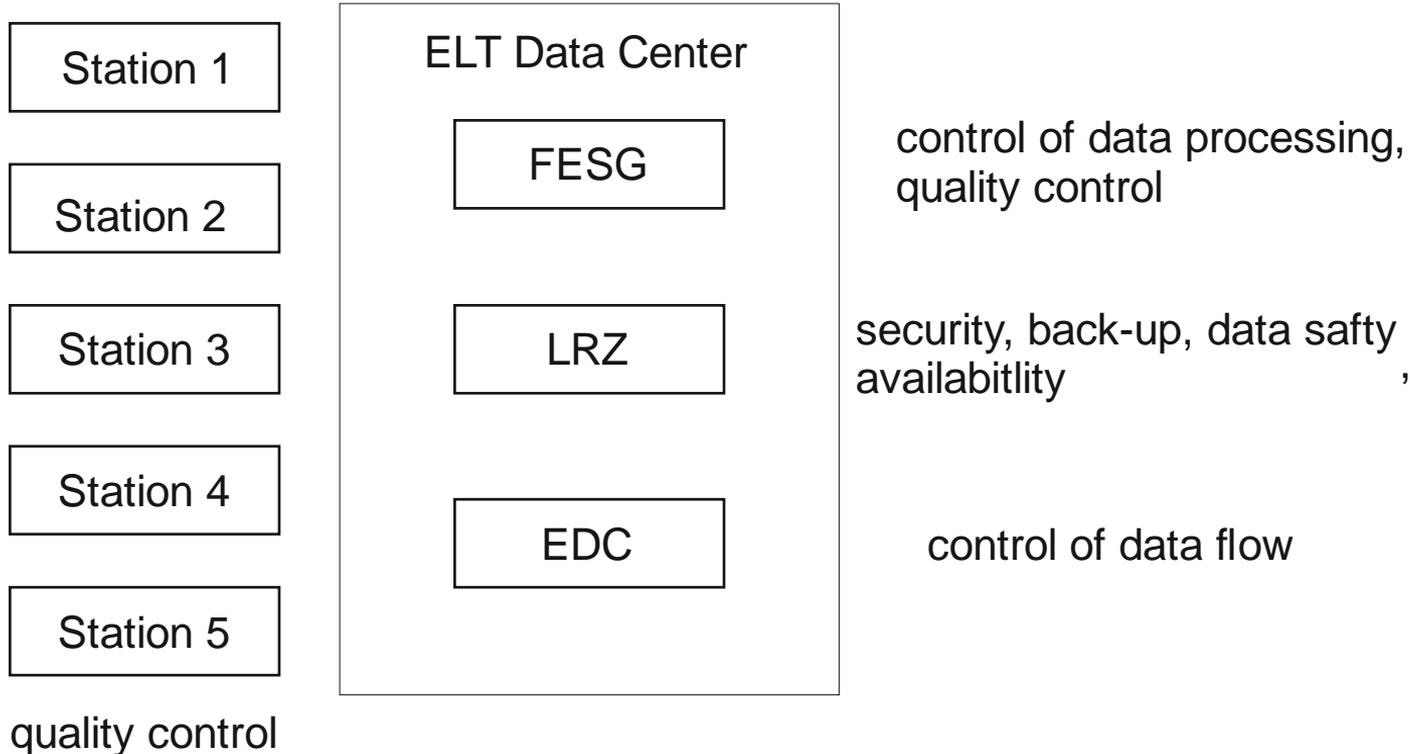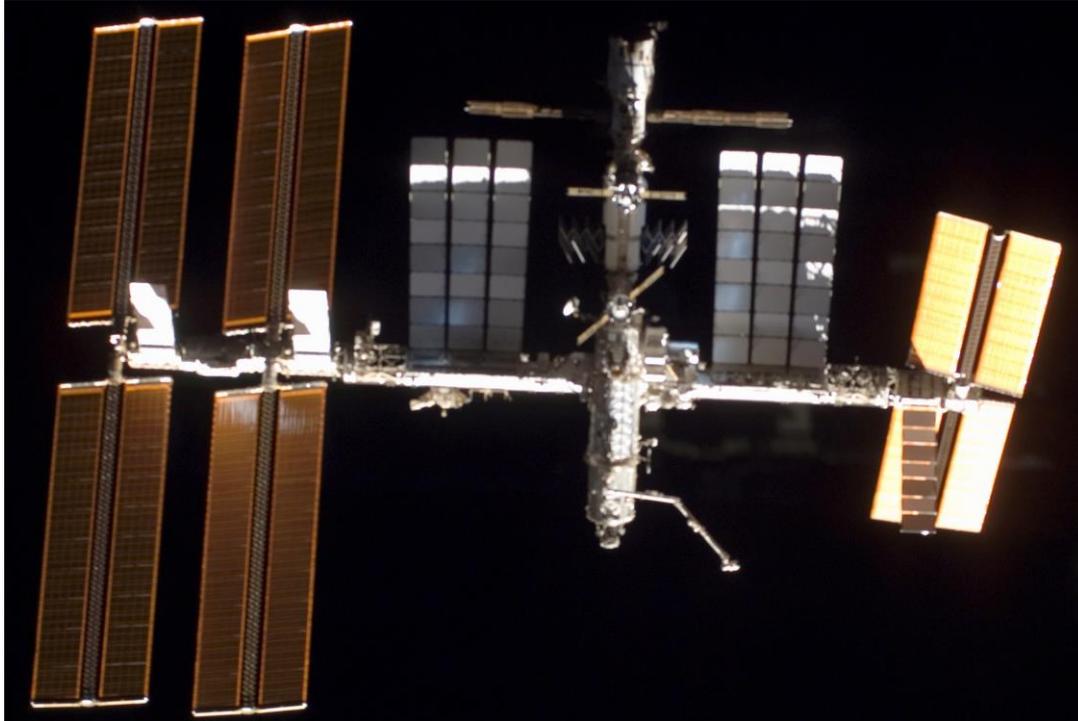 common view 3 ps
  non-common view 5 ps @ 90 min

- accuracy 50 ps ground-space
         25 ps ground-ground

- Calibration of the MWL

Data center structure

Station 1

Station 2

Station 3

Station 4

Station 5

quality control

ELT Data Center

FESG

control of data processing, quality control

LRZ

security, back-up, data safty availabitlity   ,
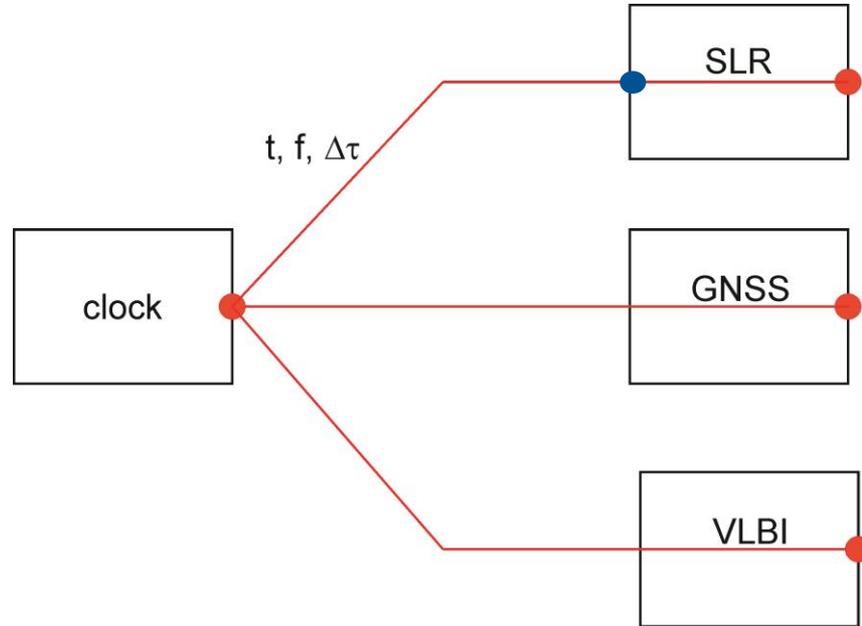
EDC

control of data flow

Challenges

- Orbit
- Single photon mode
- Short gate window in day-time
- Eye-safty requirements

- Handling of time on ground
- maser

Why should we do it?
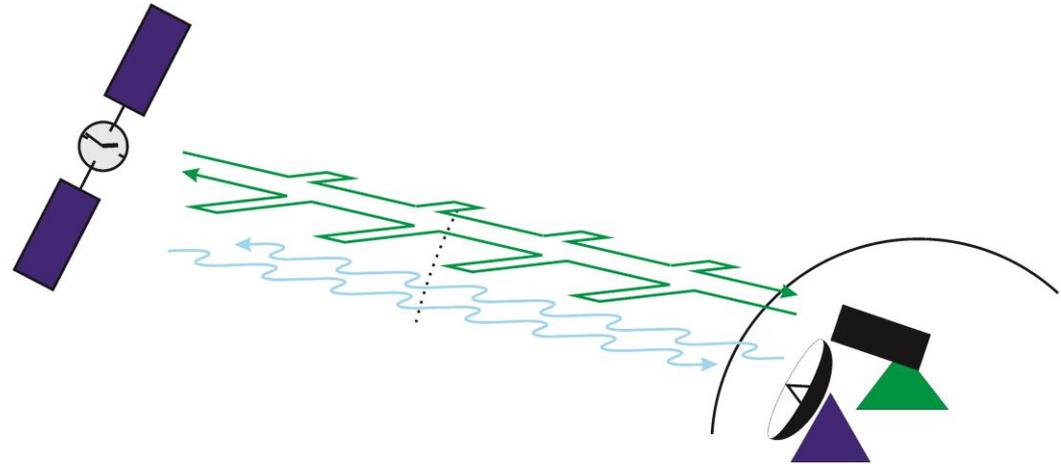
„Make time an observable!" (Ulrich Schreiber)

T2L2 and ELT monitor your
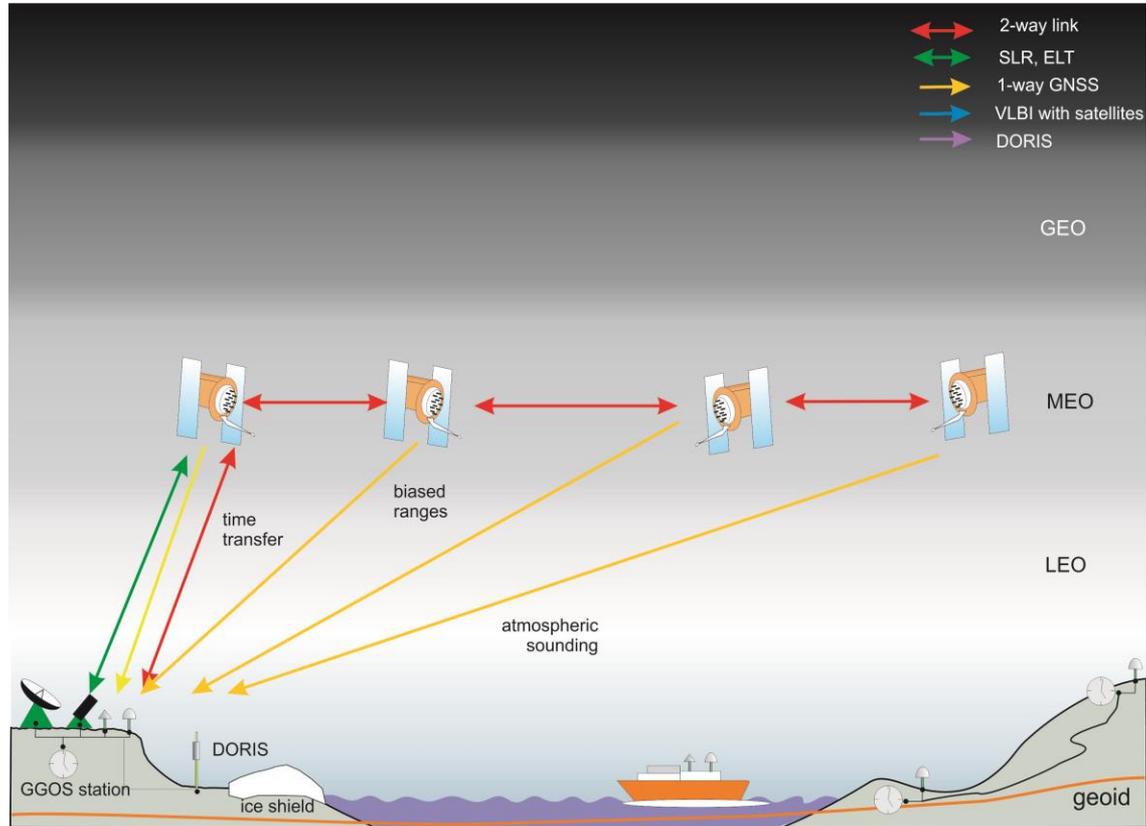distribution of time on grround!!!

Why should we do it?

„Combination of SLR and GNSS" (Urs Hugentobler)

- Co-location

- High precision

- One-way and two-way

Why should we do it?

It's a lot we expect from the stations …

Please contact us if you have some problems, need some software, …

All individual parts of ELT requirements you will need in future transponder or time transfer experiments …

… it's an extreme test …

… be prepare for spring 2018 …

It's worth it!!!