EPN Repro3

Troposphere Product

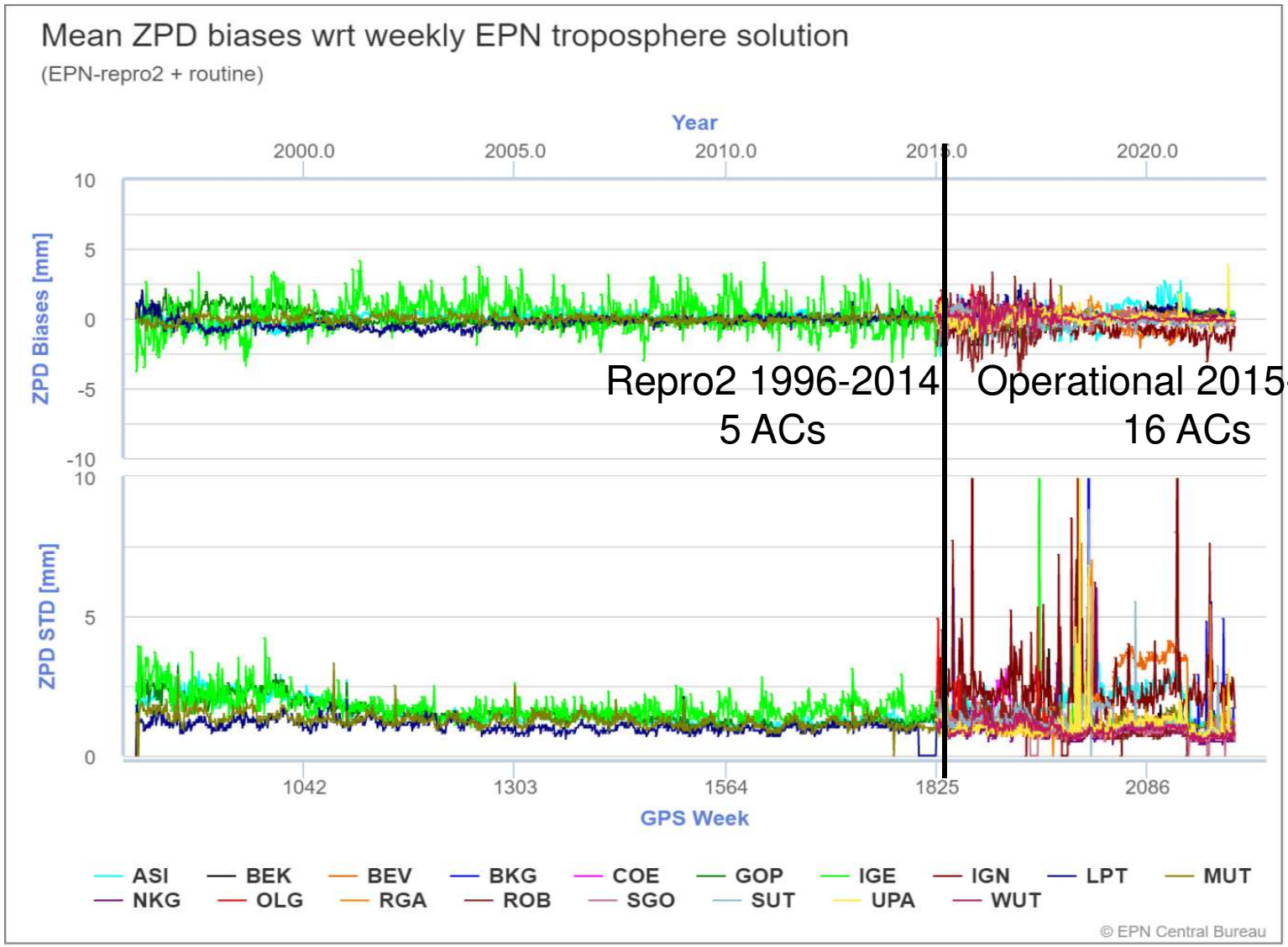
Rosa Pacione

Troposphere Coordinator

e-GEOS, ASI/CGS-Matera, Italy

EPN-Repro2 & Operational

http://www.epncb.oma.be/_productsservices/sitezenithpathdelays/



GNSS for Climate: Drivers

- The collection of GNSS observations date back to the mid-90's with a growing number of stations distributed in permanent global and local networks being established since then. The initial epoch of the continuous data collection can take the year **1994**, the start of IGS.

- Ground-based GNSS has turned into a contributor to weather forecast through **assimilation of Zenith Total Delay** (ZTD) into numerical weather prediction (NWP) models of meteorological services.

- Climate scientists consider an average in weather taken over a **30 year-period**, known as **climate normal**, as enough to evaluate climatological variables, including temperature and precipitation, for a particular site.

- GNSS is reaching the **"maturity age" of 30 years** when climate normal of ZTD and gradients can be derived.

- **EPN-Repro3,** on a regional scale, and **IGS-REPRO3,** on a global scale, are a window of opportunity for an additional study on GNSS for climate.

GNSS for Climate: Advantages

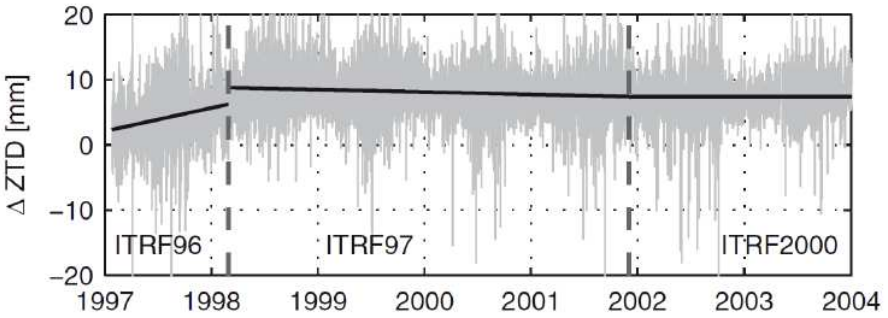
- **long-term, homogeneous, precise** → long-term variability of IWV all around the world
- **all-weather device** -> validate implementation of cloud feedback mechanism in climate models, validation of clear-sky satellite retrievals of IWV (assimilated in Numerical Weather Prediction models)
- **high temporal resolution** - > diurnal variation of IWV
- **dense regional networks** of GNSS stations -> validate convective-permitting regional climate models

GNSS for Climate: Requirements

- **Homogeneity of the time series**

different GNSS processing software, different processing methodologies, and different variants for each modelling step

-> reprocessing with the fixed processing options all **the historical GNSS data**



Differences between IGS and reprocessed zenith total delay (2-hourly) for Algonquin Park (ALGO).

Source: Steigenberger et al: J. Geod. , 2007.

A **reprocessed time series** does not contain any inhomogeneities due to the processing itself (e.g. no change in the reference system, no change in the modelling...)

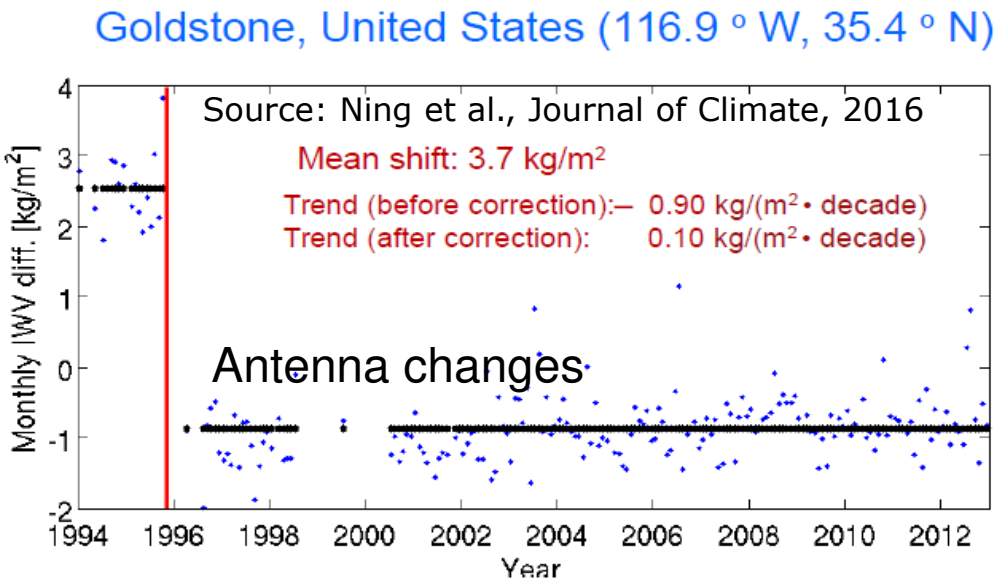
GNSS for Climate: Requirements

- **Homogeneity of the time series**

Reprocessed ZTD series are not homogeneous:

- undocumented or mis-modelled instrumental changes
- environment changes

-> breaks in the time series (metadata! correction!),



A proper **homogenization** is indispensable for climate change assessments, e.g. trends can be influenced by undetected breaks.

GNSS for Climate: Requirements

- Agree on processing options;
- Agree on historical data to use: do not consider 'bad historical data';
- Agree when switching from RNX2 to RNX3;
- Ensure AC redundancy: at least 3 ACs for each EPN station;
- Check the metadata;
- Provide tropo estimates at hh:30;
- Provide solution in SINEX_TRO v2.0 format.