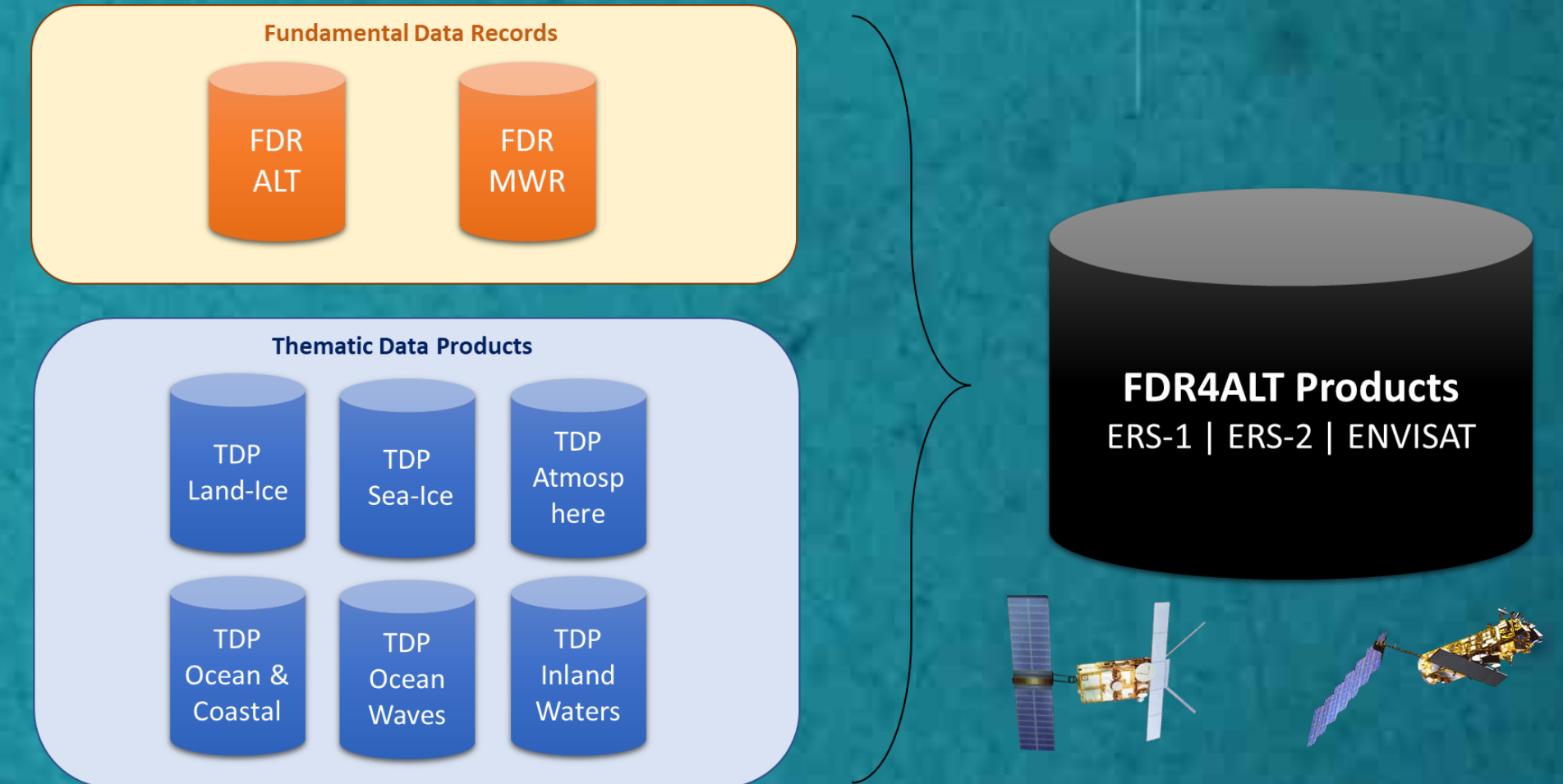
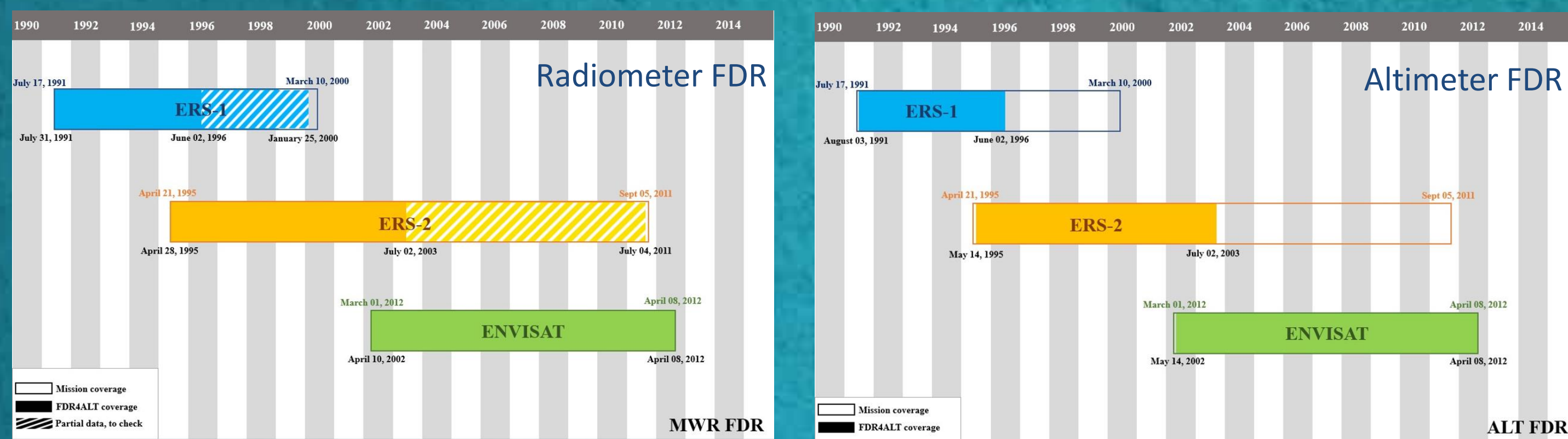


## Overview of the FDR4ALT project

In the framework of the European Long Term Data Preservation Program (LTDP+) which aims at generating innovative Earth system data records named **Fundamental Data Records** (basically level 1 altimeter and radiometer data) and **Thematic Data Records** (basically level 2+ geophysical products), ESA/ESRIN has launched a reprocessing activity of ERS-1, ERS-2 and ENVISAT altimeter and radiometer dataset. A large consortium of thematic experts has been formed to take in charge these activities which are 1) to define new tailored end-user products including the long, harmonized record of uncertainty-quantified observations, 2) to define the most appropriate and state-of-the-art level 1 and level 2 processing, 3) to reprocess the whole times series according to the upgraded ground processing and, 4) to validate the different products and provide them to a large community of users focused on the observation of the atmosphere, ocean topography, ocean waves, coastal, hydrology, sea ice, ice sheet regions.

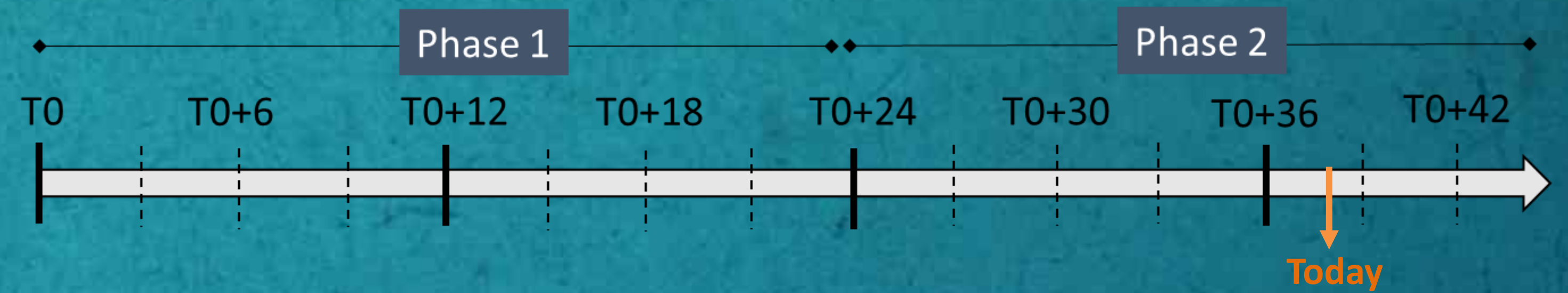


## Dataset



ERS-1, ERS-2 and ENVISAT Altimeter & Radiometer dataset will be reprocessed in NetCDF format, based on the best state-of-the-art algorithms/corrections with **definition and provision of innovative level-1 and level-2P products including uncertainty information at both levels.**

## Project planning



### Phase 1 : Processing selection and products definition (completed)

- ✓ Completeness analysis
- ✓ Selection of the algorithms for the FDR & TDP
- ✓ products Definition of a validation plan
- ✓ Organisation of the reprocessing facilities

### Phase 2 : Production and Validation (on-going)

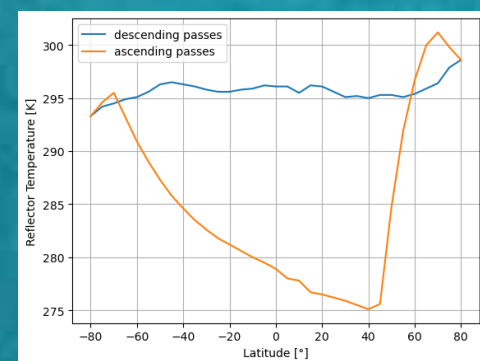
- ✓ Algorithm implementation in the CLS/CNES core system
- ✓ Massive production of the FDR and TDP for the whole dataset (23 years of data)
- ✓ FDR and TDP validation
- ✓ Uncertainty characterization

## Harmonized processing

### ERS1/ERS2

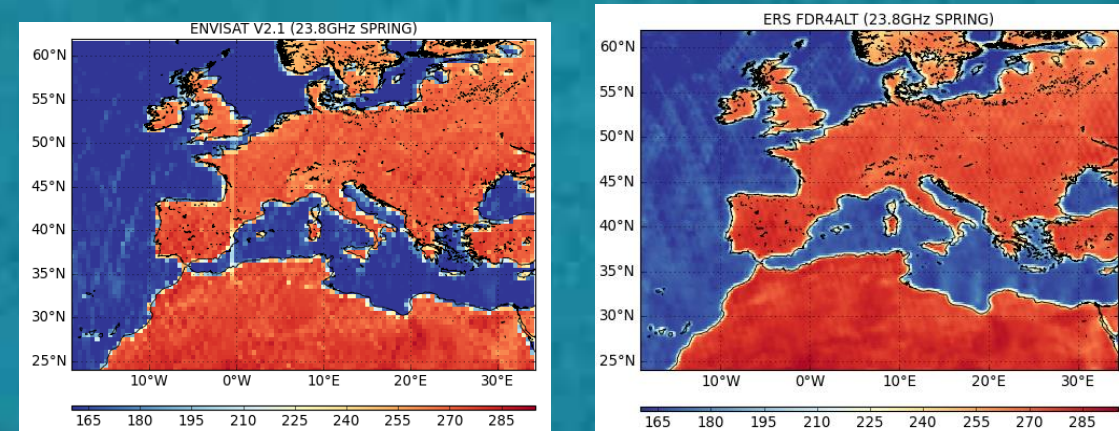
#### MWR model updates

- Interpolation of losses to temperature (ERS-2)
- Correction for Reflector losses (up to 6K impact)
- SAR temperature correction (coupling term with Tearth)



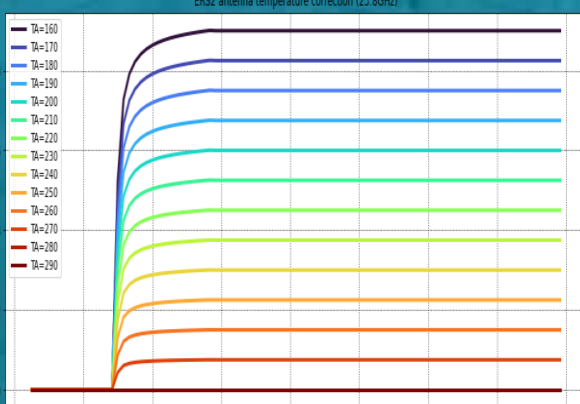
#### Sidelobes correction

- S3 antenna pattern
- Seasonal maps with Enhanced resolution



#### Gain drop correction

- Correction adapted from Sharoo et al

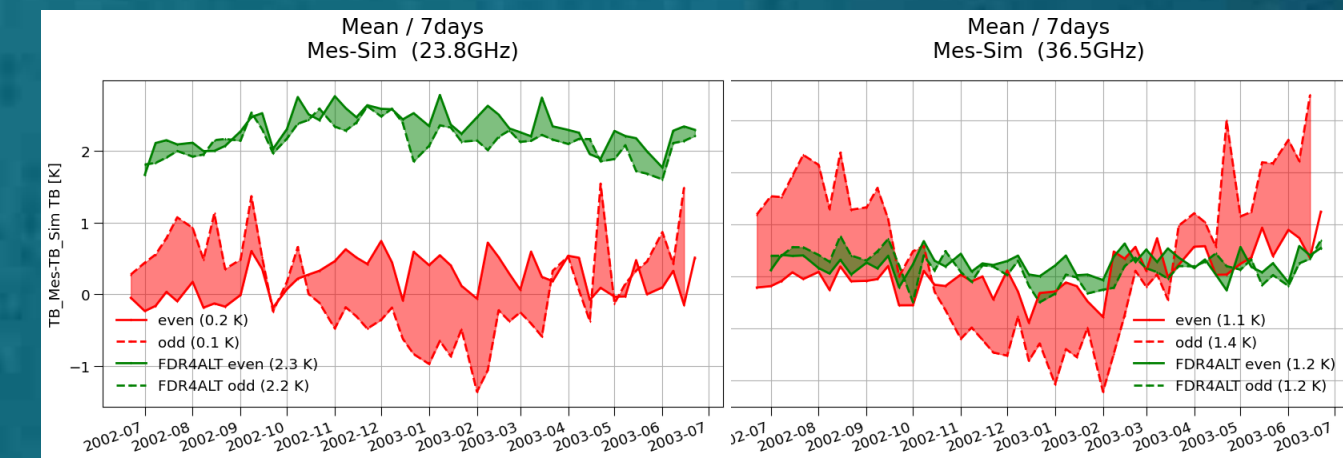


### Envisat



#### MWR model updates

- Errors in MWR model equations
- Account for Leakage temperature in TE computation
- ➔ The strong difference between ascending and descending passes when comparing to simulated measurements is not observable anymore in FDR4ALT reprocessing

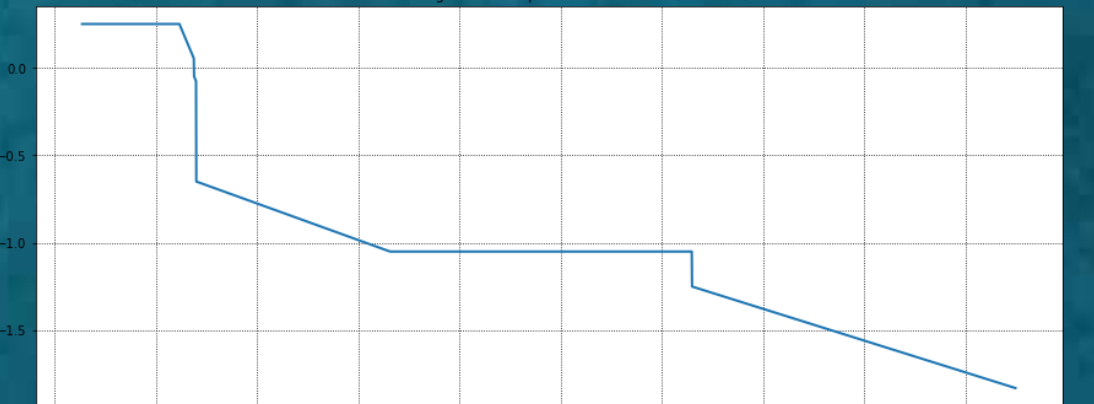


#### Updated Sidelobes correction

- Better resolution
- Far lobes bases on S3 fit

#### Drift correction

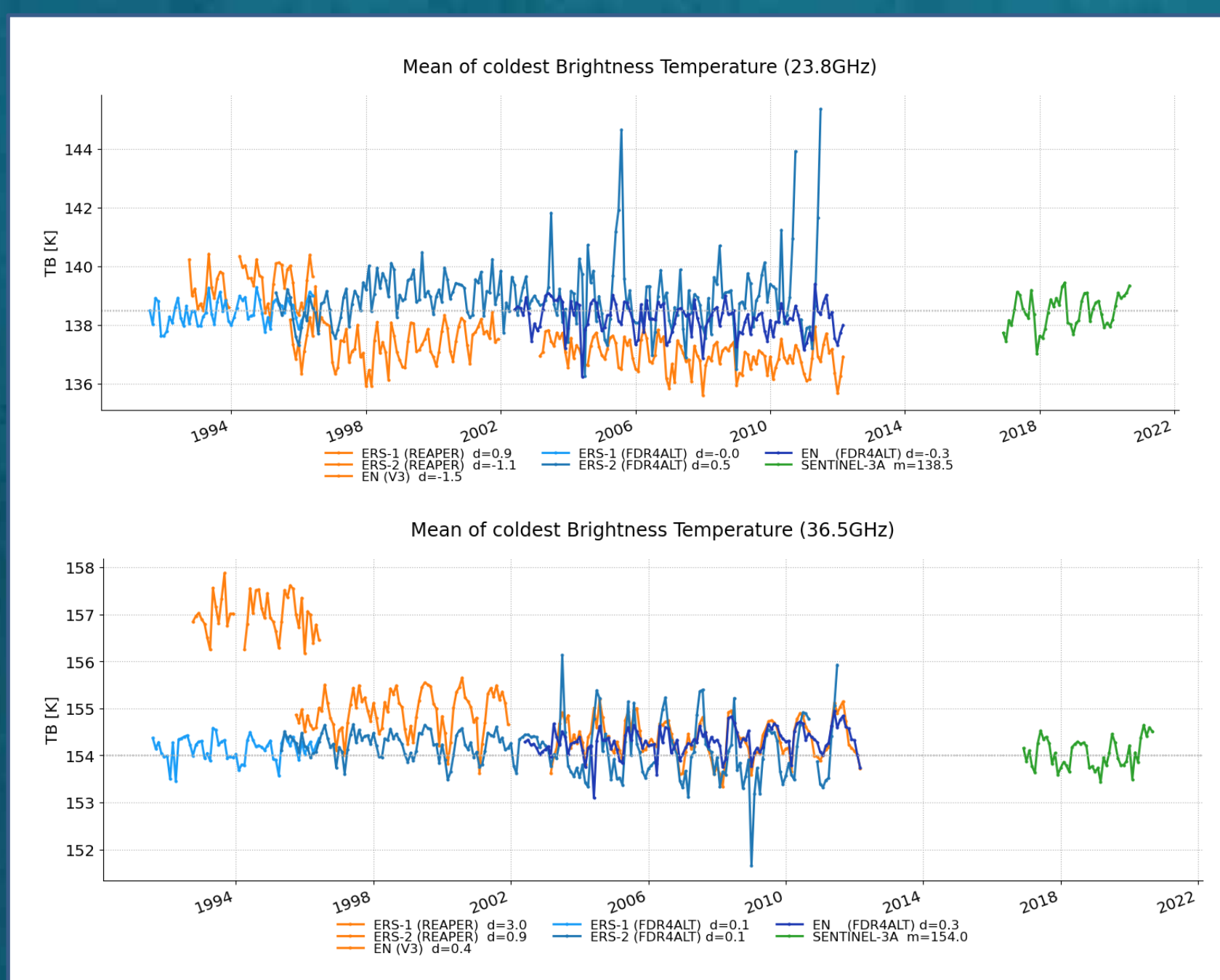
- After MWR model correction, drifts were identified and corrected
- The correction is piecewise



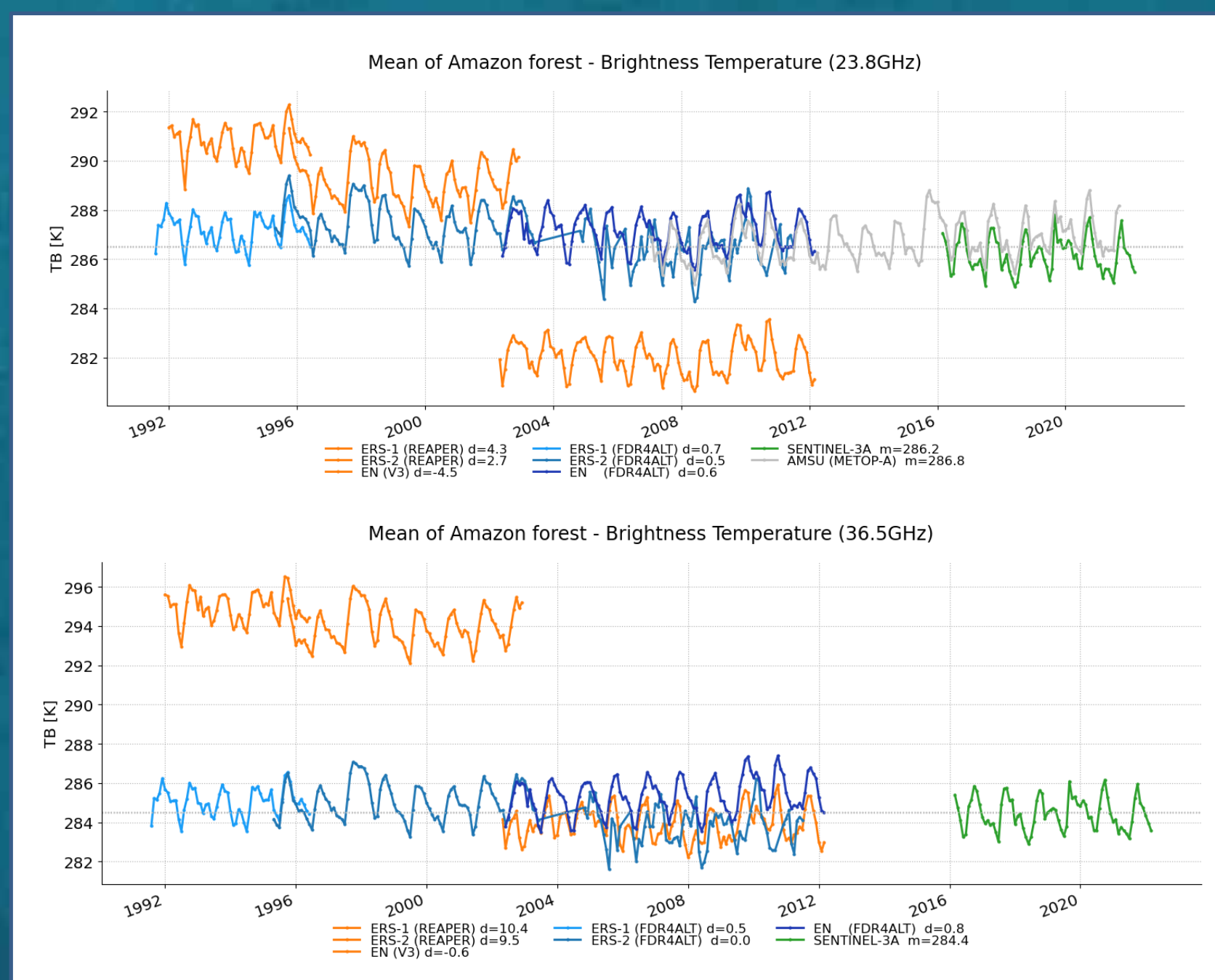
## First results

### Coldest ocean points

REAPER/EN V3 VS FDR4ALT



### Amazon forest



#### FDR4ALT missions now aligned with S3 calibration

- The harmonization of processing in FDR4ALT project has improved brightness temperatures quality
- The bias correction of brightness temperatures will help to remove the small residual bias between the instruments

#### FDR4ALT missions now aligned with S3 calibration

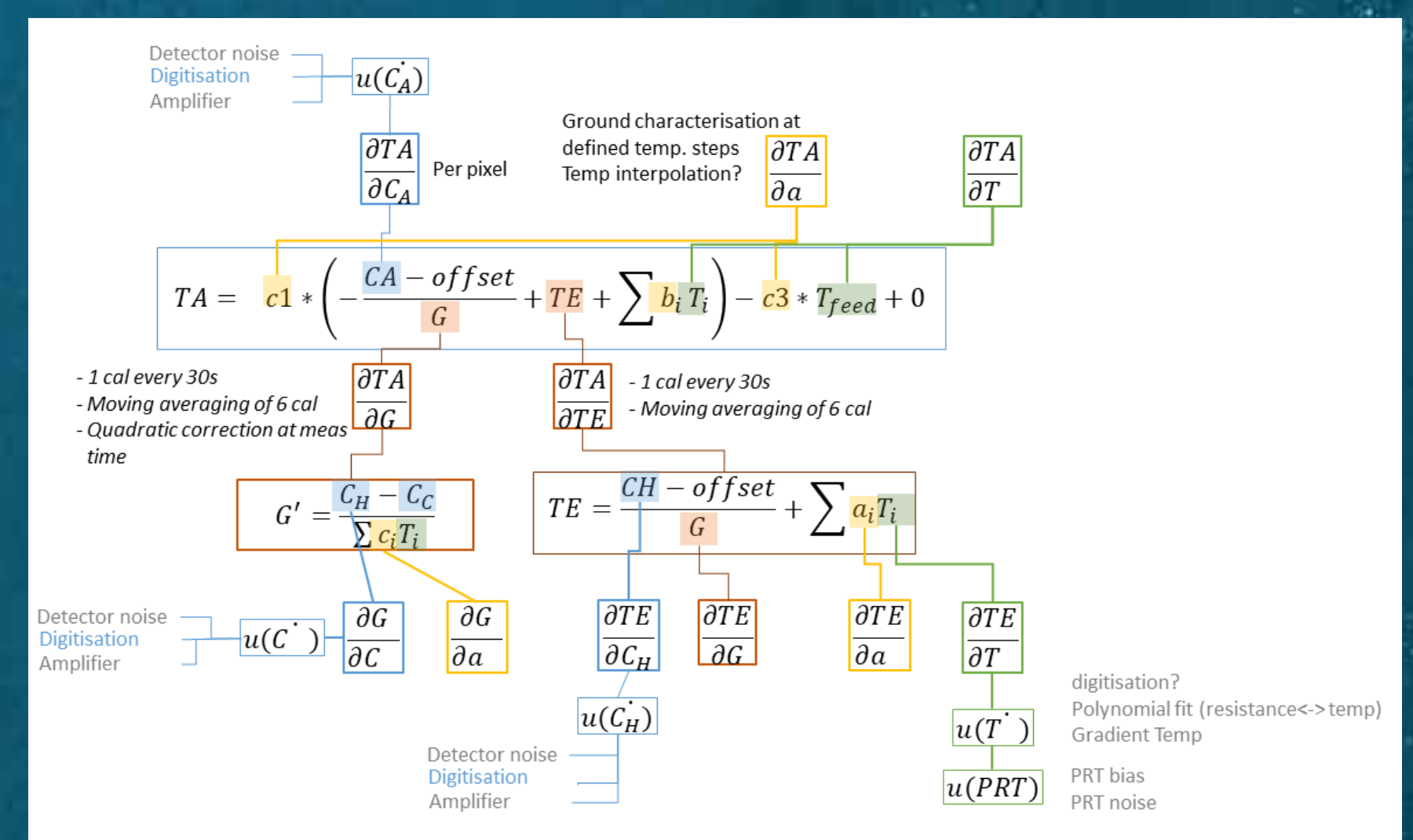
- The harmonization of processing in FDR4ALT project has improved brightness temperatures quality
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## Uncertainties

Same methodology as in FIDUCEO used for uncertainty estimation

- Definition of an uncertainty tree centered on the measurement function
- Definition of effects table
- Assessment of contributors, correlation,
- Estimation of a value to feed each contributor

➔ Goal: Providing of uncertainty for each measurement of the FDR



For more details on the impressive improvements on altimetry dataset, poster **FUNDAMENTAL DATA RECORDS FOR ALTIMETRY : Reprocessing of ERS-1, ERS-2 and ENVISAT altimeter and radiometer dataset oriented towards dedicated Level 1 and Level 2P products (SC12022\_002)**

#### Interested in a test dataset and/or more information ?

Don't hesitate to contact Fanny Piras (fpiras@groupcls.com) or Pierre Féménias (pierre.femenias@esa.int) or to visit the FDR4ALT website :

