Impact of change from GRIB-1 to GRIB-2 format and meteorological changes at ECMWF on May 18, 2011 on AOD1B product

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- AOD1B RL04 atmospheric product generation till 17 May 2011 was based on
  - ECMWF GRIB edition 1 (GRIB-1) data format
  - ECMWF EMOSLIB version 000371

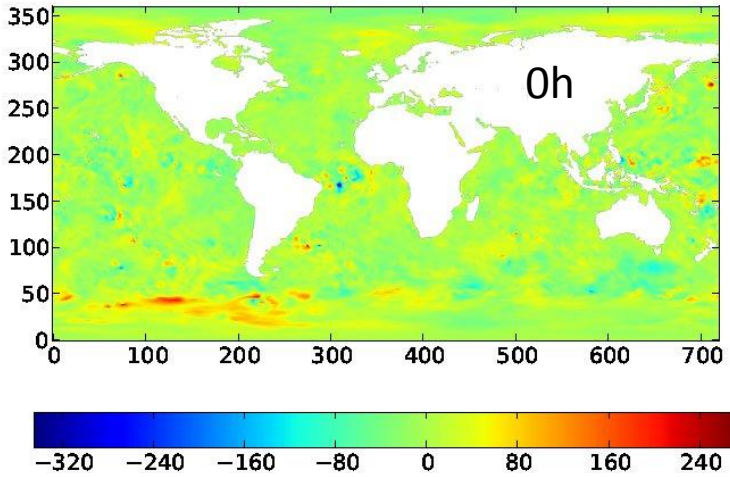
- On 18 May 2011
  - ECMWF migrated its analysis and forecasting systems to use WMO FM-92 GRIB edition 2 (GRIB-2) encoding for its model level fields (TEMP/SHUM).
  - GRIB-1 model-level data will no longer be produced and disseminated.
  - EMOSLIB had to be updated to version 000381
  - In order to be able to handle both GRIB-1 and GRIB-2 fields, it is recommended to use grib_api library.
  - Test data in both formats have been made available by ECMWF
  - Details on http://www.ecmwf.int/products/changes/grib2_migration/
  - Change does not only contain technical (format) but also meteorological changes, see http://www.ecmwf.int/products/data/operational_system/evolution/evolution_2011.html#18May2011

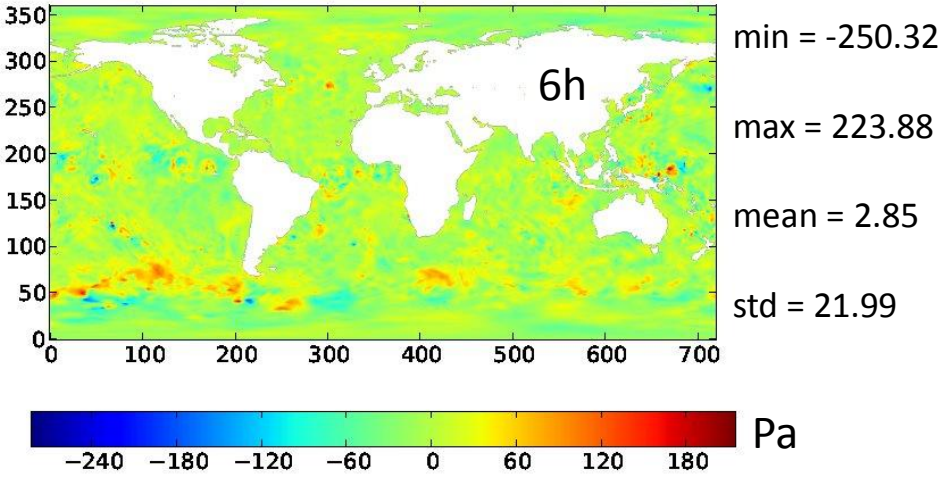
- Therefore the AOD1B software, especially the atmospheric part using model level data, had to be updated. No problems to derive OMCT outputs as the software is based on ”edn cdo's” which can read both grib and grib2

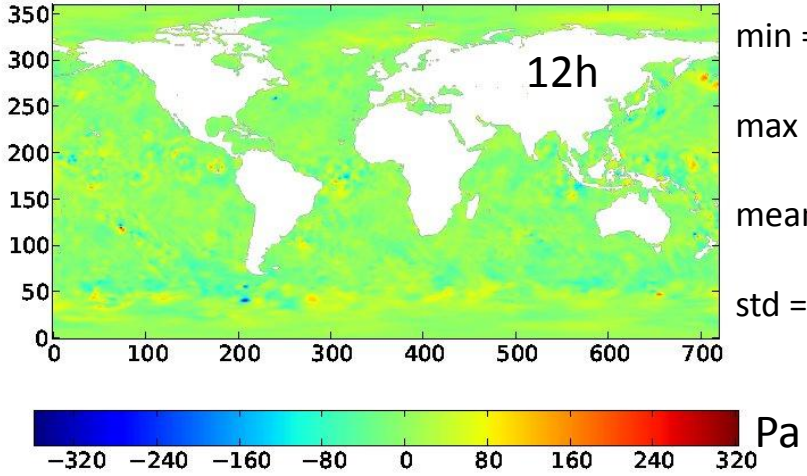
- Following slides shows the impact of the changes on the global combined product

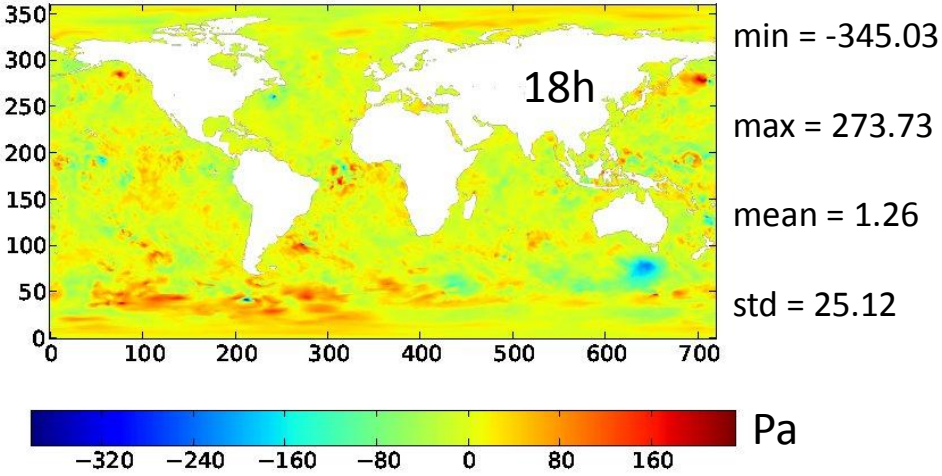
- The meteorological changes influence “single-layer” data. We see differences in the order of +/- 300 Pa in the PSFC GRIB-1/GRIB-2 files, e.g. for May 15 (see next slide, color scales are chosen that signatures become evident).
- Discussed that with ECMWF. The answer was “Therefore (FF: due to the meteorological changes) we would expect values to be different between the two versions. If we are looking at surface fields, they are produced in GRIB 1 for both export versions. A simple comparison (FF: with command grib_compare) of archived data (no interpolation) like below shows, e.g. all surface pressure values to be different by up to 0.33 %, which seems reasonable”
- This 0.33% are in line with our finding

GRIB-1 and GRIB-2 difference in PSFC for May 15



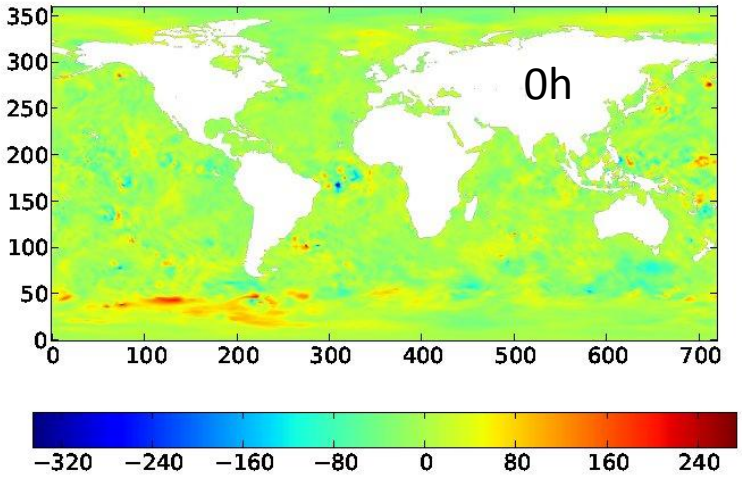






- PSFC difference translates “more or less” directly into the AOD1B difference (Example 1.5.2011, 0h)

- Effect on AOD1B is small (and maybe comparable with other meteorological changes in the analysis data in the past years)

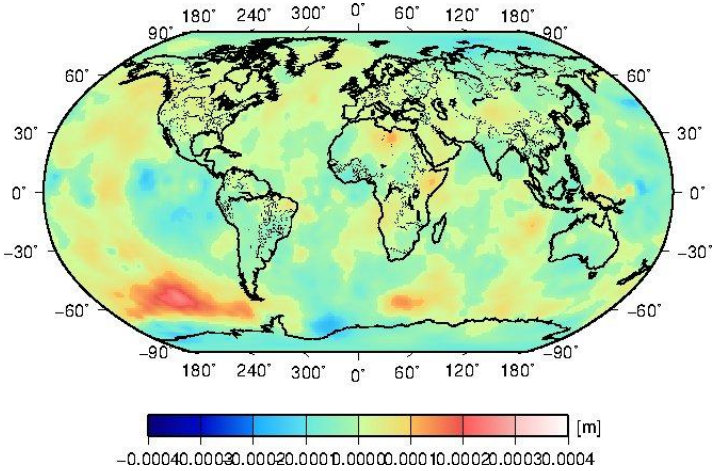


min = -205.99 Pa

max = 200.97 Pa

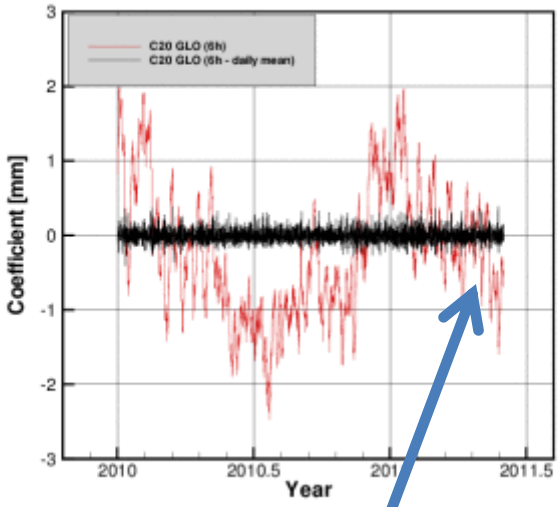
mean = 4.57 Pa

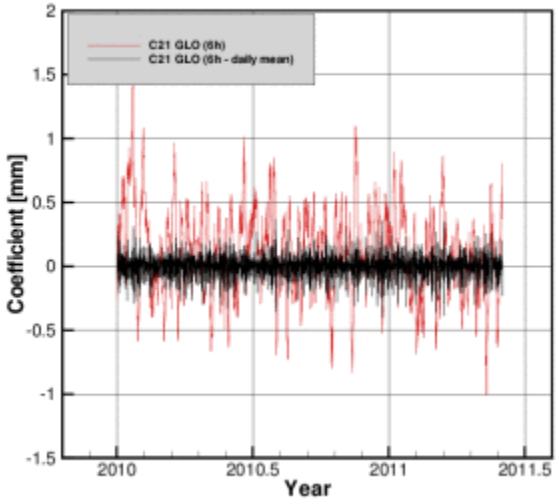
std = 22.41 Pa

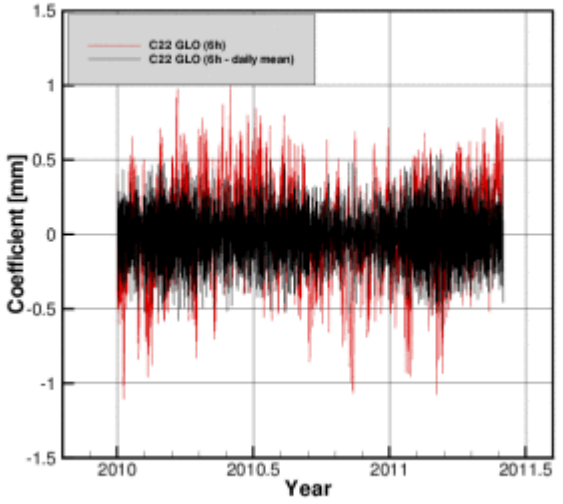


Mean = 0.0 mm
wRMS = 0.0 mm
Min = -0.2 mm
Max = 0.3 mm

- AOD1B S/W has been updated and products for May 18 till June 2 2011 generated
- The “GRACE AOD1B RL04 Quality Assurance” for 2010/2011 data shows nominal behavior for new data (after May 18), e.g. degree 2 coefficient 6h variability
- Conclusion is to continue with AOD1B RL04 production







May 18, 2011