Ozone Total Column Offline product overview

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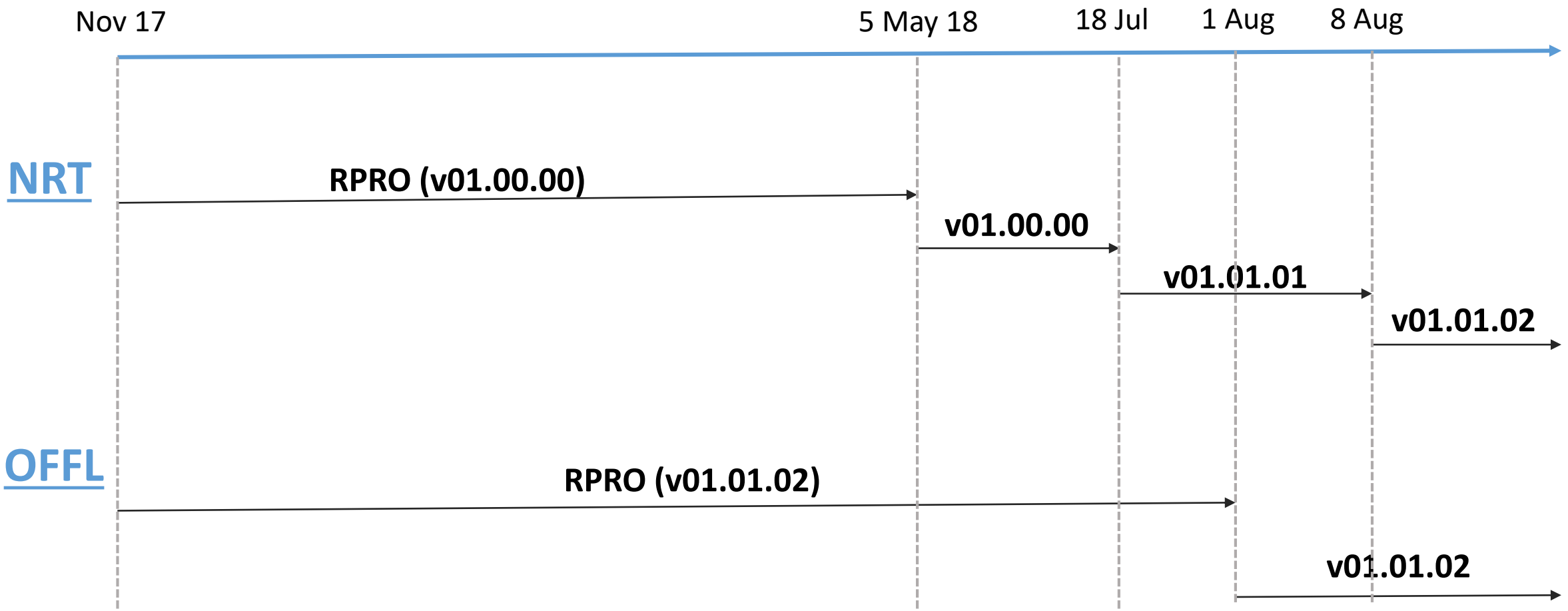
2nd Products Release Webex Meeting – 28/09/2018

Total Ozone Data Products

!! TO3 NRT and OFFL products rely on different algorithms



Total Ozone Data Products

!! TO3 NRT and OFFL products rely on different algorithms

NRT

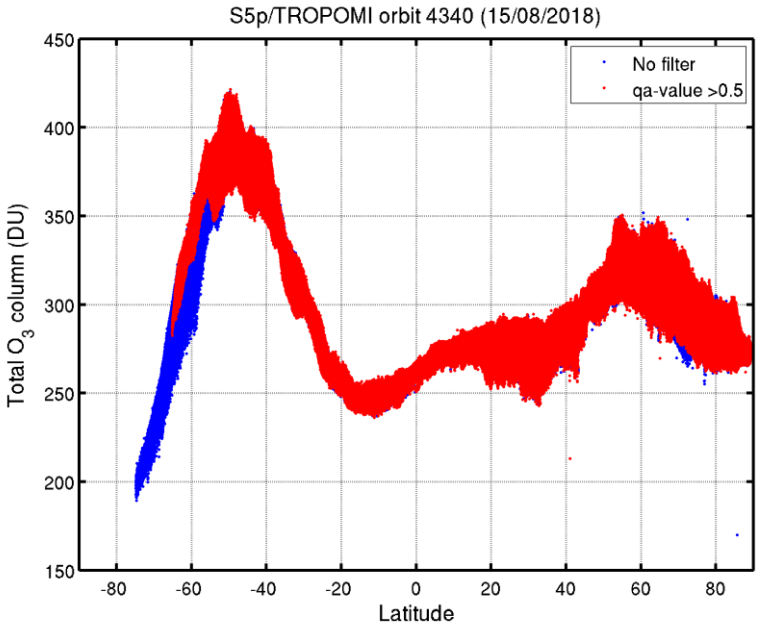
- DOAS approach
- Cloud correction: IPA based on CAL cloud parameters
- Stripe/bias correction applied to have general consistency with OFFL/GB.
- Surface albedo extracted from climatology

OFFL

- Direct fitting approach (approach followed for CCI/C3S climate data records)
- Cloud correction: Effective scene based on CRB cloud parameters
- Effective albedo fitted

OFFL product: Known data quality issues

1. qa_value not optimal (as for NRTI):
   - Out of range values not always considered.
   - Too stringent at high SZA → unnecessary coverage loss.



➔Recommended not to use qa_value if interest in high latitudes; expected ranges for key variables are given in the PRF.

➔Approach for computing qa_value to be revisited

OFFL product: Known data quality issues

2. Smoothing error given in DU instead of mol.cm^{-2}.

3. Two first rows are not available owing to the spatial misalignment between bands 3 (O3) and 6 (clouds).

4. Cloud top pressure (CRB) sometimes too high in Tropics → leads to O3 columns too low. A fix is under implementation in the cloud algorithm.

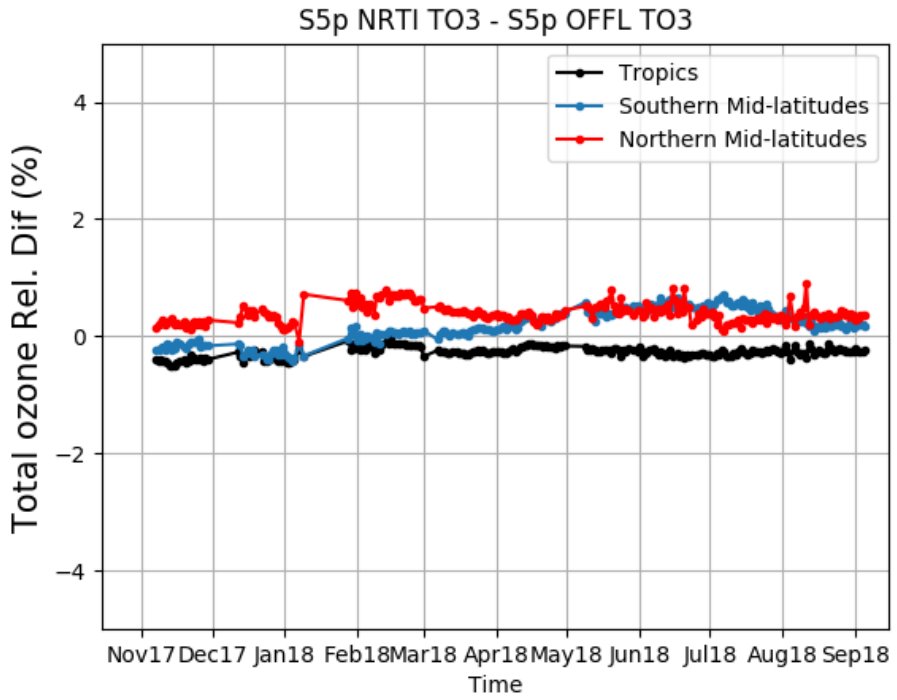
5. Fixed irradiance spectrum used during the period May-June 2018. Impact not clear, although the quality of validation and sat-sat comparisons seems to remain at the same level. It is recommended to reprocess that period anyway.

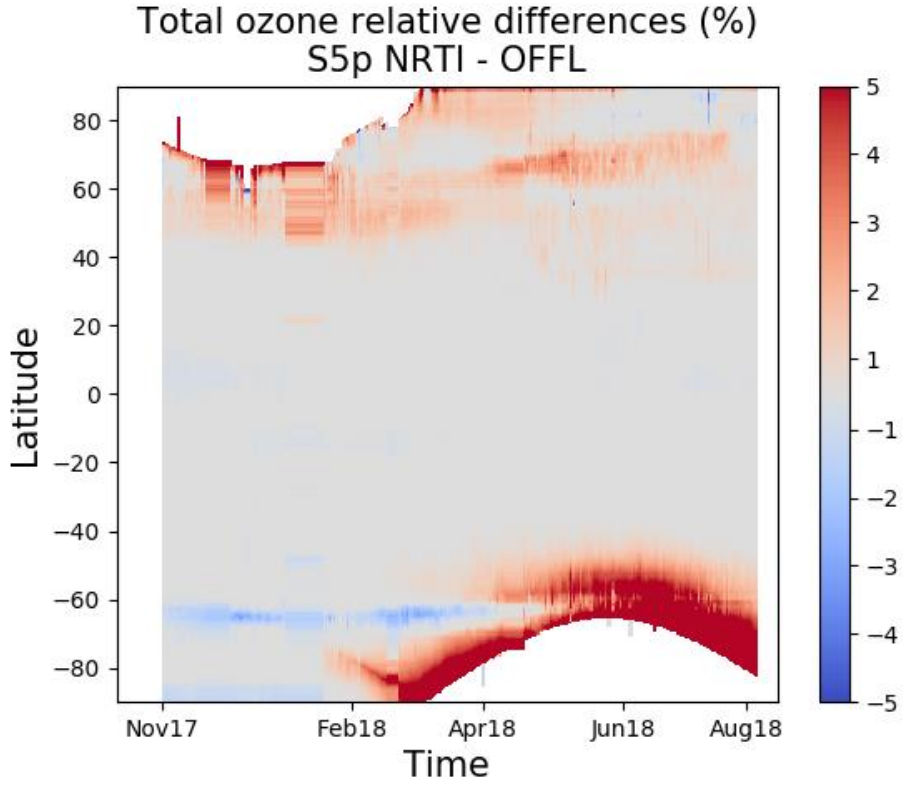
6. Inconsistency between pressure grids and both a priori profiles and AK grids in case of clear cases.

Comparison of OFFL and NRTI products.

TO3 NRTI – OFFL

Zonal mean relative differences



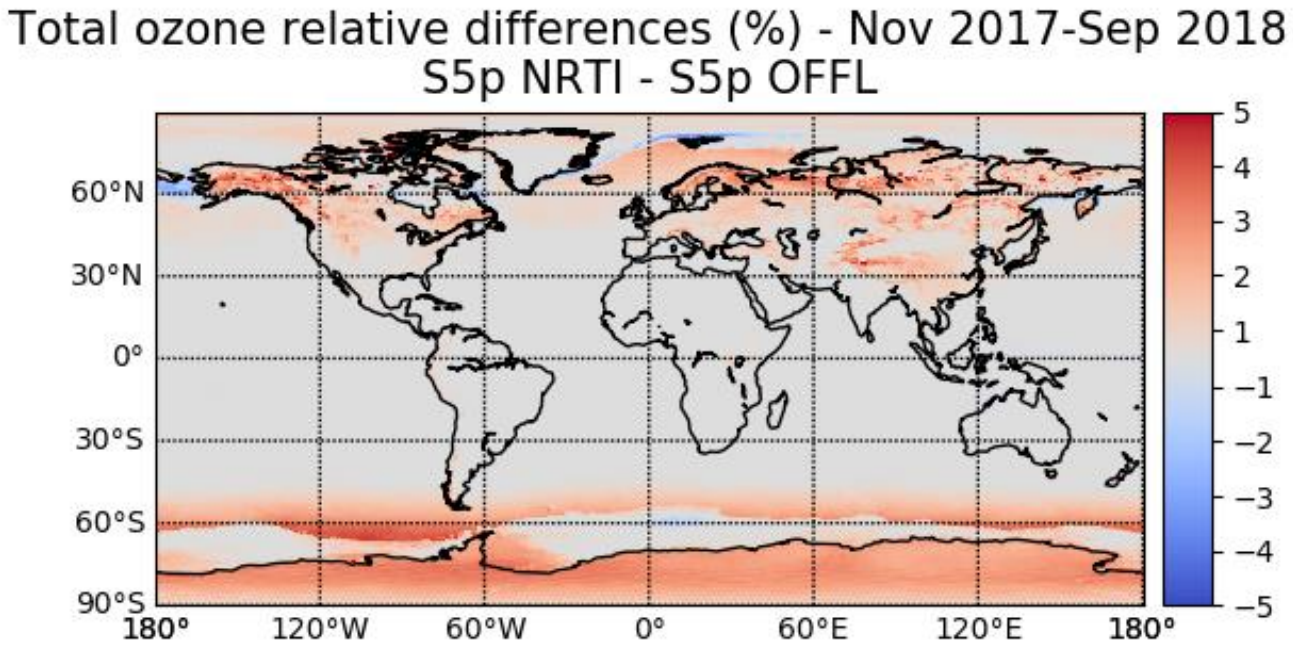


- Overall NRTI and OFFL products agree well. Zonal mean differences are within 1% at low and mid-latitudes.
- Larger differences at Northern mid- and higher latitudes.

Comparison of OFFL and NRTI products.

TO3 NRTI – OFFL

Map of mean relative differences



- Regional differences may be larger than zonal mean differences because of:
  - ✓ Forward model
  - ✓ Surface treatment
  - ✓ Cloud model

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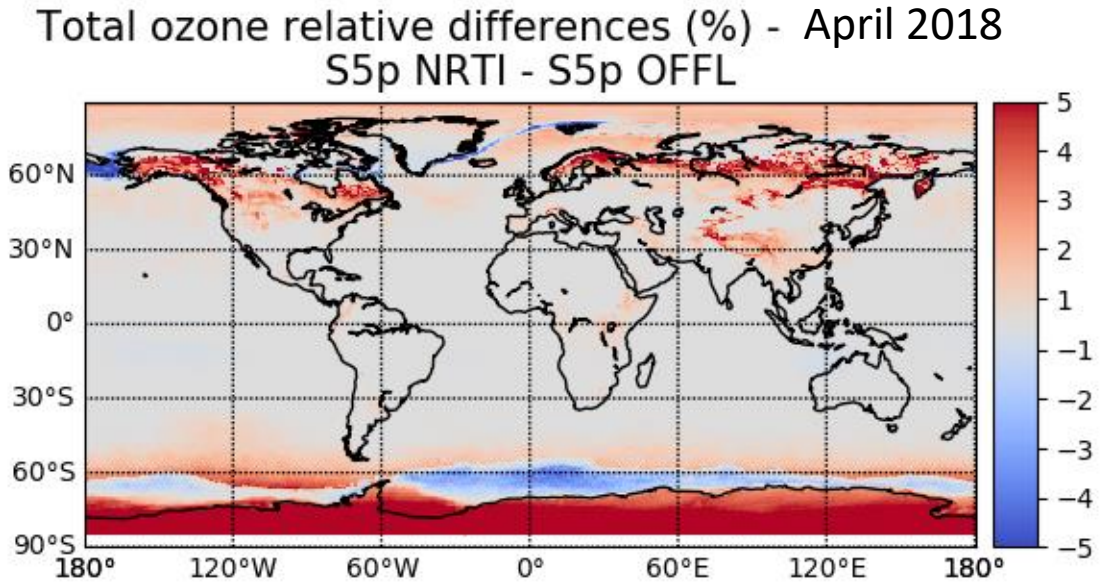
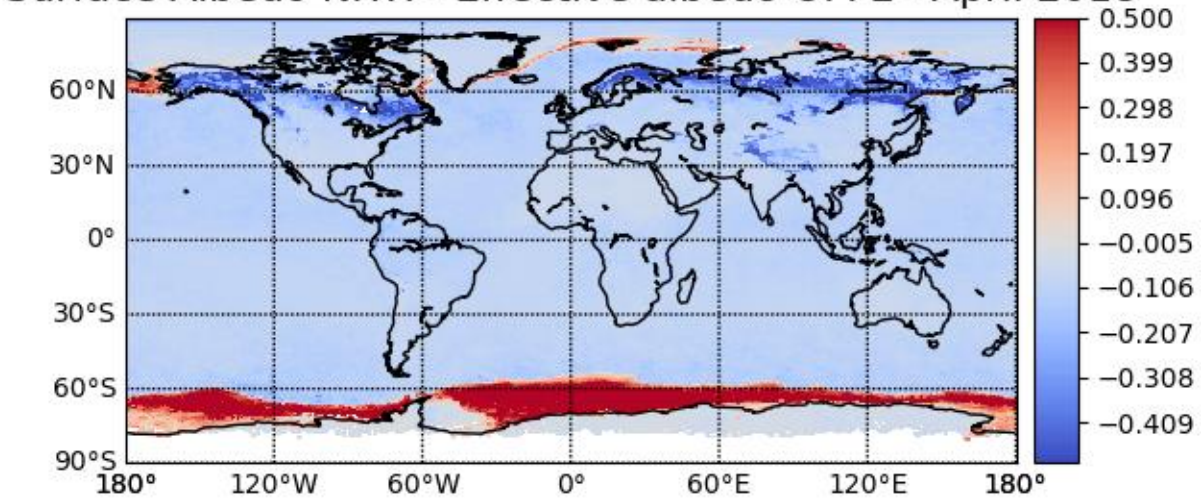
Map of mean relative differences



Cloud fraction <0.1



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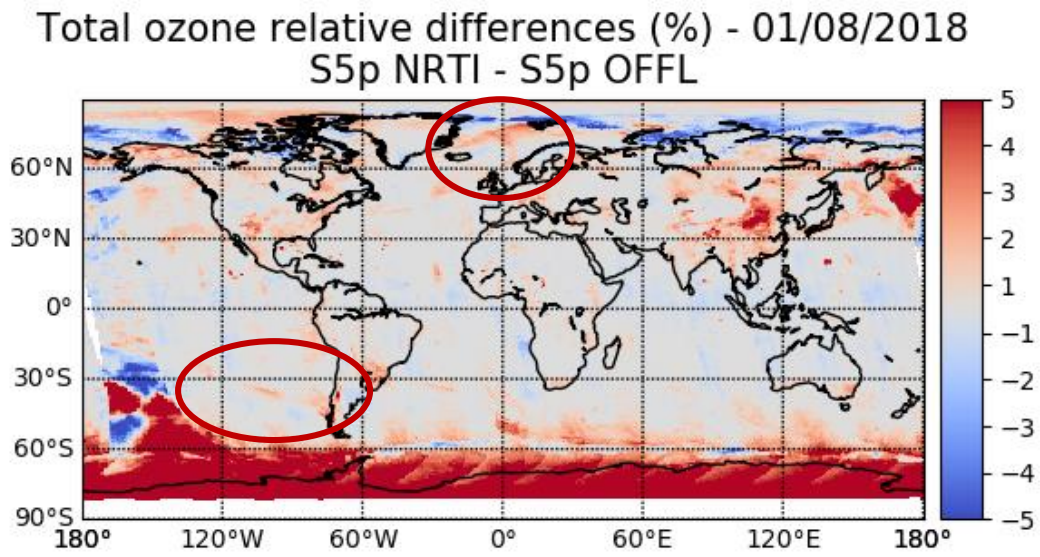
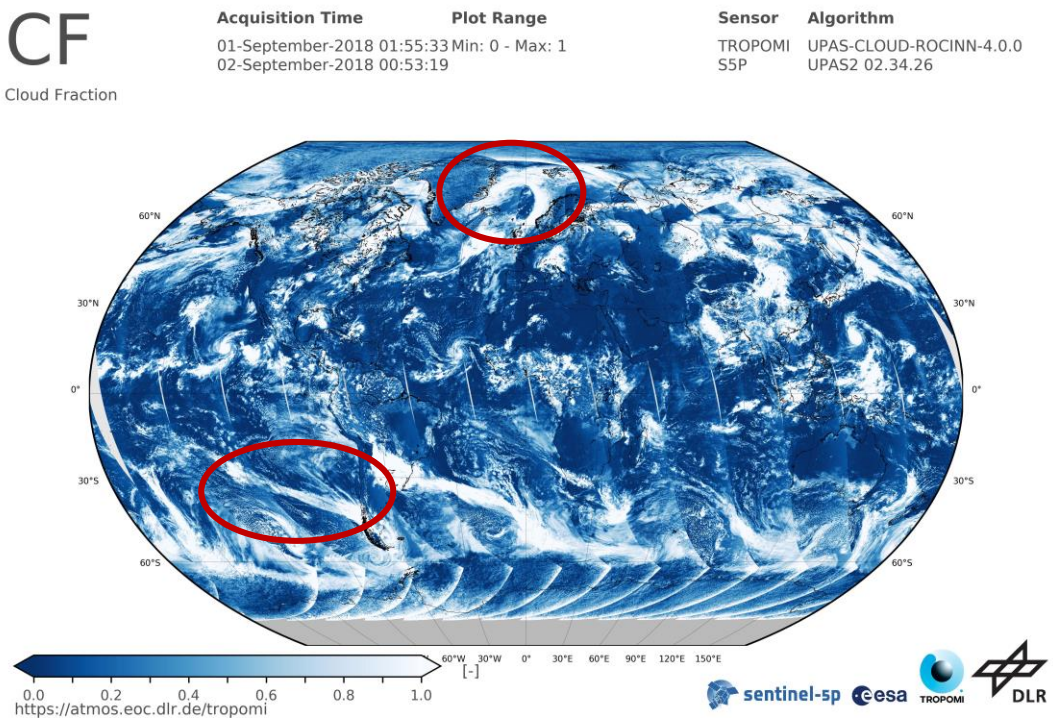


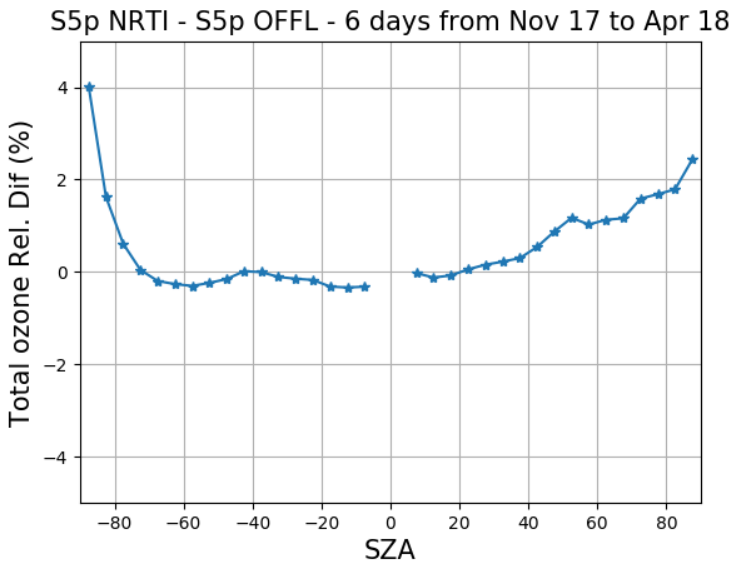


Comparison of OFFL and NRTI products.

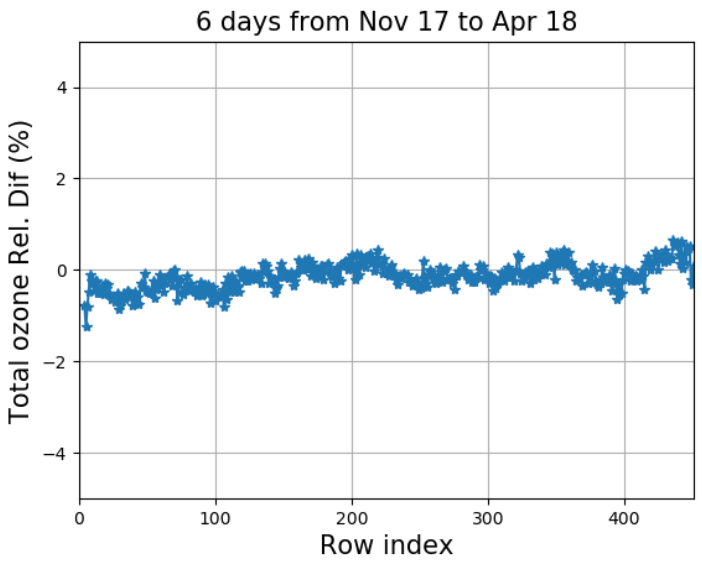
TO3 NRTI – OFFL

Mean relative differences asaf of key variables

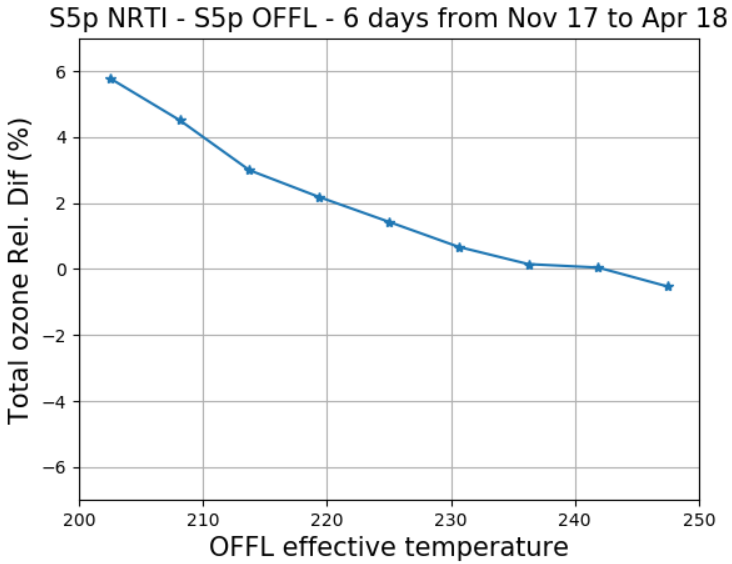
SZA dependence



Row dependence



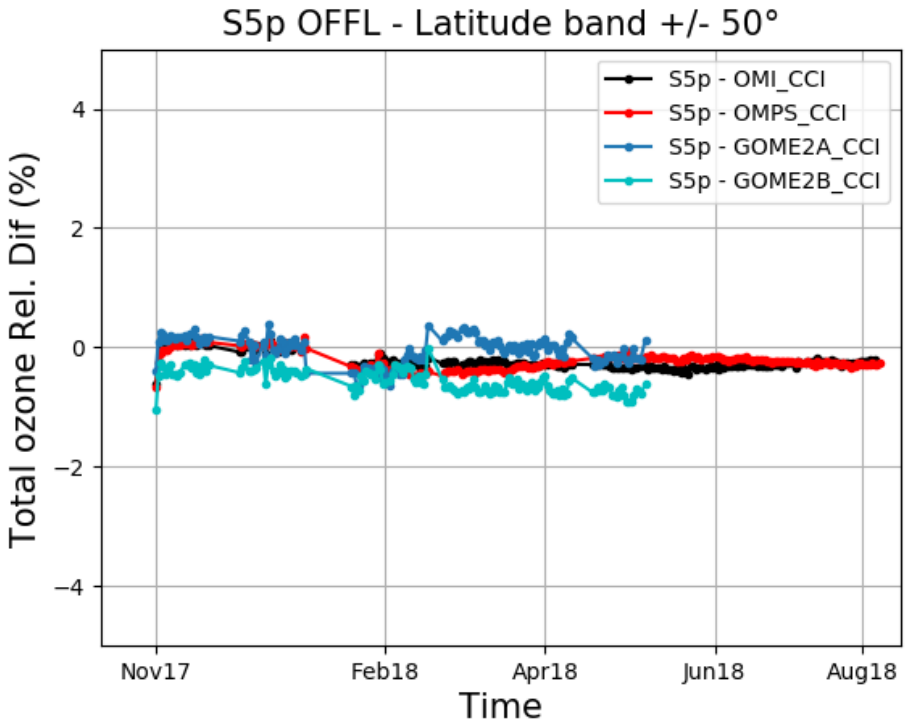
Eff. Temperature dependence

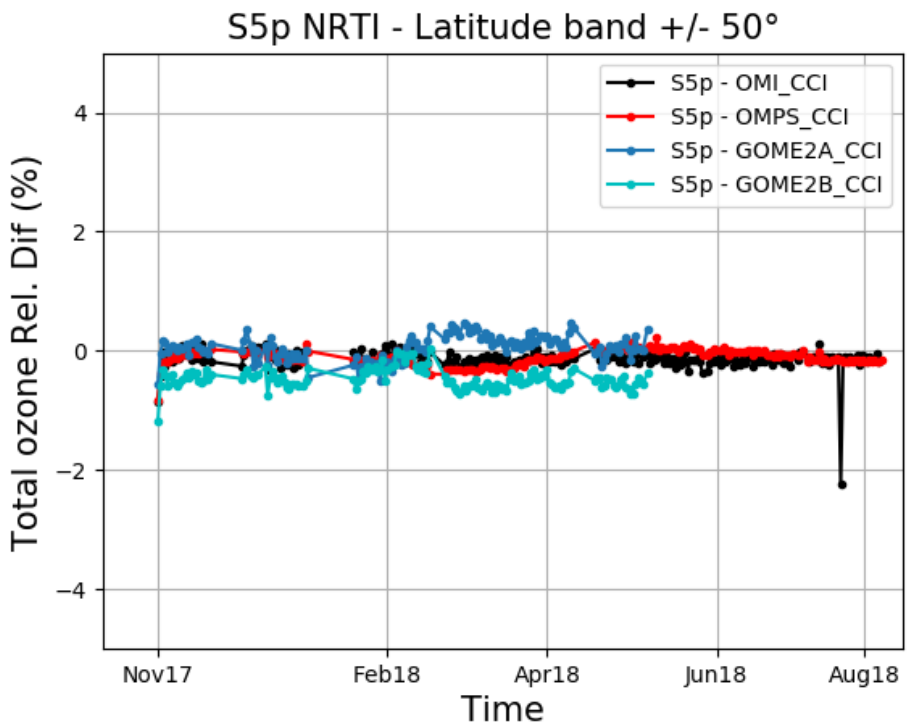


- SZA dependence originates from the differences in the forward model (correlates also with albedo differences)
- No significant pattern in the row dependence plot, despite there is no stripe correction in OFFL.
- Large dependence wrt OFFL effective temperature, but most pixels are in the range 220-240K. Also low temperatures correlate with large SZAs, where NRTI effective temperatures are overestimated (→ difficult to identify potential issues for validation).

Satellite-satellite comparison

Zonal Mean Relative Differences

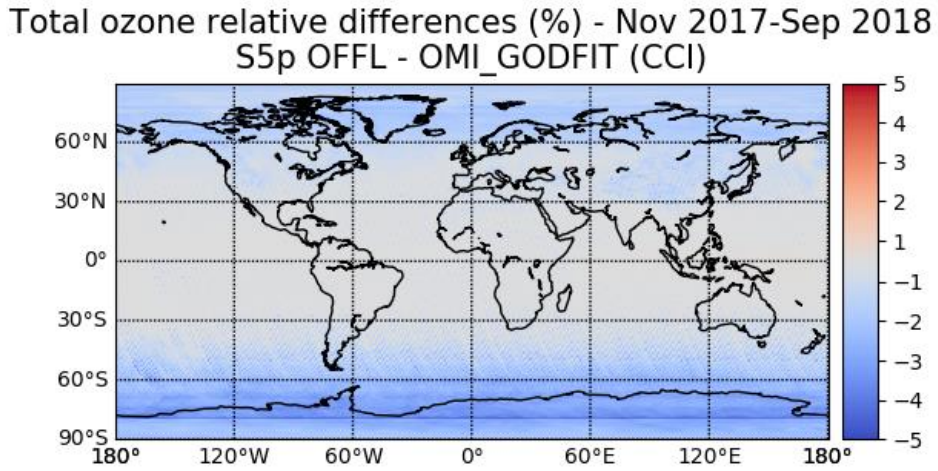


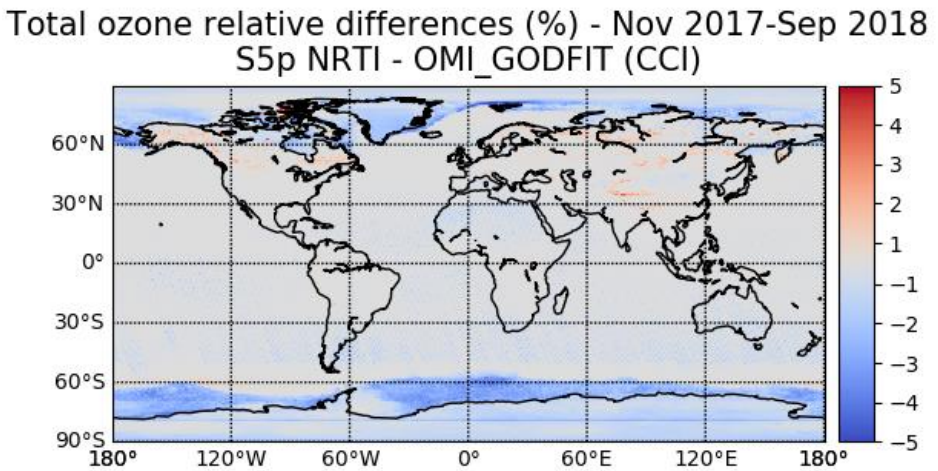


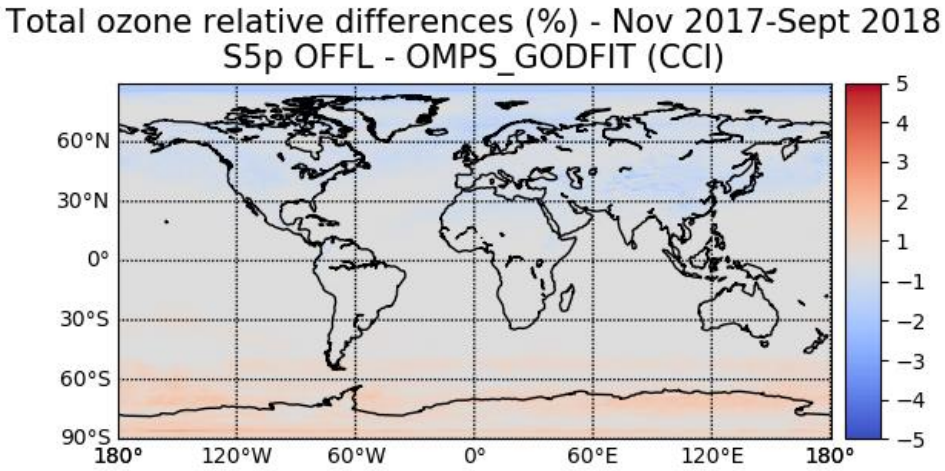
- Zonal mean differences are within 1% for all CCI data sets and both for NRTI and OFFL products.

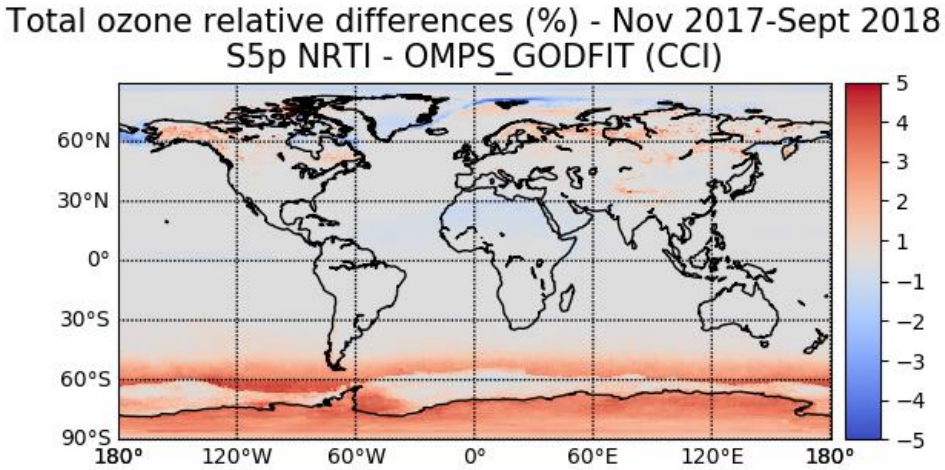
Satellite-satellite comparison

Map of Mean Relative Differences









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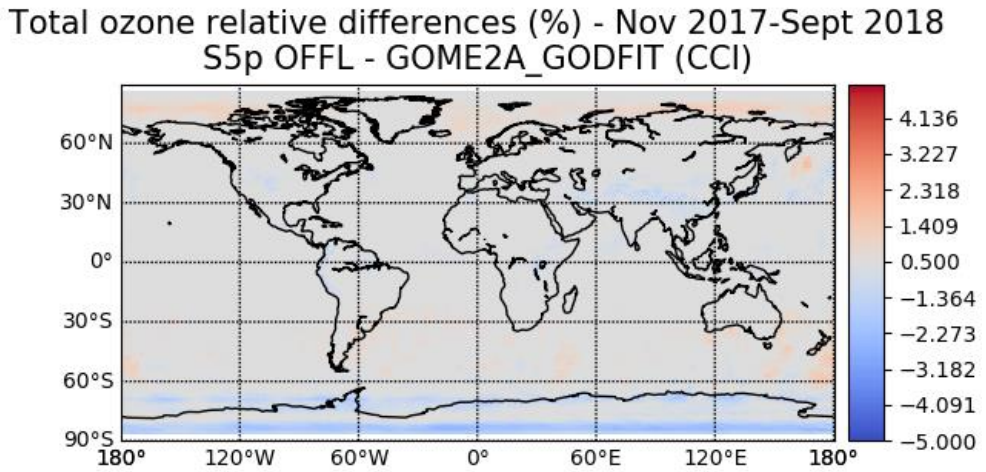

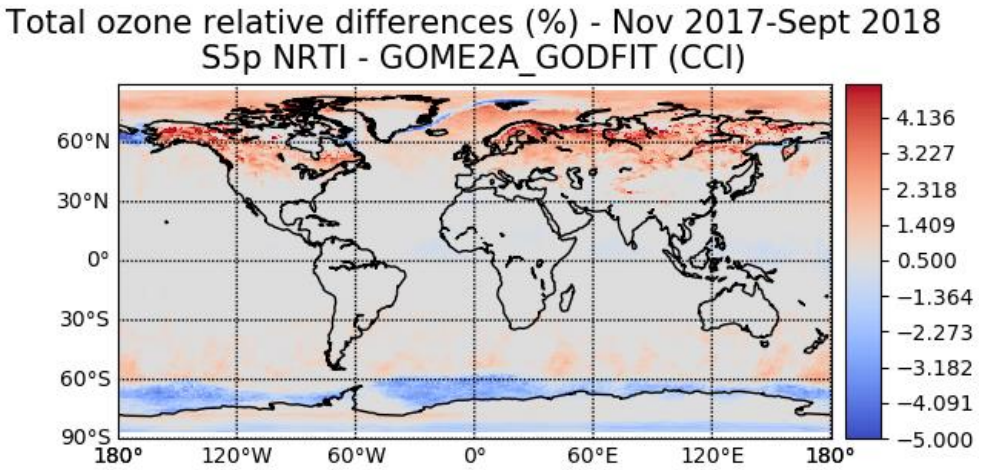

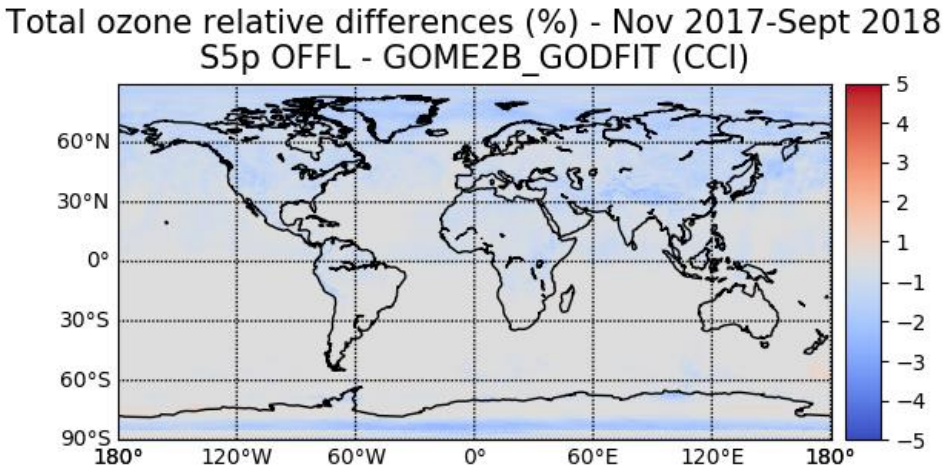

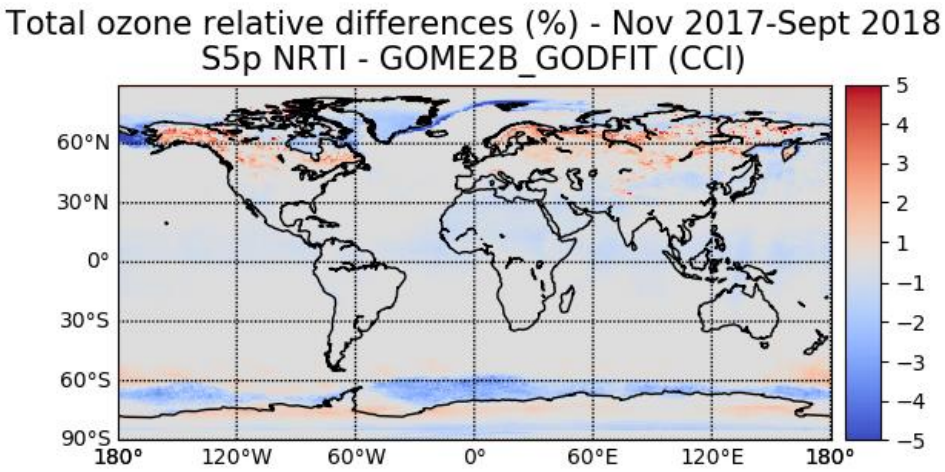

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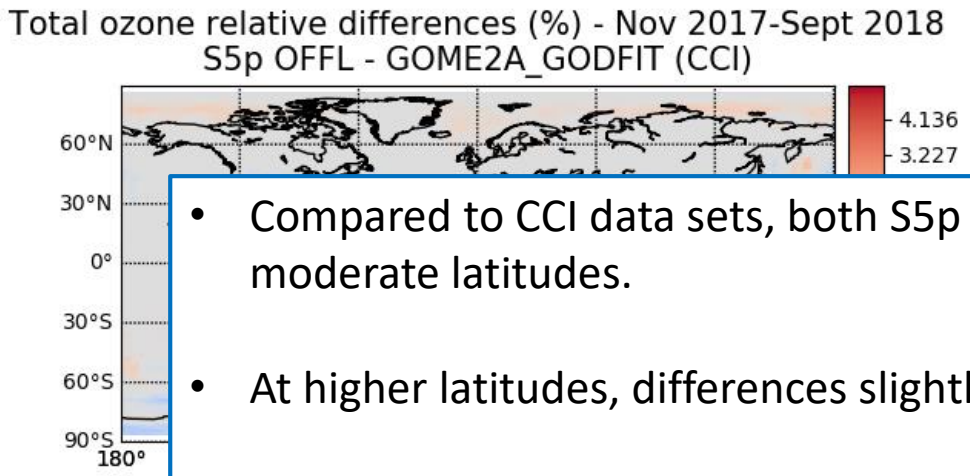
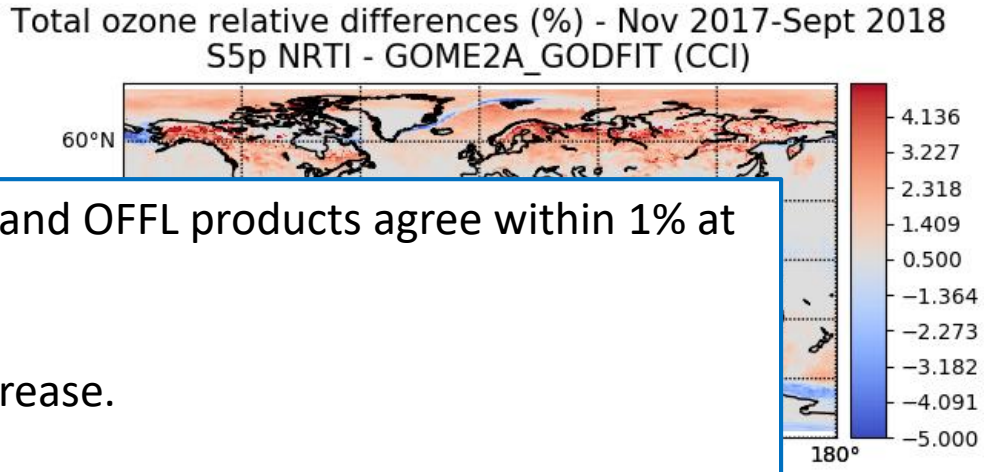
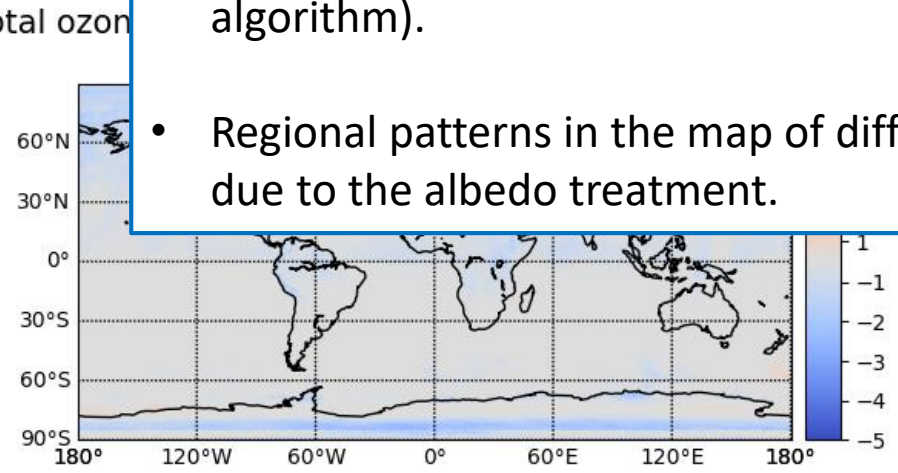
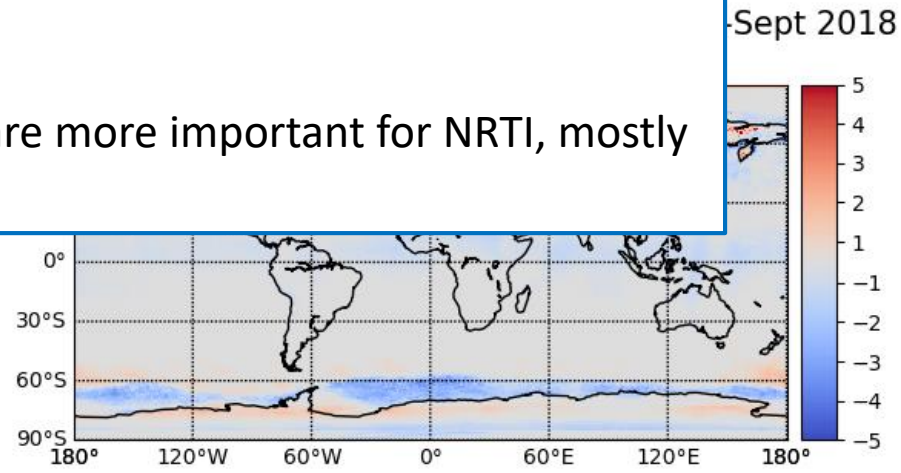




- Compared to CCI data sets, both S5p NRT and OFFL products agree within 1% at moderate latitudes.
- At higher latitudes, differences slightly increase.
- In general, OFFL product agrees better with CCI data sets as expected (same algorithm).
- Regional patterns in the map of differences are more important for NRTI, mostly due to the albedo treatment.





Summary

- The OFFL TO3 data product relies on a more accurate algorithm than the NRTI product.
- Minor issues have been identified in the product, but no blocking issue. qa_value should be revisited.
- Overall, NRTI and OFFL products are consistent with each others. Origin of the differences is well understood. The OFFL processor fits an effective albedo, therefore eliminating the issues identified in the NRTI processor due to the use of a coarse albedo data base.
- Overall consistency with other CCI data sets is excellent, both for NRTI and OFFL products. Intersatellite differences are, as always, larger at high latitudes. Differences can be locally larger for the NRTI product due to the treatment of surface.

➔ Product seems to be of very high quality and ready for release.