First results from the Metop-C IASI Level 2 cal/val

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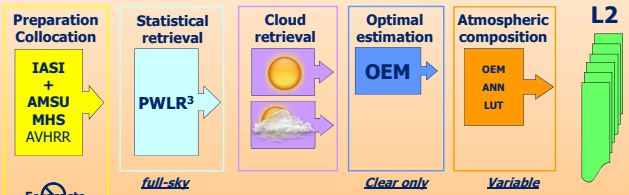
EUMETSAT

Introduction

Geophysical parameters from the IASI instruments on Metop-A and Metop-B are provided from EUMETSAT's Central Facility in near real time since 2007 for Metop-A and since 2013 for Metop-B. The EUMETSAT IASI Level 2 (L2) suite [1] includes vertical profiles of temperature and humidity, cloud information (coverage and top height), surface skin temperature and emissivity, and atmospheric composition parameters (e.g. CO, O3, SO2, CH4). Metop-C, the third of a series of three platforms in the EUMETSAT Polar System (EPS) program was successfully launched November 2018, 7th, bringing the number of flying IASI instruments to three. We present here validation results from the Metop-C IASI Level 2 commissioning.

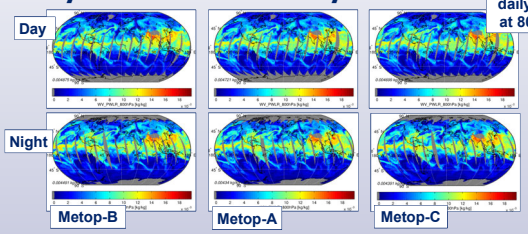
We provide some examples of the sanity and self-consistency checks performed on the Metop-C IASI L2 products, particularly through direct comparisons to the Metop-A and -B products. Using models, the accuracy of the Metop-C retrievals is compared to the other IASI instruments through indirect comparisons. Then, the quality of the Metop-C IASI L2 products is assessed against in-situ measurements.

The IASI L2 Products Processing Facility



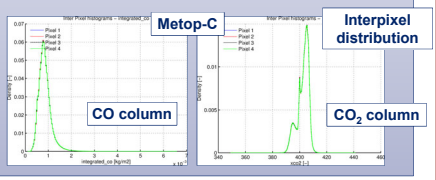
* : demonstrational product
**: products available Q4 2019

Sanity and self-consistency checks

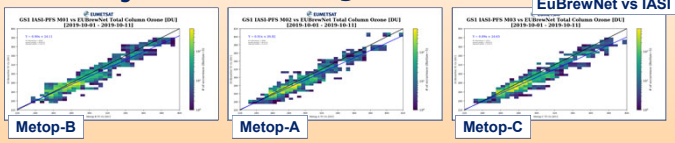


Comparing Metop-C to Metop-B and -A IASI L2 products demonstrated the very good health of all the products and the remarkable inter-platform consistency of the IASI instruments

To hunt interpixel differences, we are comparing the distribution of the products in each of the 4 IASI pixels separately. No differences can be seen in any of the Metop-C IASI L2 products, confirming the very good quality of the IASI L1 calibration.

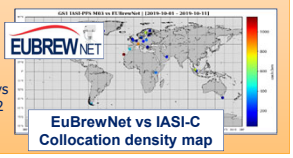


IASI L2 O_3 total column vs ground Brewer

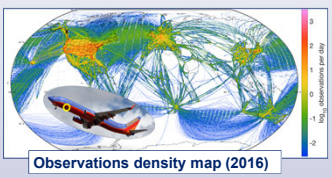


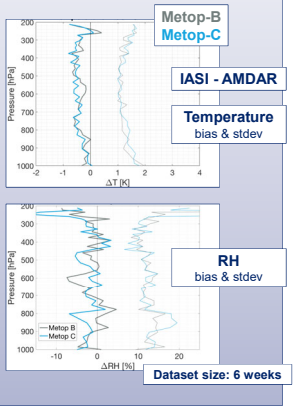
EuBrewNet coordinates Brewer spectrophotometer measurements of ozone within Europe, providing a consistent, spatially homogeneous European data resource [7].

We have compared our IASI L2 O_3 total column product to the collocated EUBrewNet measurements. Over the selected 10 days period, we observe an overall good agreement in the range of 2 percent rel. error with the brewers. We also see that IASI-C performances are very similar to the two other platforms.



IASI L2 T and H_2O profiles vs airborne AMDAR





The aim of the WMO AMDAR program is to collect temperature, humidity and wind from commercial aircrafts [9]. In particular, take-offs and landings allow the acquisition of profiles and can be used to perform temperature and humidity profile validation.

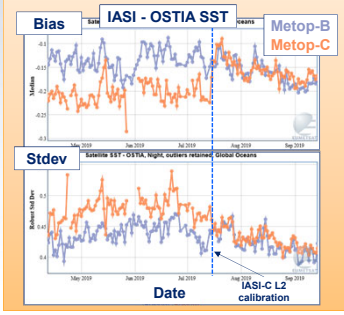
Though not initially designed for operational scientific purposes, these data are proving very valuable in the context of satellite products validation and monitoring. We observe a very good agreement between the IASI L2 profiles and the AMDAR measurements for both the temperature and the relative humidity products. We can also see that Metop-C and Metop-B show very comparable performances.

Validation strategy

Since the launch of the first Metop in 2007, the IASI L2 products have accumulated a long history of validation (examples: [2],[3],[4],[5]). For each of the IASI L2 products, many comparison studies have been performed against in-situ measurements, other satellites products or model data. New validation projects are regularly added to the collection through new scientific collaborations. Some of these studies have led to the implementation of routine validation systems that allows us to monitor the performances of our IASI L2 products.

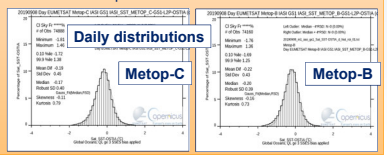
For the Metop-C Commissioning, we decided naturally to rely on this vast heritage to validate the IASI L2 products coming from the new platform. From routine sanity checks to brand new validation studies resulting from recent collaborations, this poster presents some of the numerous elements of the EUMETSAT IASI L2 Commissioning activities.

IASI L2 OEM SST vs OSTIA SST

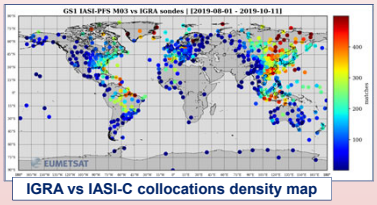


To assess the performances of our IASI L2 OEM Sea Surface Temperature (SST) retrieval, we are monitoring its bias and standard deviation compared to the OSTIA data. The OSTIA model [6] use satellite and in-situ data to produce high resolution SST analyses.

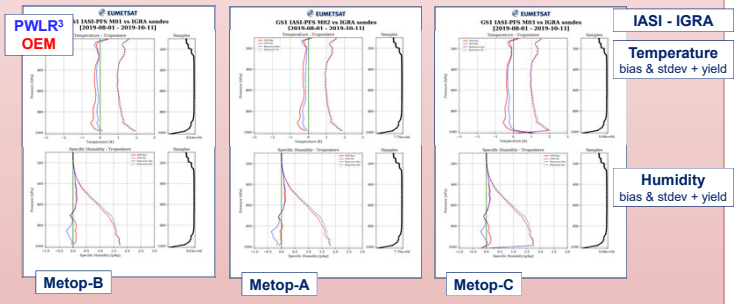
Metop-B and -A IASI SST have always shown a good agreement when compared to OSTIA. We can see that well calibrated Metop-C SST shows performances very similar to Metop-B.



IASI L2 T and H_2O profiles vs IGRA sondes

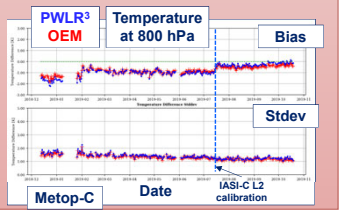


The Integrated Global Radiosonde Archive (IGRA) provides radiosonde and pilot balloon observations at over 2,700 globally distributed stations available at standard and variable pressure levels [8]. Variables include pressure, temperature, geopotential height, relative humidity, dew point depression, wind direction and speed. In this study we used the version 2 of the IGRA dataset (IGRA v2).



IASI L2 vs IGRA profiles comparisons are running routinely at EUMETSAT as a part of our monitoring framework. Long term analysis of these comparisons have shown a very good agreement between the IASI L2 products and the IGRA measurements, with a temperature's standard deviation equal to 1K over most of the troposphere.

Over the 1-month period used here, we can see that the Metop-C performances when compared to IGRA are very similar to the two other platforms. Furthermore, the timeseries show a very stable behaviour since the deployment of the IASI-C L2 calibration parameters.



Summary

- The IASI-C L2 commissioning took place between June and October 2019. All the products that make up the EUMETSAT IASI L2 suite have been calibrated and validated for the new Metop-C platform.
- The cal/val strategy was based on the long history of validation accumulated from the previous IASI instruments: (i) direct comparison to IASI-A and IASI-B, (ii) comparative performances assessments against models and (iii) parallel validation against in-situ measurements, were used to ensure that the quality of the IASI-C L2 products was similar to the two other instruments performances.
- Feedbacks from external partners provided during the trial dissemination phase have confirmed the overall quality of the IASI L2 product from the Metop-C platform.
- The **24th of October 2019**, the IASI-C L2 products have been declared **operational** and are distributed to the users.

You have questions about the IASI L2 products or the way to access them?
⇒ Contact *ops@eumetsat.int*

References

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