

MEMORANDUM

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L2P Reprocessing User Note

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SUBJECT: User Note for (A)ATSR L2P Reprocessing

This User Note gives details for the planned reprocessing of the AATSR, ATSR-1 and ATSR-2 L2P data.

Introduction

A full reprocessing for AATSR, ATSR-1 and ATSR-2 L2P data in netCDF format is under way; it is anticipated that the full reprocessed (A)ATSR archive will be released mid-2013.

The existing L2P archive will be replaced with ARC L2P data generated by a new processor. Details are given here of the new ARC L2P processor.

The AATSR Product Specification will be updated to reflect the changes in the L2P products, and will be available upon data release.

Full reprocessings are also in progress for AATSR, ATSR-1 and ATSR-2 Envisat-format products; details for these reprocessings were given in separate User Notes: <u>AATSR 3rd</u> Reprocessing User Note and ATSR-1 and ATSR-2 3rd Reprocessing User Note

New ARC L2P Processor

The new ARC L2P processor is based upon the ARC SST [1] processor. New L2P and L3U products in GHRSST Data Specification 2.0 netCDF format [2] will be produced for all three instruments.

The existing L2P archive will be replaced with the ARC L2P data generated by the new processor. The processor used for this reprocessing is version 1.2 of the ARC L2P Processor.

The L3U products will be an entirely new dataset for the archive, produced as one of the outputs from the ARC L2P processor. These data are the L2P products averaged onto a regular grid at 0.1 degree resolution (they are therefore similar to the AR / Meteo Envisatformat products).

Processor Features

Whereas the previous (A)ATSR L2P processor, in simple terms, repackaged the L2 NR dual-view SSTs into netCDF format and added some ancillary information, the new ARC L2P processor applies its own algorithm to generate SSTs from the L1B data. The ARC L2P processor is based on the software developed for the ARC project and includes:

- Bayesian cloud detection;
- the ARC SST retrieval algorithm;
- the ARC SST uncertainty model.

The processor takes as inputs both Level 1B (A)ATSR data in Envisat product format,







and corresponding ECMWF-interim NWP data. The NWP data (atmospheric and surface state) are needed as input for the RTTOV radiative transfer model (used within the Bayesian cloud detection), for ARC SST retrieval, and to complete auxiliary fields in the output files.

The original ARC SST dataset is available from the NERC Earth Observation Data Centre [3] and comprises 18 years of data from the start of ATSR-1 data in August 1991 through to the end of 2009, as Level 3 daily averaged products (note also that whilst these are netCDF, they are not GDS compliant). This dataset was extended to the end of the Envisat mission under the ESA Climate Change Initiative project. The ARC dual-view retrievals meet a target (for climate change analysis) of regional biases to be less than 0.1 K, when compared to drifting buoys, over the majority of the global oceans [4] and stability better than 5 mK year⁻¹ compared to tropical moored buoys between 1994 and 2010 to 95% confidence [5]. The (A)ATSR ARC L2P products being generated are full resolution products.

Envisat-format Products

Full reprocessings are also taking place for AATSR, ATSR-1 and ATSR-2 Envisat-format products; the reprocessed L1B Envisat-format products will be used as inputs to the ARC L2P processor.

(Note that the SSTs contained within the Envisat-format L2 NR products have also been improved via the use of ARC-based coefficients in this reprocessing; please refer to the User Notes referenced above for further information.)

Official Release of Reprocessed Data

Once all parties involved in quality control are satisfied that the full (A)ATSR reprocessed dataset is as complete as possible and the quality assessment has been completed, a recommendation will be made by the AATSR Quality Working Group that it is ready for release.

ESA will inform the users of the official release of the reprocessed data; this will also include the final report on the QC of the data. All things having proceeded as expected, this shall cover the ATSR-1, ATSR-2 and AATSR data in all formats, meaning that users will have access to an improved, near-continuous dataset of accurate SSTs spanning 20 years.

It is anticipated that the full (A)ATSR archive will be released mid-2013.

References

[1] Merchant, C. J. *et al.* (2008) Deriving a sea surface temperature record suitable for climate change research from the along-track scanning radiometers. *Adv. Space Res.* **41**, 1–11.

http://dx.doi.org/10.1016/j.asr.2007.07.041

[2] GHRSST Science Team (2010) The Recommended GHRSST Data Specification (GDS) 2.0, revision 4, available from the GHRSST International Project Office. https://www.ghrsst.org/documents/q/category/gds-documents/operational/

[3] Embury, O. and Merchant, C. J. (2011) ARC (AATSR Reprocessing for Climate) data; 2011; NERC Earth Observation Data Centre; available from: http://badc.nerc.ac.uk/view/neodc.nerc.ac.uk ATOM___DE_3abf8c96-a7d6-11e0-9cb8-00e081470265

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- [4] Embury, O. *et al.* (2012) A reprocessing for climate of sea surface temperature from the along-track scanning radiometers: Initial validation, accounting for skin and diurnal variability effects. *Remote Sens. Envir.* **116**, 62–78. http://dx.doi.org/10.1016/j.rse.2011.02.028
- [5] Merchant, C. J. *et al.* (2012) A 20 year independent record of sea surface temperature for climate from Along-Track Scanning Radiometers. *J. Geophys. Res.* **117**, C12013. http://dx.doi.org/10.1029/2012JC008400