AAPP developments for MetOp, NOAA-19 and NPP

Nigel Atkinson, Anna Booton, Pascal Brunel[1] , Philippe Marguinaud[1] and Tiphaine Labrot[1]

The ATOVS and AVHRR Pre-processing Package (AAPP) is a pre-processing package for the imaging and sounding instruments on the operational NOAA and MetOp satellites. The package is maintained by the EUMETSAT Satellite Application Facility for Numerical Weather Prediction (NWP SAF) and is freely available to users worldwide. AAPP can accept as input either direct-readout data (level 0, or HRPT) or level 1 data from NOAA, EUMETSAT or the Regional ATOVS Retransmission Services (RARS). The primary output is calibrated, geolocated radiances, either on the original instrument grid or mapped to one of the other sounder grids.

This poster describes the recent developments in AAPP, its current status, and developments planned for the near future.

1. Main developments in AAPP since ITSC-16

- Support for NOAA-19 (launched 6 February 2009)
- MAIA3 – AVHRR cloud mask and cloud classification on the 1km AVHRR grid
- Support for EARS-IASI
  - New IASI level 1c format with channel selection and Principal Component scores
  - New set of eigenvectors computed by EUMESAT
- Support for new BUFR sequences for global IASI and EARS-IASI
- OPS-LRS "day 2"

Current AAPP release is v6.12, released 25 February 2010

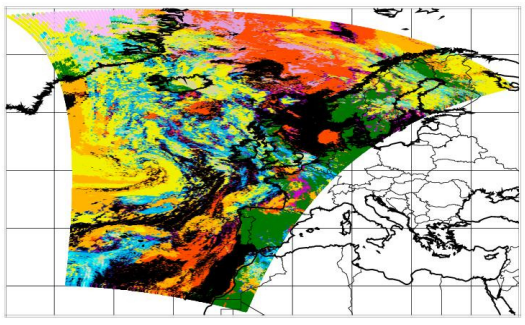
Full source package

New MetOp test case

See website www.nwpsaf.org for details of release.

2. MAIA3 – AVHRR cloud mask and classification

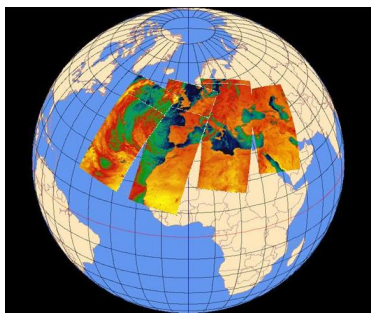
NOAA-19, 3rd July 2009



- AVHRR level 1b as input
- Generates AVHRR level 1d output (new format)
- Forecast file required for best results, but can be run with supplied climatological files

See *MAIA AVHRR Cloud Mask and Classification* by Lydie Lavanant, www.meteorologie.au.org/ici/maia/maia3.pdf

3. Support for EARS-IASI



- Regional IASI level 1 data service
- Will be based on AHRPT for descending passes (see example coverage map) and Svalbard Fast-dump-extract for ascending
- Full spatial resolution (~25km)
- Channel selection (366 channels) + Principal Components compression (290 scores)
- AAPP v6.12 contains both outstation code and user code.
- See Fiona Hilton's poster for more on the PC compression

4. New BUFR formats for IASI level 1c

AAPP v6.12 can decode and generate the following new sequences:

3-40-008

- Subset of channels and PC scores
- Number of channels and PCs are configurable (using delayed replication)
- To be used for EARS-IASI and global data on GTS

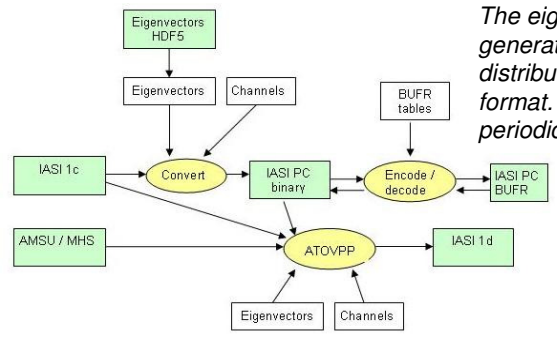
3-40-007

- All channels
- To be used for global data via EUMETCast, from May 2010
- Replaces the existing 3-40-001

Both of these sequences include land fraction, AVHRR-derived cloud amount and snow fraction. Also additional quality flags.

See tables B0000000000000014000.TXT, D0000000000000014000.TXT in ECMWF BUFR library version 000383.

5. AAPP data flows for IASI level 1c/1d processing



The eigenvector files have been generated by EUMETSAT and distributed with AAPP. In HDF5 format. May be updated periodically if necessary.

Option to generate reconstructed radiances, for user-specified channels.

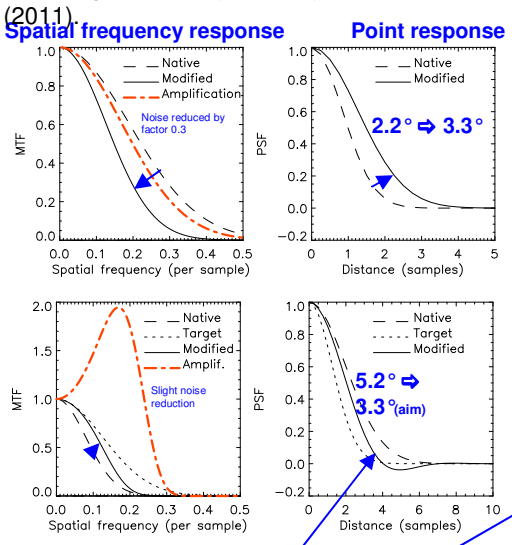
Typical configurations:

1. At the EARS outstation – to generate the IASI PC BUFR files.
2. User – read in the IASI PC BUFR files, combine with AMSU/MHS (atovpp) and generate the existing IASI 1d product.

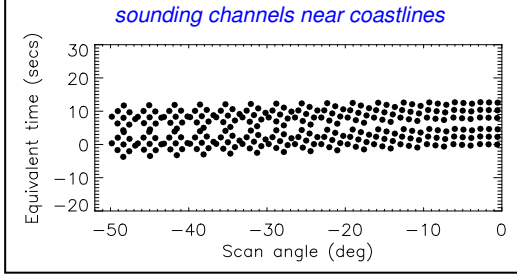
6. Pre-processing for NPP

AAPP version 7 will be able to ingest ATMS/CrIS Sensor Data Records (from IPOPP) and the global data (in BUFR) from NOAA. Aim to release v7 in time for NPP launch (2011).

Spatial frequency response **Point response**

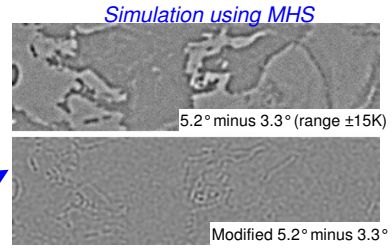


Potential for improved consistency between window channels and sounding channels near coastlines



- Different groups of ATMS channels have different beam widths: 5.2°, 2.2° and 1.1°
- For NWP it is useful for all channels to have similar beam width, e.g. AMSU-A-like 3.3°
- Need to reduce noise in the sounding channels
- One way of doing this is via Fourier techniques – examples at left

Simulation using MHS



- For some applications, need to map ATMS to the CrIS scan pattern
- Relatively straightforward since ATMS is densely sampled
- Do this after manipulating the ATMS beam width
- Generate cloud and scattering indices as with ATOVS

Conclusions

- AAPP supports all the operational NOAA and MetOp satellites. Also FY-1D
- AAPP v6.12 is ready for the start of the EARS-IASI service
- Preparations underway for NPP
- Freely available to users. Support available via the NWP SAF Helpdesk.
- To register, visit www.nwpsaf.org

Met Office FitzRoy Road, Exeter, Devon, EX1 3PB United Kingdom
Tel: 01392 884528 Fax: 01392 885681
Email: nigel.atkinson@metoffice.gov.uk

Météo-France[1] DP/CMS, Avenue de Lorraine, BP 50747, Lannion, France