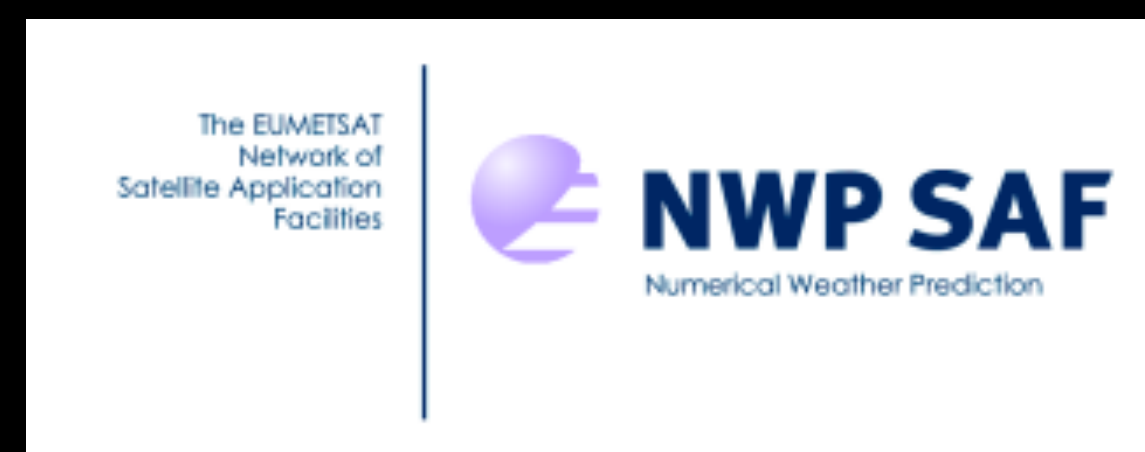# AAPP status report for ITSC-19

Nigel Atkinson, Anna Booton, Pascal Brunel[1], Pascale Roquet[1]

The ATOVS and AVHRR Pre-processing Package (AAPP) is a pre-processing package for the imaging and sounding instruments on the NOAA, Metop, S-NPP and FY-3 polar-orbiting satellites. Its primary use is to generate calibrated, geolocated radiances, either on the original instrument grid or mapped to one of the other sounder grids. 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).

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-18

- Support for Metop-B (launched 17th September 2012)
- MAIA4 – VIIRS cloud mask and cloud classification
- BUFR encode/decode for the FY-3A and FY-3B sounders
- Improved support for NOAA/CLASS 1b data (TOVS and AVHRR)
- OPS-LRS is much closer to the OPS used in EUMETSAT's EPS ground segment

Current AAPP version is v7.6, released 24 Feb 2014
Current OPS-LRS version is OPS_V7.0, released 13 Sept 2013

Sources of information on AAPP:
1. The NWP SAF web site www.nwpsaf.org
2. The AAPP Forum www.nwpsaf.eu/forum/
3. New releases are announced by email to registered users
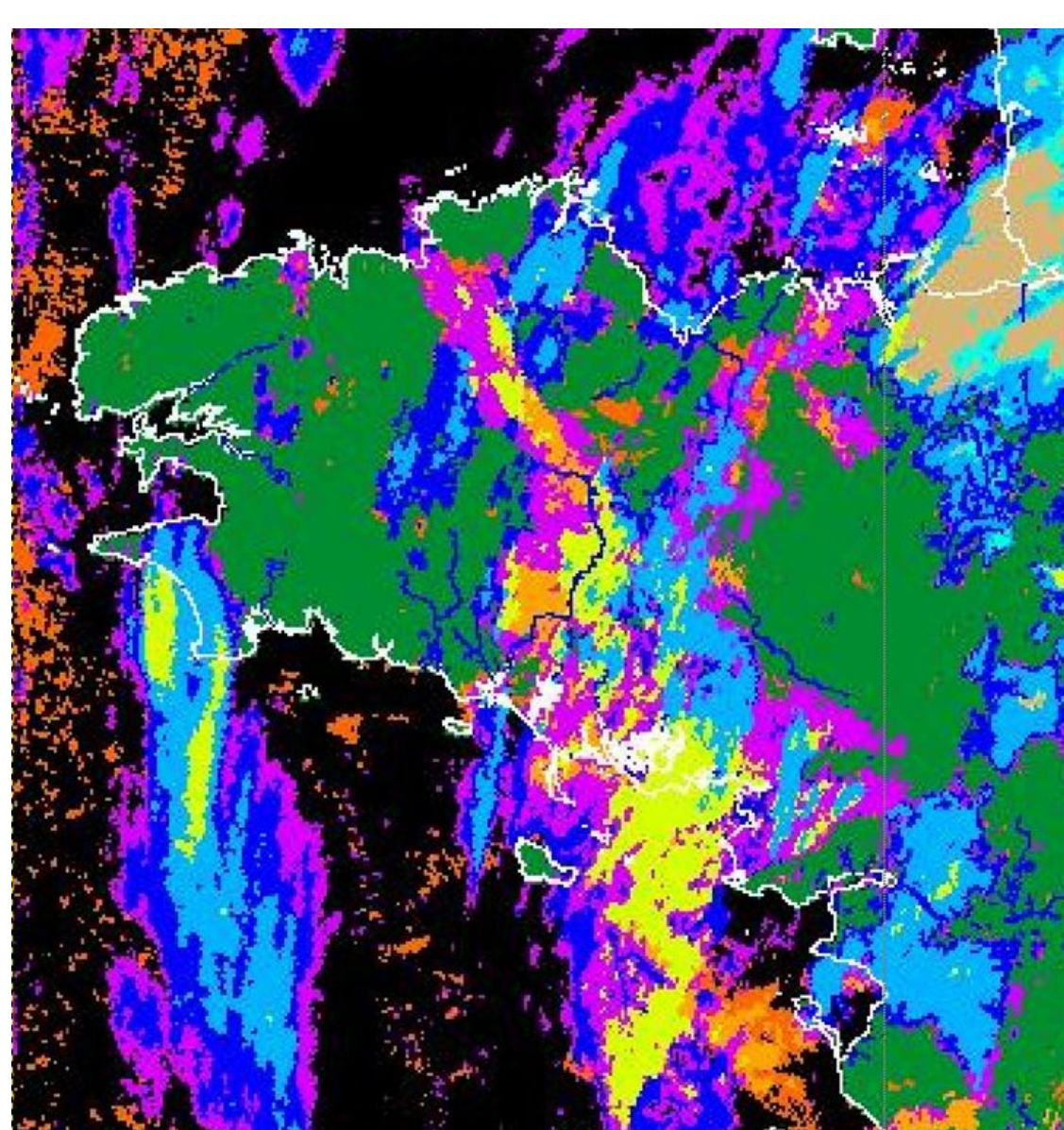
2. MAIA4 – VIIRS cloud mask and classification

Figure 1: MAIA4 cloud mask over France

MAIA (*Mask AVHRR for Inversion ATOVS*) was originally developed for AVHRR, and has now been extended for VIIRS

- MAIA4 released July 2013
- Takes VIIRS SDR files as input
- Forecast file required for background temperature, humidity profiles, etc.
- MAIA4 output file in HDF5 format
- Land/sea atlas resolution improved to 0.01° in Feb 2014.
- Developed by Lydie Lavanant

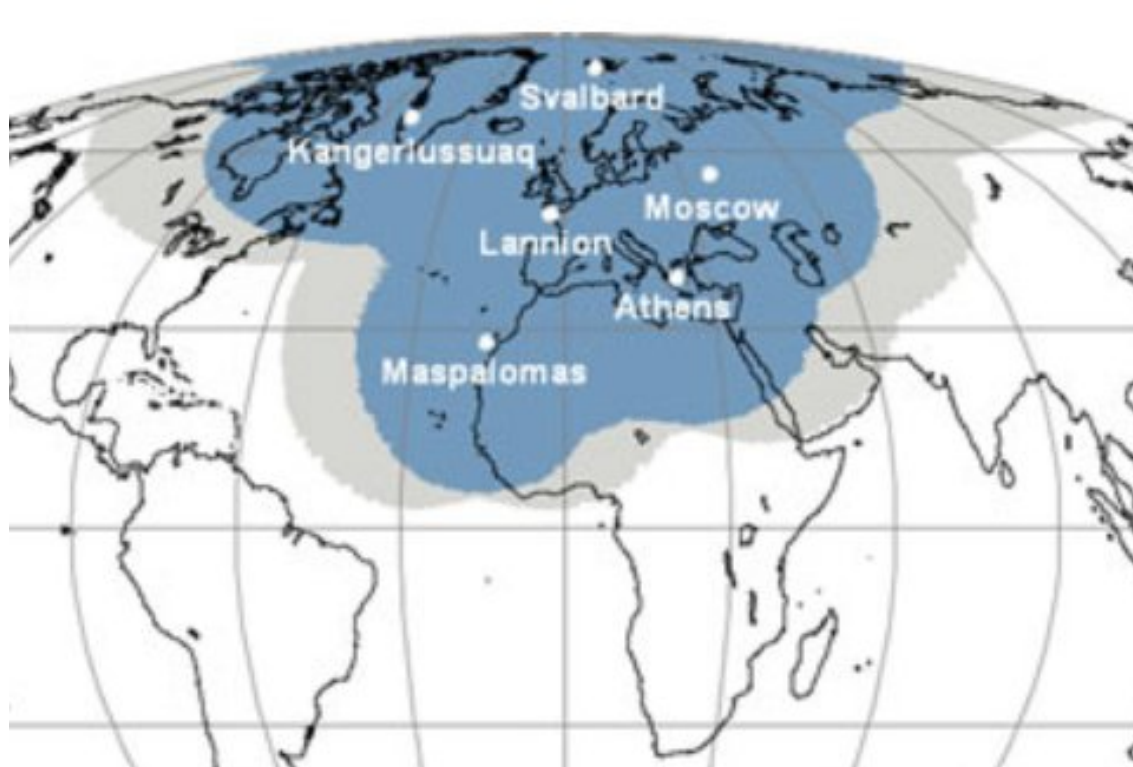## 3. Support for EARS services and RARS

Figure 2: HRPT stations for EARS-ATMS, EARS-CrIS and EARS-IASI

- EARS is the *EUMETSAT Advanced Retransmission Service*
- AAPP (with OPS-LRS) is the principal processor for EARS-ATOVS and EARS-IASI
- EARS-IASI service started April 2012.
- AAPP is used for BUFR encoding in EARS-ATMS and EARS-CRIS services – started April 2013.
- Worldwide ATOVS service is administered by WMO – *Regional ATOVS Retransmission Service* (RARS)

4. Support for FY-3 sounders

AAPP decodes the Sensor Data Record (SDR) files for FY-3A and 3B sounders:
  – Micro-Wave Temperature Sounder (MWTS)
  – Micro-Wave Humidity Sounder (MWHS)
  – Infra Red Atmospheric Sounder (IRAS)

and converts them to an internal binary format similar to NOAA l1b. Includes additional quality control steps.

BUFR encode/decode modules have been added for these instruments, based on the BUFR sequence devised by ECMWF.

Coming soon: AAPP will be extended to process FY-3C sounder data (launched Sept 2013)

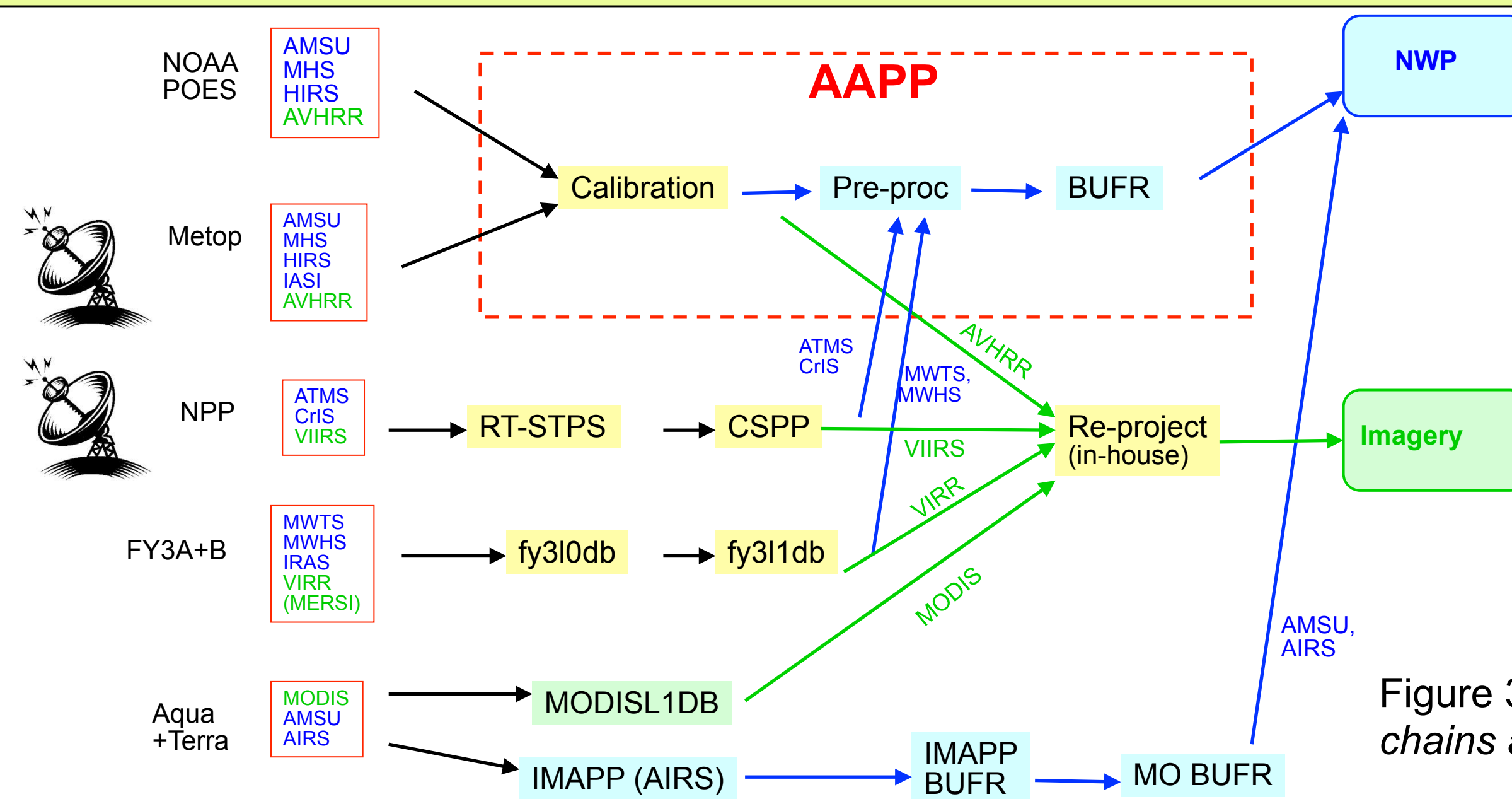## 5. Relationship of AAPP to other processing packages

Figure 3: DB processing chains at the Met Office

AAPP performs end-to-end processing for NOAA and Metop direct broadcast, and has processing modules for Suomi-NPP and FY-3. Also used for global data streams (e.g. EUMETCast)

6. Support for historical data from NOAA/CLASS

Tools have been added to AAPP to support:

- TOVS-era MSU and HIRS/2
  - converts NOAA files to AAPP 1b format

- AVHRR GAC, LAC and HRPT
  - converts NOAA files to AAPP 1b format
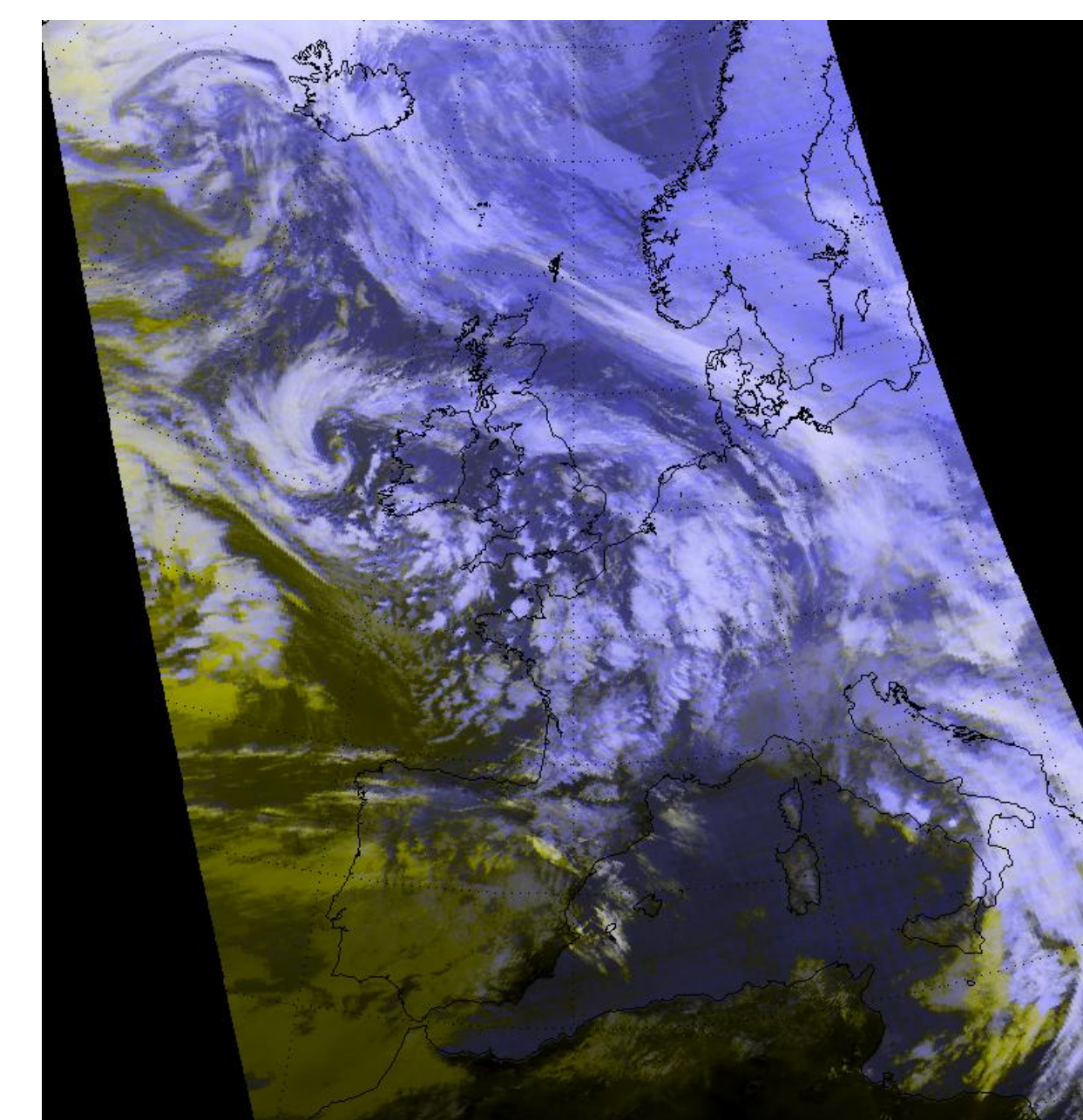 - also converts AAPP 1b format to current NOAA 1b format

Figure 4: TIROS-N AVHRR image for 12th Dec 1978. Earliest UK AVHRR data in the NOAA/CLASS archive

7. VIIRS to CrIS mapping

Coming soon: VIIRS mapped to CrIS field of view
- CrIS 1d format includes slots for mean and sdev of VIIRS BTs within the field of view
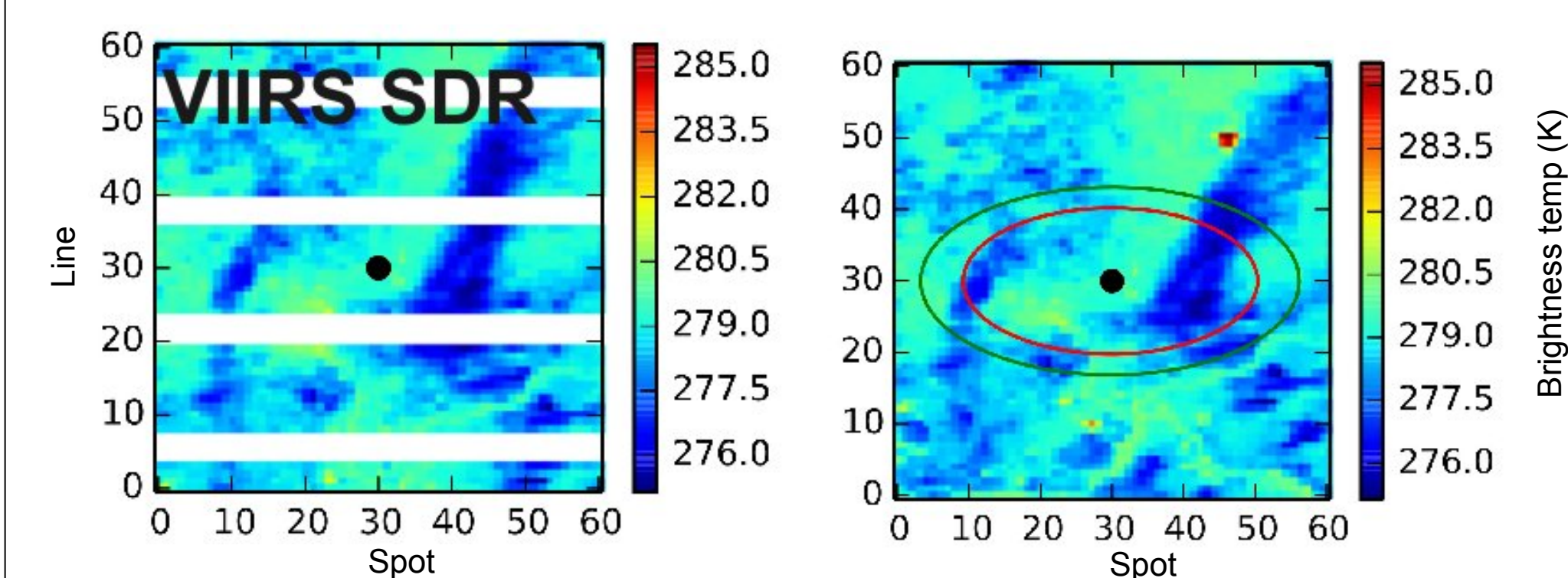- The software will also work for MAIA4 output

See poster by Pascal Brunel et al. "Mapping CrIS field of view onto VIIRS"

Figure 5: Left: raw VIIRS SDR; right: after Adjacency processing, with CrIS FOV ellipse marked

Conclusions

- AAPP supports all the operational NOAA, MetOp and FY-3 satellites
- Freely available to users, on registration. Support available via the NWP SAF Helpdesk.
- For more information, or to register, visit the AAPP web page, at www.nwpsaf.org and the AAPP forum at www.nwpsaf.eu/forum/