

# Status of the MSG and MTG AMVs at EUMETSAT

Manuel Carranza

Régis Borde





**Comparison with Nested Tracking** 

**Status of MTG prototype** 

**MSG vs MTG algorithms using MSG data** 

Himawari-8 AMVs using the MTG prototype



- MET-08 (launched on 28/08/2002) provides the IODC service at 41.5° E.
- MET-09 (launched on 22/12/2005) provides the Rapid Scan Service at 9.5° E.
- MET-10 (launched on 05/07/2012) provides the Full Earth Scan service at 0°.
- MET-11 (launched on 15/07/2015) is currently in in-orbit storage.

• No major algorithm updates since last International Winds Workshop (2016).



#### **Comparison with Nested Tracking**

**Status of MTG prototype** 

MSG vs MTG algorithms using MSG data

Himawari-8 AMVs using the MTG prototype



#### Comparison with Nested Tracking Test case

- Comparison of CLA, OCA and Nested Tracking algorithms
  - CLA 24x24 pixels
  - OCA 24x24 pixels
  - Nested Tracking 16x16, 20x20 and 24x24 pixels
- Four days of data (14/04/2016 18/04/2016)
- Only channel 9 (10.8 µm)
- Results filtered by QI > 80%
- Statistics computed against forecast



AMV speed bias against forecast (global)





AMV speed bias against forecast (northern hemisphere)





AMV speed bias against forecast (tropics)





AMV speed bias against forecast (southern hemisphere)





#### AMV speed NRMS against forecast





# Comparison with Nested Tracking AMV histograms





- Similar speeds and directions.
- Clear redistribution of AMV pressures from low to high levels when moving from OCA to CLA to Nested Tracking.



# Comparison with Nested Tracking AMV time series



14/04, 00:45 14/04, 08:41 14/04, 16:37 15/04, 00:33 15/04, 08:29 15/04, 16:25 16/04, 00:21 16/04, 08:17 16/04, 16:13 17/04, 00:09 17/04, 08:05 17/04, 16:01 17/04, 23:57 18/04, 07:53 18/04, 15:49 18/04, 23 Date



#### Comparison with Nested Tracking Conclusions

- CLA and OCA provide similar statistics, with slightly smaller AMV speed bias for OCA.
- For Nested Tracking the smaller the target box, the higher the average AMV speed and, thus, the larger the AMV speed bias.
- For Nested Tracking the AMV speed bias changes the sign for different target box sizes; it is unclear why.
- The AMV speed NRMS is very similar in all cases considered.
- Nested tracking takes, in general, much longer to compute (over twice as much as CLA/OCA).



**Comparison with Nested Tracking** 

#### **Status of MTG prototype**

MSG vs MTG algorithms using MSG data

Himawari-8 AMVs using the MTG prototype



### Status of MTG prototype

- The MTG algorithm is largely based on that of MSG.
- The prototype is based on the MSG MPEF, but detached from it.
- It is able to run with MSG data.
- It was adapted to use Himawari-8 data from various sources (JMA, KMA). Comparisons are still ongoing.
- FCI Level-2 test data expected for next year.
- Possibility to adapt the prototype to GOES-R data (time permitting).



**Comparison with Nested Tracking** 

**Status of MTG prototype** 

#### MSG vs MTG algorithms using MSG data

Himawari-8 AMVs using the MTG prototype



#### MSG vs MTG algorithms using MSG data Algorithm differences

- The MTG algorithm is largely based on that of MSG:
  - CCC used for tracking;
  - 3 km spatial resolution;
  - 15 minutes temporal resolution.
- The main differences are:
  - three images (at HH:15, HH:30, HH:45) instead of four (at HH:00, HH:15, HH:30, HH:45);
  - reference image at HH:30 (backward plus forward tracking) instead of HH:00 (only forward tracking);
  - no intermediate product averaging; the second component is used as final product instead;
  - final AMV coordinates set to the position of the tracked feature instead of target centre.



#### MSG vs MTG algorithms using MSG data Test case

- Comparison of MSG and MTG algorithms using the same MSG images and ancillary data
- One month of data (14/05/2016 14/06/2016)
- Only channel 9 (10.8 µm)
- Results filtered by QI > 80%
- Statistics computed against forecast



#### MSG vs MTG algorithms using MSG data Accumulated AMV speed bias (high levels)



MSG

MTG



#### MSG vs MTG algorithms using MSG data Accumulated AMV speed bias (mid levels)



MSG

MTG



#### MSG vs MTG algorithms using MSG data Accumulated AMV speed bias (low levels)



MSG

MTG



AMV speed bias against forecast (global)





AMV speed bias against forecast (northern hemisphere)





AMV speed bias against forecast (tropics)





AMV speed bias against forecast (southern hemisphere)





#### AMV speed NRMS against forecast





#### MSG vs MTG algorithms using MSG data AMV histograms





#### MSG vs MTG algorithms using MSG data Conclusions

- The MTG AMV algorithm is very similar to that of MSG, with two main differences: 3 images instead of 4, and no product averaging.
- The AMV speed bias and NRMS against forecast are very similar for both algorithms, for all levels and geographical areas.
- The largest differences occur for low levels AMVs (around 8% more AMVs for MTG than for MSG).
- The AMV speed, direction and pressure histograms are very similar, with slightly faster and higher AMVs for MSG w.r.t. MTG.
- There seems to be no significant advantage in the averaging of intermediate products, as currently done for MSG.



**Comparison with Nested Tracking** 

**Status of MTG prototype** 

MSG vs MTG algorithms using MSG data

Himawari-8 AMVs using the MTG prototype



# Himawari-8 AMVs using the MTG prototype Datasets

- Available datasets:
  - JMA data from 24/08/2015
  - JMA data from 17/03/2016 21/03/2016
  - KMA data from 19/08/2015
- Results from JMA data on 24/08/2015 partially available.
- Results from JMA data on 19/03/2016 partially available. Full fiveday period still to be processed.
- Results from KMA data hopefully before the end of the year.

• Upcoming: 3rd AMV Intercomparison Study



#### Himawari-8 AMVs using the MTG prototype Channel 3 (0.64 µm, VIS)



JMA

#### EUMETSAT



# Himawari-8 AMVs using the MTG prototype Channel 13 (9.66 µm, IR)



#### JMA

#### EUMETSAT



# Himawari-8 AMVs using the MTG prototype AMV histograms



Channel 3 (VIS)





**Comparison with Nested Tracking** 

**Status of MTG prototype** 

MSG vs MTG algorithms using MSG data

Himawari-8 AMVs using the MTG prototype



- MSG:
  - Investigate OCA heights at low levels
  - Test the use of cloud microphysics from OCA
  - Compare CLA/OCA heights with radiosonde observations
  - Derive AMV speed and direction errors from image errors
  - WV clear-sky AMVs: test using 50% coldest pixels and 100% clear-sky pixels
- MTG:
  - Further compare the MSG and MTG algorithms using MSG data (e.g. channels 2, 5 and 6)
  - Compare MSG and MTG heights with radiosonde observations
- Himawari-8:
  - Get results for the 3<sup>rd</sup> AMV Intercomparison Study
  - Get results from five-day JMA dataset
  - Get results from KMA dataset

