CURRENT STATUS OF EUMETSAT OPERATIONAL WINDS

R. Borde, M. Carranza, and O. Hautecoeur
Content

✓ AMVs from Geostationary Satellite status
  • MTP/MSG Planning
  • Major evolutions impacting AMVs since IWW12
  • Upcoming Changes

✓ AMVs from Low earth Orbiting Systems status
  • Metop planning
  • AVHRR Winds
  • Upcoming Changes

✓ Other business
MSG space segment configuration is stable since the end of relocations and services swaps in early 2013.

- **Rapid Scan Service**
  - Launched 28-8-2002
  - Back up Met-10
  - Back up Met-9 RSS
  - RSS gap filling until 2015

- **MSG-4 IOS position**
  - Launched 5-7-12
  - Full Earth Scan
  - 3.4°W
  - 0°
  - 3.5°E
  - 9.5°E
  - 57.5°E

- **Met-10**
  - 3.4°W
- **Met-8**
  - 0°
- **Met-9**
  - 3.5°E
- **Met-7**
  - 9.5°E
  - 57.5°E
  - IODC
Long Term Planning Reference Baseline - 2015

1) MSG operations for IODC (or other) is TBD by Council

2) Duration of MSG-4 in orbit storage is TBD by Council
Recent activities. MPEF Release 2.2

Use of Optimum Cloud Analysis (OCA) product for AMV HA. Saved as additional height in the output file.

1. **whole disk**

<table>
<thead>
<tr>
<th></th>
<th>CLA</th>
<th>OCA</th>
<th>DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean pressure</td>
<td>548.33</td>
<td>513.49</td>
<td>-34.84</td>
</tr>
<tr>
<td>Mean QI with FC</td>
<td>69.69</td>
<td>71.77</td>
<td>+2.08</td>
</tr>
<tr>
<td>Mean QI without FC</td>
<td>73.95</td>
<td>76.65</td>
<td>+2.69</td>
</tr>
</tbody>
</table>

2. **Central inversion area (lat. [-35º,5º], lon. [-20º,20º])**

<table>
<thead>
<tr>
<th></th>
<th>CLA</th>
<th>OCA</th>
<th>DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean pressure</td>
<td>619.55</td>
<td>582.51</td>
<td>-37.04</td>
</tr>
<tr>
<td>Mean QI with FC</td>
<td>72.90</td>
<td>74.52</td>
<td>+1.62</td>
</tr>
<tr>
<td>Mean QI without FC</td>
<td>77.63</td>
<td>79.37</td>
<td>+1.74</td>
</tr>
</tbody>
</table>

3. **Jet area (lat. [5º,30º], lon. [-10º,30º])**

<table>
<thead>
<tr>
<th></th>
<th>CLA</th>
<th>OCA</th>
<th>DIFF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean pressure</td>
<td>525.44</td>
<td>413.69</td>
<td>-111.75</td>
</tr>
<tr>
<td>Mean QI with FC</td>
<td>51.57</td>
<td>64.33</td>
<td>+12.76</td>
</tr>
<tr>
<td>Mean QI without FC</td>
<td>55.68</td>
<td>71.47</td>
<td>+15.79</td>
</tr>
</tbody>
</table>
Recent activities. MPEF Release 2.2

- HA of Water Vapour AMVs
- New HA method for WV clear sky AMVs
- Correction of Low levels Cloudy WV winds

<table>
<thead>
<tr>
<th>Channel</th>
<th>Number</th>
<th>Clear-sky</th>
<th>OLD</th>
<th>NEW</th>
<th>NEW – OLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WV 6.2 µm</td>
<td>7,640</td>
<td>36.6</td>
<td>46.4</td>
<td>+9.8</td>
<td></td>
</tr>
<tr>
<td>WV 7.3 µm</td>
<td>7,730</td>
<td>30.1</td>
<td>51.5</td>
<td>+21.4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Channel</th>
<th>Number</th>
<th>Cloudy</th>
<th>OLD</th>
<th>NEW</th>
<th>NEW – OLD</th>
</tr>
</thead>
<tbody>
<tr>
<td>WV 6.2 µm</td>
<td>690</td>
<td>1.9</td>
<td>65.5</td>
<td>+63.6</td>
<td></td>
</tr>
<tr>
<td>WV 7.3 µm</td>
<td>30</td>
<td>4.0</td>
<td>69.7</td>
<td>+65.7</td>
<td></td>
</tr>
</tbody>
</table>
Recent activities. MTG Prototype

- Commissioning of Meteosat 11

- MTG prototype developed from MSG code
  - 3 images, No averaging
  - Use OCA as HA baseline.
  - MTG prototype adapted to Himawari data.
  See Manuel's talk, this session: ‘Generation of Himawari-8 AMVs using the future MTG AMV processor.’

- Nested tracking implemented on our test chain (Collaboration with J. Daniels and W. Bresky).
  - Run using several target sizes configurations.
  - Comparison against MSG algorithm on 5 days period.
Future activities.

- **Operations**
  - Met 8 over IODC (autumn 2016)

- **MTG prototype**
  - Comparison of MSG and MTG codes performances
  - MTG prototype to be adapted to MET8 RSS data (L2PF activities)
  - Use OCA microphysics to improve AMV HA.
  - Compare MTG prototype to GeoKompsat prototype using Himawari data (Collaboration with KMA)
  - Participation to 3rd AMV intercomparison study.
The Metop-A satellite continues to be a valuable component of the EUMETSAT Polar System despite some instrument degradations.

The Dual - Metop configuration gives robustness to the core service.

<table>
<thead>
<tr>
<th></th>
<th>Metop-A</th>
<th>Metop-B</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLM</td>
<td>HRPT not global</td>
<td></td>
</tr>
<tr>
<td>IASI</td>
<td>Concern over magnets lifetime.</td>
<td>Concern over magnets lifetime</td>
</tr>
<tr>
<td></td>
<td>Electronics Side B due to CC speed flags.</td>
<td></td>
</tr>
<tr>
<td>GOME</td>
<td>Swath 960km, UV Throughput</td>
<td>Swath 1920km, UV Throughput</td>
</tr>
<tr>
<td>GRAS</td>
<td>Improved Performance</td>
<td>Improved Performance</td>
</tr>
<tr>
<td>ASCAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MHS</td>
<td>H3 &amp; 4 Improved Performance</td>
<td></td>
</tr>
<tr>
<td>AMSUs</td>
<td>H3,7, 8 not usable: No ATOVS L2</td>
<td></td>
</tr>
<tr>
<td>AVHRR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIRS</td>
<td>Ageing effects apparent.</td>
<td>LW channels cyclic degradation</td>
</tr>
<tr>
<td>SEM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S&amp;R</td>
<td></td>
<td>CRA Problem</td>
</tr>
<tr>
<td>ADCS</td>
<td>ARGOS-3 Service</td>
<td>CRA Problem: ARGOS-2 only</td>
</tr>
</tbody>
</table>
Council (Q4 2012) agreed lifetime extension planning:

- Last OOP in 2015
- Drift until at least mid-2018
- De-orbit within 25 years (compliant with ISO 24113)

Based on Metop-C Launch in Q1 2018

30 mins LTAN drift with fixed GT leads to phase drift. 20 mins AOS to AOS separation maintained.
EPS-Metop Orbit Position Option:
2016 OOP with LTAN mission extension

Chart assumes last OOP Manoeuvre in Autumn 2016

The single burn gains 5 months on the nominal fixed Ground Track.

Phase drift is stopped, with ground track drift to ensure at least 20 minutes AOS separation is available between Metop-A and Metop-C.

Commissioning of Metop-C at a different phase position to routine operations.
Recent activities on AVHRR winds.

- Development of Global AVHRR wind product.
- Development of Triplet mode AVHRR wind product over polar regions.

See Olivier’s talk, this session: ‘Derivation of wind vectors from Metop AVHRR at EUMETSAT.’

<table>
<thead>
<tr>
<th>AVHRR wind products</th>
<th>Number of satellite used</th>
<th>Number of images used</th>
<th>Time to derive the product (~min)</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Metop polar</td>
<td>1</td>
<td>2</td>
<td>100</td>
<td>Polar areas</td>
</tr>
<tr>
<td>Global AVHRR</td>
<td>2</td>
<td>2</td>
<td>50</td>
<td>Global</td>
</tr>
<tr>
<td>Triplet mode</td>
<td>2</td>
<td>3</td>
<td>100</td>
<td>Polar areas</td>
</tr>
</tbody>
</table>
AVHRR winds Examples

Single Metop polar, 17/09/2014, 1:31-1:52

Global AVHRR, 18/09/2014, 9:04-9:46
Single AVHRR wind product assimilated at Met Office (Feb 2015) and ECMWF (Feb 2016). Lat>60°

Global AVHRR wind product assimilated at ECMWF (Feb 2016). 40°<Lat<60°.

Courtesy K. Salonen an N. Bormann: Atmospheric Motion Vector observations in the ECMWF system: Fifth year report
Other recent activities on AVHRR winds.

- Investigation of Metop A end of life scenario on wind products.

- External study on comparison of AVHRR wind products (TROPOS)
  See A. Horvath’s poster: ‘Evaluation of dual-mode METOP CMVs.’

![Map showing geographic distribution of METOP wind speed bias averaged over all levels. All comparison CMVs are from CIMSS. Geostationary: GOES-15/13, METEOSAT-10/7, MTSAT-2 and polar: MODIS-Terra.](image)

Courtesy A. Horvath
Geographic distribution of METOP wind speed bias averaged over all levels. All comparison CMVs are from CIMSS. Geostationary: GOES-15/13, METEOSAT-10/7, MTSAT-2 and polar: MODIS-Terra.
Future activities on LEO satellites.

- **Operations**
  - End of life of Metop A
  - Commissioning of Metop-C (2018)

- **AVHRR wind products**
  - Extension of AVHRR triplet mode coverage setting the 2\textsuperscript{nd} image as reference (Q4 2016)

- **EPS-SG METImage wind products**
  - Documentation updates (ATBD and PGS)
  - Start development of METImage AMV prototype code
Other recent activities.

- Development of 3D wind product from IASI Level2 temperature and humidity fields.
  - Collaboration with P. Héas from INRIA (Rennes in France)
  - Use 3D optical flow software.
  - Proof of concept tested on IASI Level2 product.

See Olivier’s talk, session 7: ‘Extraction of 3D wind profiles from IASI level 2 products.’ (Thursday 30 June)
Other business future activities.

- Development of 3D wind product from IASI Level2 temperature and humidity fields.
  - Get consolidated results by end 2016
  - Decision to implement this algorithm or not on operation in 2017

- Investigate AMV extraction from Sentinel 3 SLSTR instrument.
  - Strategy under investigation.

- ITT on the investigation of recurrent AMV fast bias over tropics.
  - Presently on EUMITS.
Thanks for attention