Status of Operational AMV Products at EUMETSAT

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IWW15, 12-16 April 2021

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Content

✓ Operation activities

- MSG/SEVIRI
- EPS/AVHRR

✓ New developments and future missions

- MTG/FCI
- S3/SLSTR
- EPS-SG/METImage
- EPS/3D IASI winds
- Aeolus/DWL

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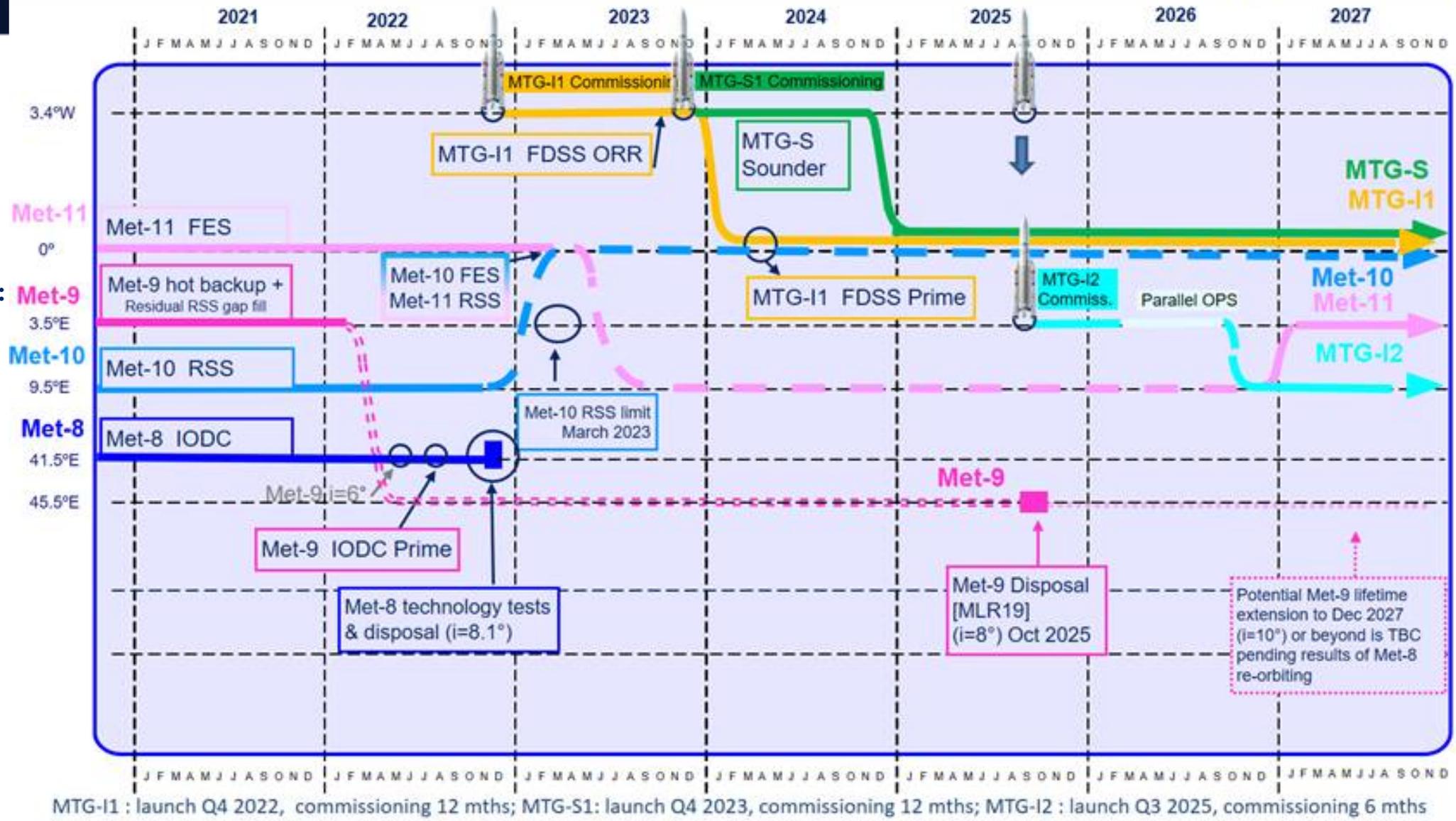# Reference Operations Baseline - (2020-2027)

Since 20 February 2018:

Since 20 March 2018:

Since 20 March 2018:

Since 1 February 2017:

MTG-I1 : launch Q4 2022, commissioning 12 mths; MTG-S1: launch Q4 2023, commissioning 12 mths; MTG-I2 : launch Q3 2025, commissioning 6 mths

1   EUM/STG-OPSWG/47/20/VWG/03, 5-6 March 2020

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Operation baseline EPS

➤ **Trident configuration since 19 Feb 2020**

✓ **Single platform operations**
Metop-A, *Metop-B* and *Metop-C* AMV_02 products operational and full dissemination
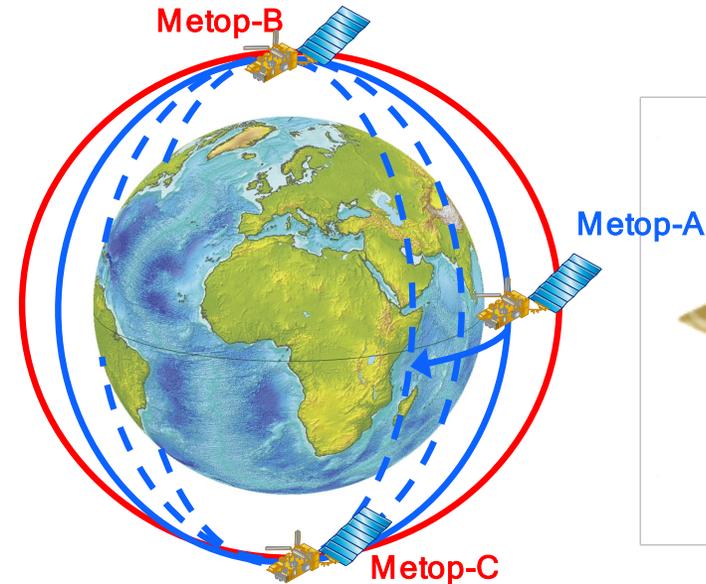
✓ **Dual platforms operations**
AMV_2D and AMV_2T products
The three platforms involved since January 2019
- *Metop-B → Metop-C* (M01/M03)
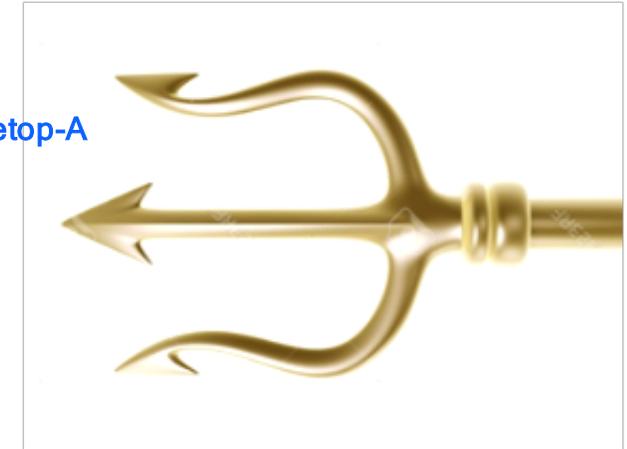- *Metop-C → Metop-A* (M03/M02)
- *Metop-A → Metop-B* (M02/M01)

✓ **Metop-A drifts on its orbit…**
Situation not stable
Impacts the overlap

Overlap estimated at equator (minimum) for a swath of 2800 km			
	Dual platform in multi-satellites operations		
Reference platform	M01 (Metop-B)	M02 (Metop-A)	M03 (Metop-C)
M01 (Metop-B)		50.2%	65.2%
M02 (Metop-A)	49.1%		14.4%
M03 (Metop-C)	34.1%	85.0%	

Operation activities on AMVs since IWW14

➤ Operation activities on MSG

- ✓ Common QI implemented in AMV output file since fall 2019
- ✓ New AMV BUFR sequence (3.10.077) implemented on Feb 03, 2021

➤ Operation activities on EPS

- ✓ Commissioning of Metop-C (from Nov 2018 until July 2019)
- ✓ AMV AVHRR production adapted to 3 Metop satellites configuration (Jan 2019)
- ✓ Regular changes of production rules to adapt AMV production to Metop-A drift.
- ✓ New AMV BUFR sequence (3.10.077) implemented on Feb 03, 2021

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Upcoming operation activities on AMVs

➢ Operation activities on MSG / MTG

   ✓ Commissioning MTG-FCI (2022-23)

   ✓ Meteosat 9 prime over IODC and disposal of Meteosat 8 (2022)

➢ Operation activities on EPS

   ✓ Metop-A de-orbiting operations in November 2021

   ✓ Changes production rules to use only Metop-B and Metop-C for dual operations

      • Pairs B/C and C/B

      • Q2 2021

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MTG-FCI AMVs status

➢ MTG-FCI prototype developed from MSG code
  ✓ Comparison of performances against MSG AMVs
  ✓ Scientific validation against GeoKompsat AMVs
  Oh, S.M., R. Borde, M. Carranza, I.C. Shin, 'Development and Intercomparison Study of Atmospheric Motion Vector Retrieval Algorithm for GEO-KOMPSAT-2A', Remote Sens. **2019**, *11*(17), 2054.
  ✓ Participation to 3rd Intercomparison study
  Santek, D. et al., 2019, 2018 Atmospheric Motion Vector (AMV) Intercomparison Study', Remote Sens. 2019, 11(19), 2240
  ✓ Verification against reference code (L2PF activities, started 2019).

➢ Upcoming work
  ✓ Verification against reference code (L2PF activities, 2021-22)
  ✓ Commissioning MTG-FCI (2022-23)
  ✓ Participation to 4th Intercomparison study

See M. Carranza presentation in Session 2:
Current Status of the EUMETSAT MTG-FCI AMV Prototype

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Sentinel-3 AMV - Status

Approach based on EUMETSAT AMV for geostationary (MSG SEVIRI) and LEO (Metop AVHRR) constellation.

Using Sentinel-3/SLSTR TIR (10.8 um) Nadir view Dual satellites operation (A+B).

Sentinel-3 AMV estimation based on normalized cross-correlation technique on a equal-area grid minimizing distortion and scale effects

Mid-/High-latitude bands (polewards of 40 deg) to be covered (including the 60-70 deg. N!).

Prototype code is finished and documentation is up-to-date (ATBD and Validation report).
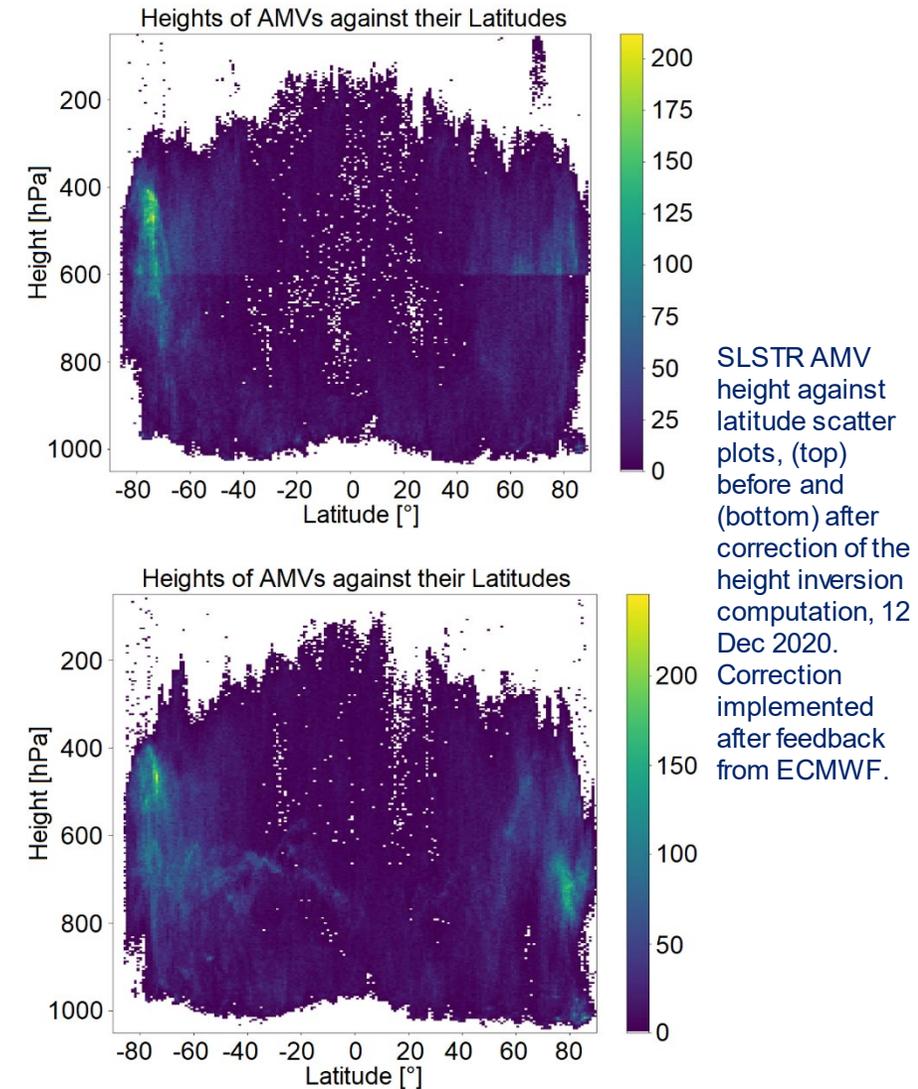
See K. Barbieux presentation in Session 2:
Derivation of Atmospheric Motion Vectors from Projected Low Earth Orbit Images

AMV extracted from SLSTR images taken over Northern Alaska on 14/08/2019 at 08:00:43 UTC (S3B - red contour) and from 06:56:15 to 07:05:15 UTC (S3A - purple contour). K. Barbieux and R. Borde (EUM)
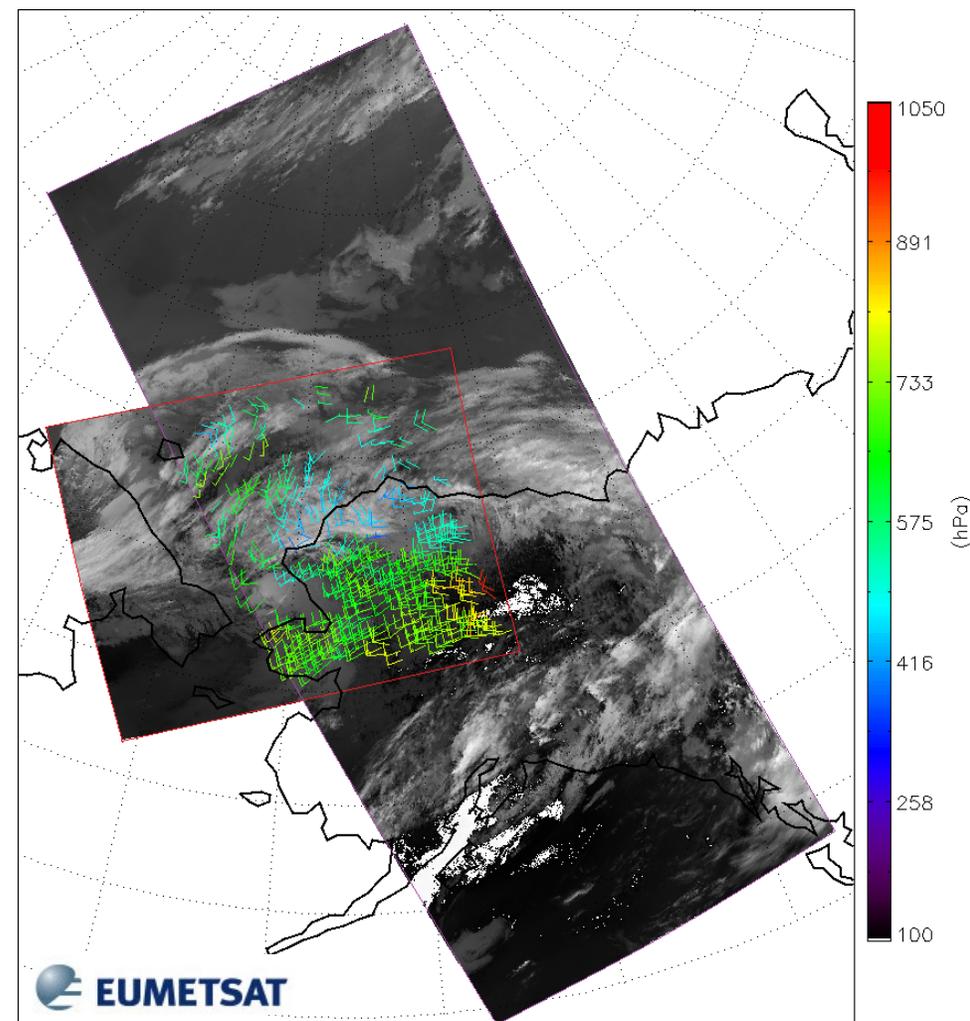
Sentinel-3 AMV - Status

➢ A demonstration period of one month (June-July 2020) has been disseminated to users

  ✓ Positive feedback was received from ECMWF

  ✓ Small corrections applied in the algorithms after user feedback

  ✓ Similar performance to AVHRR AMVs

➢ Operational implementation is ongoing

  ✓ Important technical challenges to solve (S3A and S3B not on the same GS)

  ✓ The target for operational production is now 2022 (TBC)

  ✓ Products are routinely derived offline and can be made available to users for monitoring and testing

SLSTR AMV height against latitude scatter plots, (top) before and (bottom) after correction of the height inversion computation, 12 Dec 2020. Correction implemented after feedback from ECMWF.

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EPS-SG METImage AMV - Status

Same framework than S3/SLSTR AMVs
See K. Barbieux presentation in Session 2:
Derivation of Atmospheric Motion Vectors from Projected Low Earth Orbit Images

Prototype code is developed. It includes AMV extraction from 5 channels: Vis0.8, IR3.7, WV6.73, WV 7.3 and IR10.7

Dataset V1 distributed in Sept 2019

Feedback on dataset V1 received from CIMSS (D. Santek)
Comparison with MODIS winds shows good agreement.

➢ Future Work:
✓ Verification against reference code from industry (PDAP activities, 2021-23)
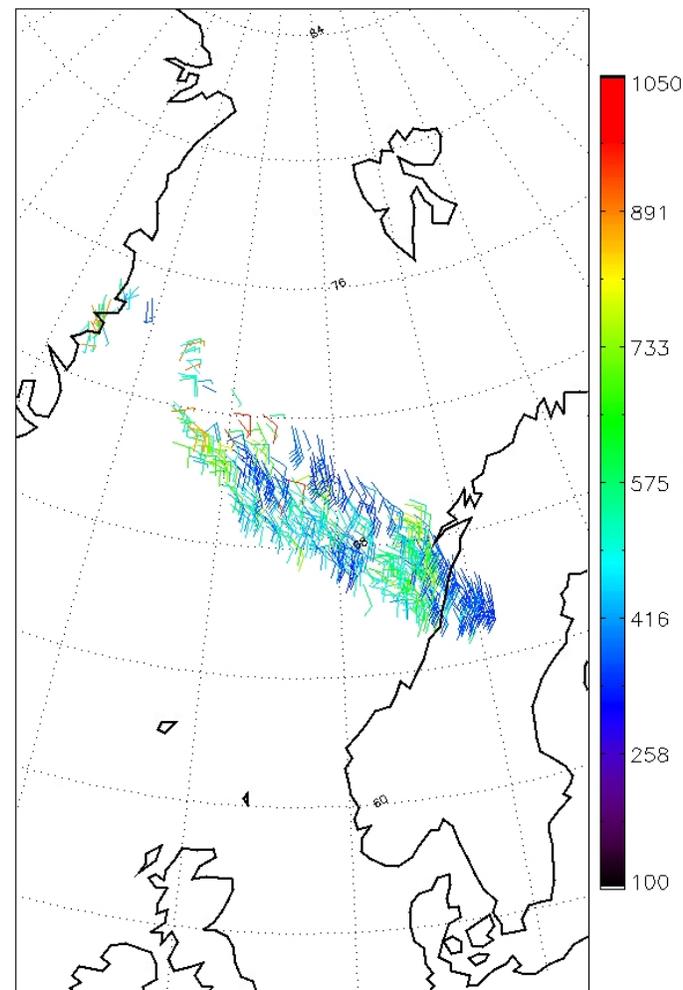✓ Scientific validation of the products.

Figure: AMVs derived from simulated METImage band 37 (10.69 µm) images, West of Norway. Altitudes in hPa.

IASI 3D winds – Status

➢ A demonstration period provided to users end 2018
- ✓ Encouraging feedbacks received from MET Office and DWD
- ✓ Several corrections/modifications applied after user feedbacks.
- ✓ Spatial binning strategy implemented to reduce number of profiles, reduce the variance and limit problem of spatial correlation.

➢ Operational implementation is ongoing
- ✓ Off line production planned in April 2021
- ✓ Specific BUFR template designed with CIMSS (D. Santek)
- ✓ The target for operational implementation on EPS GS is Q3 2021

➢ Future work
- ✓ Scientific validation, Q2-Q4 2021.
- ✓ Preparation for MTG-IRS

See O. Hautecoeur presentation in Session 5:
Extraction of 3D Wind Profiles from Hyperspectral IASI Level 2 Products

NH_20170321004609Z_M02_54062

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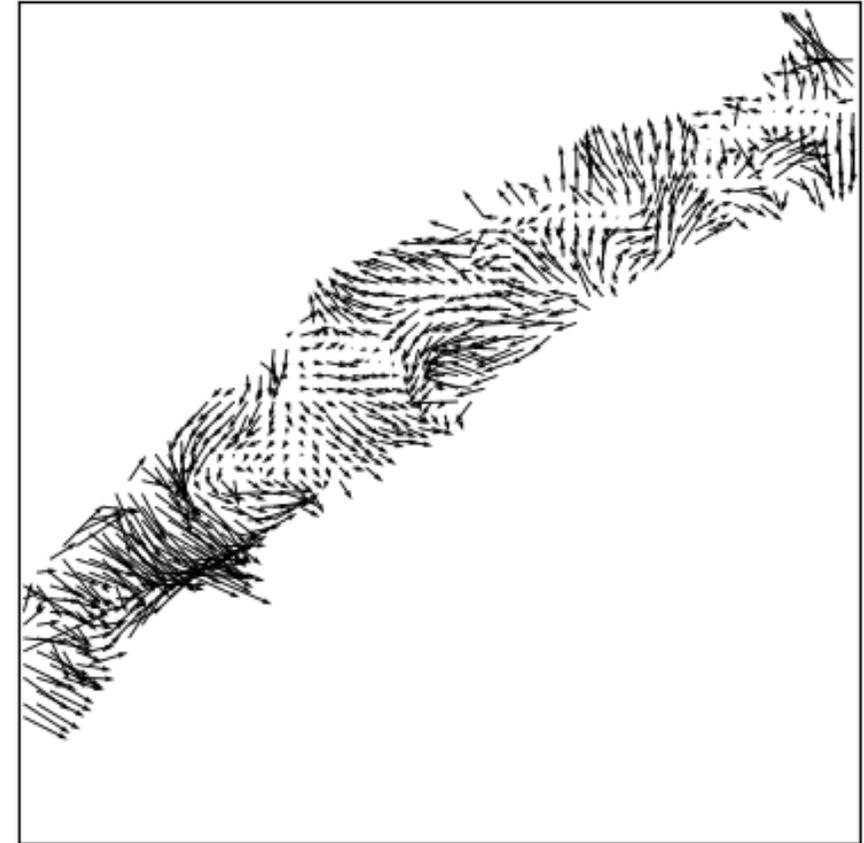
Aeolus follow on – DWL - Status

➤ Assumptions and bases, Phase 0 (Sept 2020 - March 2021)
- ✓ The mission shall be "affordable", Reuse of existing assets shall be priority
- ✓ Mission duration: 10+ years, 2 satellites, Launch of first satellite: Q4 2029
- ✓ Observational requirements defined by Aeolus SAG
- ✓ Mission Definition Key Point on architectural design activities successfully completed 10/03/2020.

➤ Upcoming activities
- ✓ ESA / EUM requirements consolidation planned to start April 2021
- ✓ Draft EURD, Presentation to September 2021 SWG, to October 2021 STG

➤ Main drivers
- ✓ Workshop with ESA, EUMETSAT and EUMETSAT member states – Mid/End 2022
- ✓ ESA programme approval planned @ Cmin 2022

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Study on AMV speed bias over Tropics

See J. Staufer poster in Session 2:
Study of AMV Speed Biases in Tropics

➢ External study done by Thales Services, 2018-20
  ✓ Final report online:
  https://www-cdn.eumetsat.int/files/2020-11/AMV-TN-0008-TS_Final_report.pdf

➢ 1st part investigated speed bias over tropics
  ✓ Global and local statistics using 1 year of data
  ✓ Bias studied vs tropical convection, cloudiness, diurnal cycle surface temperature, position of tropical Jet in model.
  ✓ AMV altitude compared to A-Train (Cloudsat and CALIPSO)

➢ 2nd part investigated comparisons AMVs against Aeolus HLOS winds
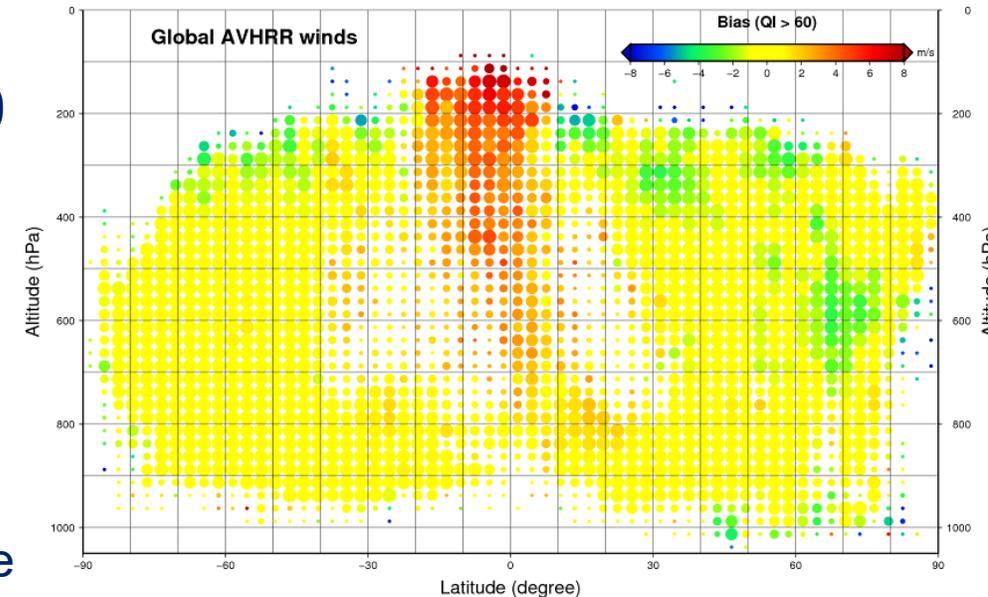
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AMV reprocessing activities

➢ Important part of AMV activities at EUMETSAT

  ✓ Production of CDRs for MFG/MSG and AVHRR winds

  ✓ Important for climatology studies and reanalysis

See M. Doutriaux Boucher in Session 6:
Climate Data Record of Atmospheric Motion Vectors at EUMETSAT: Status and Perspective

See A. Lattanzio in Session 6:
Analysis of the Polar Jet with the EUMETSAT Geostationary Atmospheric Motion Vectors Climate Data Record

See R. Huckle in Session 6:
Climate Data Record AMVs from LEO-Satellites

See O. Sus in Session 2:
AMV Database: Presentation of a SQL Tool for Quick and Efficient Analysis of the Winds

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