

Status overview of the European scatterometer activities

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Outline

- MetOp/EPS status
- MetOp/EPS-Second Generation status
- 2016 scatterometer conference

- Other European ocean programme news



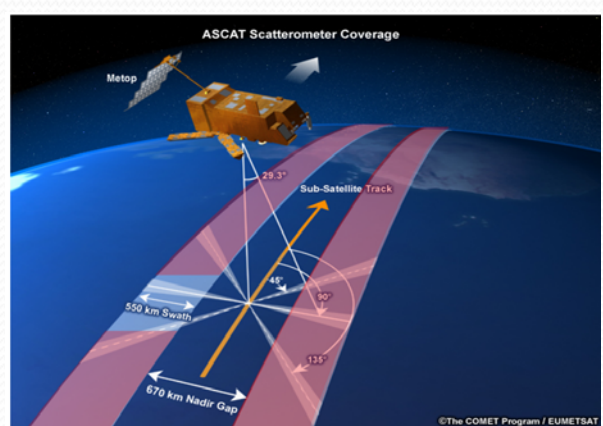
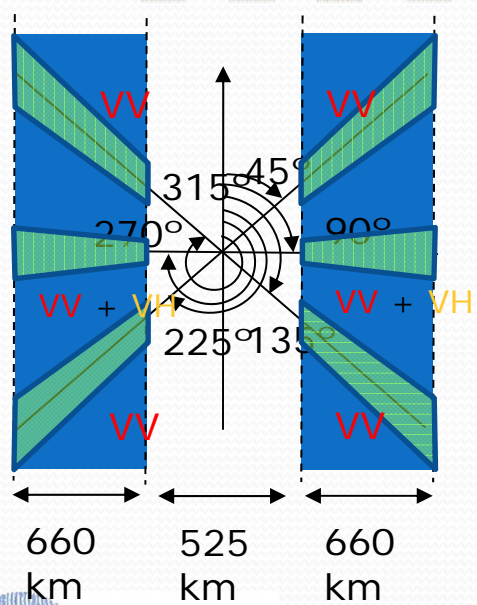
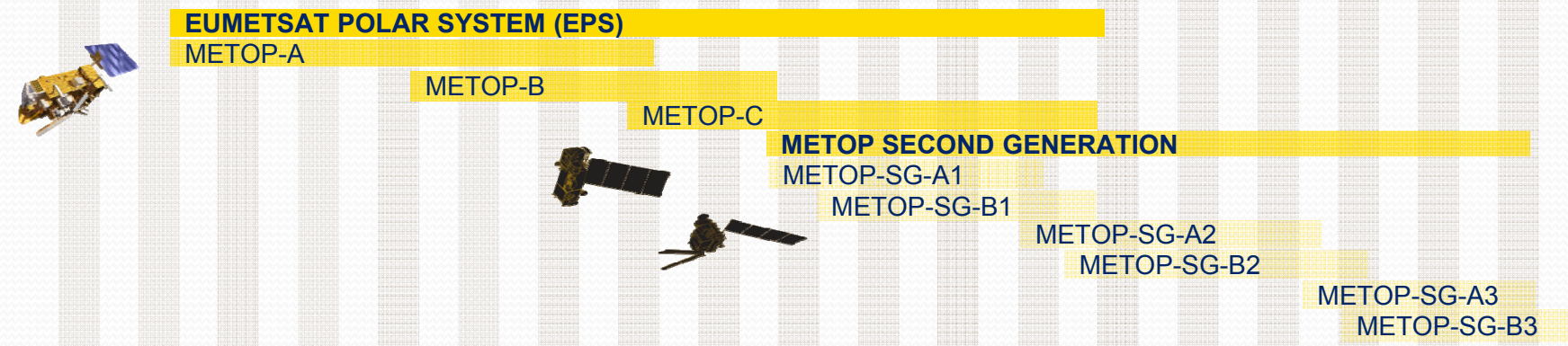
International Ocean Vector Winds Science Team
May 17-19 2016 in Sapporo, Japan





Outlook of European scatterometers

YEAR... 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40



C-band scatterometer SCA has heritage from ASCAT on MetOp (frequency band, geometry) with

- ✓ slightly improved coverage
- ✓ Improved resolution (two times ASCAT's)
- ✓ Additional information (HV measurement, less on-board processing)



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MetOp/EPS Schedule and news

- Since last year:
 - ASCAT instruments showing good performance
 - Sept/Oct 2014: Small ASCAT-A calibration changes observed (under 0.1 dB), no other major changes observed (*)
 - 2015: External calibration campaigns for ASCAT-A/B
 - ASCAT Level 1 processor, April 2016: added performance and functionality
 - ASCAT Level 2 winds processor, March 2016: Adjustment introduced to compensate for 2014 calibration changes
 - Feb 2016: Alternative re-sampling of ASCAT NRCS data assessed over land (soil moisture) and sea ice (edge and type), namely using circular Top-Hat window
- Outlook:
 - ASCAT Level 1 processor: add new features:
 - Spatial Response Function and Land Contribution Ratio calculation to 'slice' product (SZF)
 - Update the re-sampling windows for the 12.5 km product, including coastal processing
 - Preparation for launch and commissioning of MetOp-C, including
 - Ground systems upgrade for operating and processing data from 3 Metop satellites
 - ASCAT-C System In-Orbit Verification and Cal/Val plans
 - New reprocessing of ASCAT-A/B NRCS
 - Release of a long term scatterometer wind CDR, including ASCAT, ERS (OSI SAF)
 - Release of OSCAT wind CDR (OSI SAF)

(*) will be covered by contributions to the IOVWST2016 mtg



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MetOp/EPS SG schedule and news

- Since last year:
 - Sept 2015: SCA instrument Preliminary Design Review was held
 - Jan 2016: Visiting Scientist activity to discuss at EUMETSAT the possibility of extracting ocean surface currents information from SCA
 - Dec 2015: Version 1 of SCA algorithms (*) and format specifications available
 - April 2016: Invitation To Tender for the procurement of the EPS-SG Payload Data Acquisition and Processing (PDAP) facility, including the SCA operational processor and absolute calibration ground transponders
- Outlook:
 - To issue shortly the SCA science plan, to guide in the instrument development, the processing specification and the cal/val preparation
 - Assessing synergies of SCA with Microwave Imager instrument in same platform
 - Study with industry the feasibility on ocean surface current capability for SCA
 - Assessment of impact of ionosphere on SCA cross-pol NRCS
 - By the end of the year: Version 2 of SCA algorithms and format specifications for PDAP kick-off and preliminary cal/val plan

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2016 Scatterometer Conference

2016, February 2-4: “Scatterometer Science Conference – New challenges and opportunities” in ESTEC, Noordwijk, The Netherlands - **Key recommendations:**

- **To further investigate the possibility of an HH mid beam measurement for land, ice and ocean applications**
- **To conduct a feasibility study on the potential of SCA Doppler measurements for estimating ocean surface currents**
- **To support the establishment of a consistent stress and wind climate record**
- **In coordination with agencies responsible for Scatterometer missions, to standarize the definition of scatterometer quality flags and quality information and to coordinate contributions to netCDF CF standards**
- **To investigate metrics for calibrating and monitoring the inter-beam and long term stability of scatterometers (e.g. cone metrics)**
- **Urgent need for and Ocean Sea State Campaign: while it is recognized that such a campaign is out of the scope of EUM/ESA, the agencies are required to provide support**
- **To conduct a quad pol C-band (preferable covering the L- to Ku-band range) profiling radar campaign over land with high vertical resolution, to support the development and evolution of Level 2 algorithms for land applications (e.g. vegetation products)**
- **To further investigate the impact of the ionosphere on the SCA cross-pol channel and the expected performance of correction algorithms**

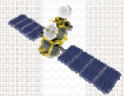


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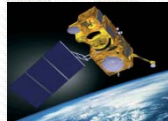


Other ocean missions launched this year

YEAR... 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39



JASON
JASON-2



JASON-3

JASON CONTINUITY OF SERVICE (CS)

COPERNICUS

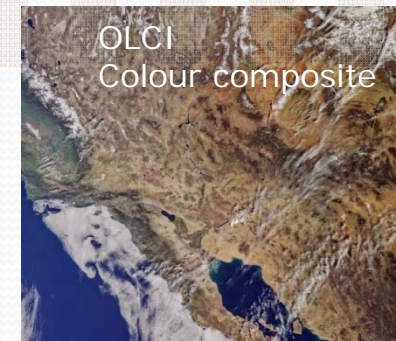
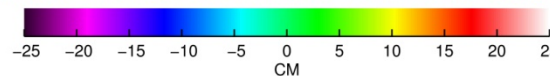
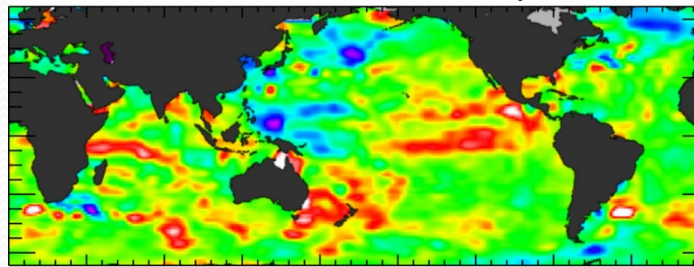
SENTINEL-3



Within international partnerships (CNES, NASA, NOAA)

- **Jason-3:** launched Jan 17th
 - Poseidon-3B altimeter
- **Sentinel-3:** launch Feb 16th
 - Sea and Land Surface Temperature Radiometer (SLSTR)
 - Ocean and Land Colour Instrument (OLCI)
 - SAR Radar Altimeter (SRAL)

Jason-3 Sea Level Anomalies for February 12-22, 2016

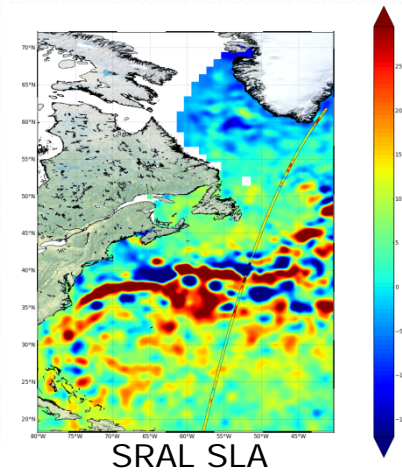


OLCI Colour composite



SLSTR Colour composite

Copernicus data (2016) CMEMS



SRAL SLA

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Thanks



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Overview of Europe Scatterometer missions

- C-band fan-beam scatterometers flying on board MetOp/EPS (3 instruments) and planned for their Second Generation satellites (nominally 3 instruments, to be formally confirmed by EUMETSAT in 2014)
- All in sun-synchronous polar orbit, altitude 832 km, mean local solar time 09:30 (descending node), repeat cycle 29 days.
- ASCAT-A (2006-...) and ASCAT-B (2012-...) on MetOp/EPS in dual operations. ASCAT-C planned for launch in October 2018
- MetOp/EPS-SG consists of two series of satellites: “SAT-A” and “SAT-B” and target 21 years of operations. The scatterometer instruments SCA are in SAT-B, the first one planned for launch in 2023

SCA specifications

- Scatterometer specifications: ASCAT versus SCA

| Parameter | ASCAT | SCA |
|------------------------|---|---|
| Frequency | 5.3 GHz | |
| Polarisation | VV for all beams | VV for all beams + VH for Mid-beams |
| Azimuth views | 45°, 90° and 135° w.r.t. satellite track | |
| Min. incidence | 25° | 20° [G] |
| Horizontal resolution | Nom: (50 km) ² High res.: (25 - 35 km) ² | Nom: (25 km) ² [G] High res.: (17 - 22 km) ² |
| Horizontal sampling | Nom: (25 km) ² High res.: (12.5 km) ² | Nom: (12.5 km) ² [G] High res.: (6.25 km) ² |
| Radiometric resolution | $\leq 3 \%$ for $\theta_i \leq 25^\circ$ at 4 m/s cross-wind (VV) $\leq (0.175 \times \theta_i - 1.375) \%$ for $\theta_i > 25^\circ$ at 4 m/s cross-wind (VV) | |
| Coverage | 97 % in 48 hrs. | 99 % in 48 hrs. [G] |

Sentinel-3 products and applications

