



The Microwave Sub Group highlights and the Microwave Standards Task

Xiaolong DONG

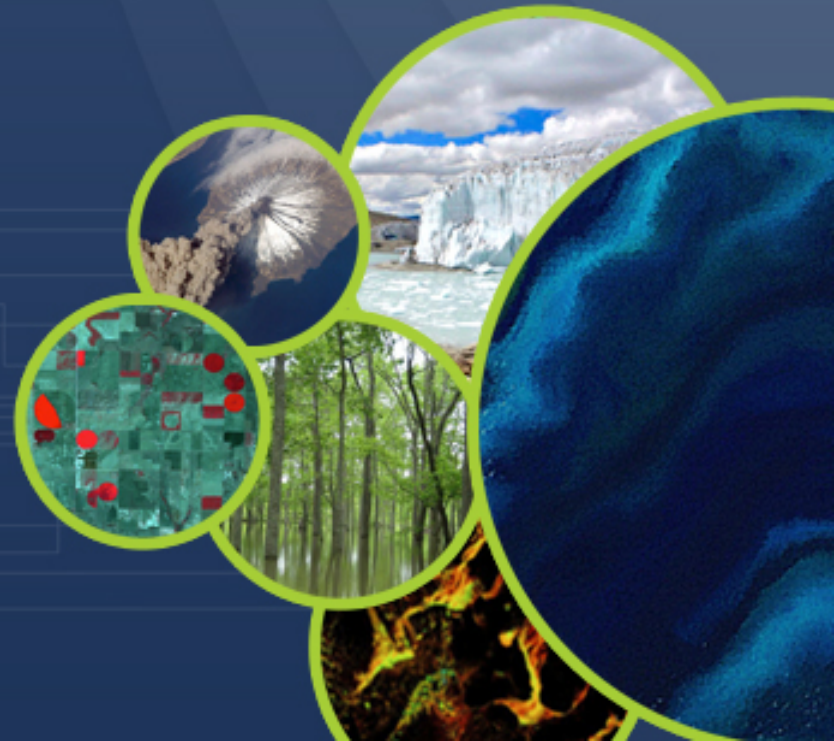
NSSC, CAS

WGCV 47th Plenary

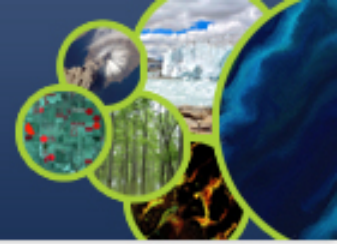
Virtual meeting

July 14-17, 2020

Working Group on Calibration and Validation

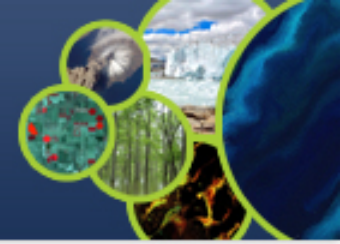


- Missions:
 - The mission of the Microwave Sensors subgroup is to foster high quality calibration and validation of microwave sensors for remote sensing purposes. These include both active and passive types, airborne and spaceborne sensors.
- Objectives
 - Facilitate international cooperation and co-ordination in microwave sensor calibration / validation activities by sharing information on sensor development and field campaigns.
 - Promote accurate calibration and validation of microwave sensors, through standardization of terminology and measurement practices.
 - Provide a forum for discussion of current issues and for exchange of technical information on evolving technologies related to microwave sensor calibration / validation.
 - Provide calibration/validation support to CEOS virtual constellations and data application groups/communities by coordination of reference sites for both passive and active microwave sensors, and standardization of quality assurance of microwave remote sensing data.



All EO sensors operated in microwave spectrum, except SAR

- **Works currently focuses on: MWR, SCAT, ALT**
 - Microwave Radiometers (sounders, imagers) (MWR)
 - Radar Scatterometers (surface and volume) (SCAT)
 - Radar Altimeters (ALT)
 - **GNSS-RO and reflectrometry**
- With current emphasis on
 - **Radar Scatterometers (Ocean and land surface)**
 - **Microwave Radiometers (Passive Microwave)**



- Objectives
 - Support CDR from microwave;
 - Support CEOS VCs;
 - Benefit member agencies and communities;
- Priorities and focuses

SCAT Level 1 data calibration

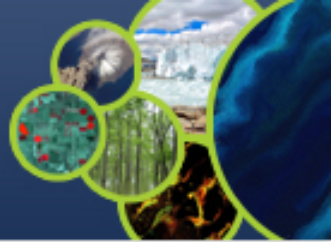
- Backscattering coefficient for radar scatterometer

MWR calibration standards

- MWR Onboard calibrator (noise source, RAM blackbody)
- Prelaunch measurement and characterization

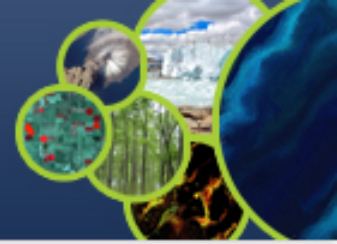
Models and algorithms supporting CDR

Recent Progresses of CV-20-05: Standards and Metrics for Scatterometers and Wind Retrievals



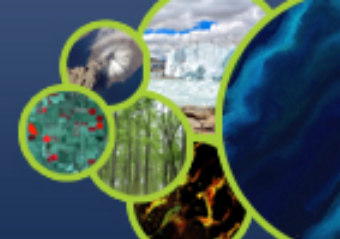
- Created in 2020
- Target completion: 2021 Q4
- Progresses
 - 2019.7 propose WP on WGCV-45
 - 2020.4.21 teleconference to confirm the task
 - 2020.5.6 confirmation of leading members
 - 2020.5.11 WGCV-46 preliminary work plan
 - 2020.6.16 1st project meeting



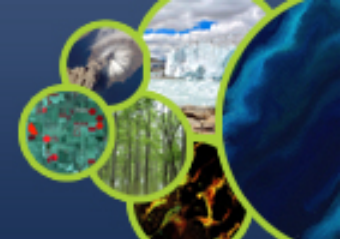


- Date: June-16-2020
- Venue: Webex remote access
- Participants: 9 remotely
- Presenting Organizations: EUMETSAT, KNMI, ICM-CSIC, ISRO, NMSC/CMA, NSOAS, NUIST, NSSC/CAS, NOAA/NESDIS & CEOS OSVW VC
- Missions related: METOP, SCATSAT, HY-2, CFOSAT(all current and future scatterometer missions)





No.	Name	Organization	Country
1	Dong, Xiaolong	National Space Science Center (NSSC), CAS	China
2	Chang, Paul	NOAA/NESDIS	USA
3	Kumar, Raj	Indian Space Research Organisation (ISRO)	India
4	Lin, Wenming	Nanjing University of Information Science and Technology	China
5	Linow, Stefanie	EUMETSAT	Germany
6	Portabella, Marcos	Institut de Ciències del Mar (ICM-CSIC)	Spain
7	Stoffellen, Ad	Koninklijk Nederlands Meteorologisch Instituut (KNMI)	The Netherlands
8	Zou, Juhong	National Satellite Oceanic Application Service (NSOAS)	China
9	Xu, Xingou	National Space Science Center (NSSC), CAS (Focus group secretary)	China



KNMI:

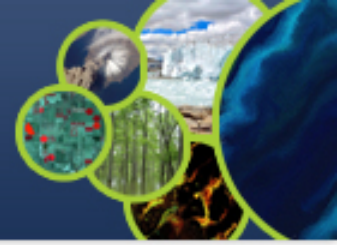
No.	Name	Membership /Leadership
1	Ad Stoffelen	Team leader
2	Anton Verhoef	Team member
3	Jur Vogelzang	Team member
4	Jeroen Verspeek	Team member
5	Rianne Giesen	Team member
6	Zhen Li	Team member
7	Mario Echeverri Bautista	Team member

ICM-CSIC:

No.	Name	Membership /Leadership
1	Marcos Portabella	Team leader
2	Giuseppe Grieco	Team member
3	Federico Cossu	Team member
4	Ana Trindade	Team member

NUIST:

No.	Name	Membership /Leadership
1	Wenming Lin	Team leader
2	Zhixiong Wang	Team member
3	Xiaokang Zhao	Team member



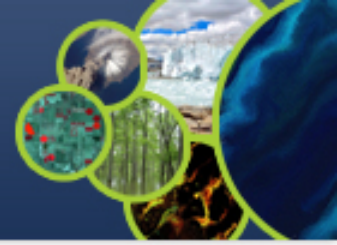
NSOAS:

No.	Name	Membership /Leadership
1	Juhong Zou	Team leader
2	Bo Mu	Team member
3	Shuyan Lang	Team member
4	Yi Zhang	Team member

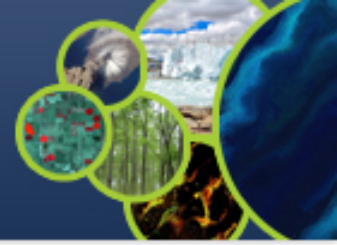
NSSC:

No.	Name	Membership /Leadership
1	Xiaolong Dong	Team leader
2	Di Zhu	Team member
3	Risheng Yun	Team member
4	Xingou Xu	Team member
5	Jianying Ma	Team member

NOAA, EUMETSAT &
ISRO:
Team leader
confirmed.
Other member to be
provided

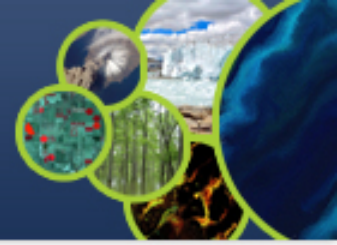


- Specific work plan of standards and metrics for scatterometers and wind retrievals, including tasks, implementing agencies and a task schedules. Activities and expected outcomes have also been confirmed.
- The updated workplan (version 1.3) will be confirmed in the Task meeting scheduled in August, 2020
- To develop the standard and metrics of spaceborne radar scatterometer backscattering measurement calibration, wind retrieval approaches, wind data validation and assessment for ocean surface vector winds.
- The main scope of the standard and metrics cover:
 - Calibration, including cross-calibration of L1 and L2 data;
 - Validation of scatterometer wind data;
 - Quality indices of L1 and L2 data.



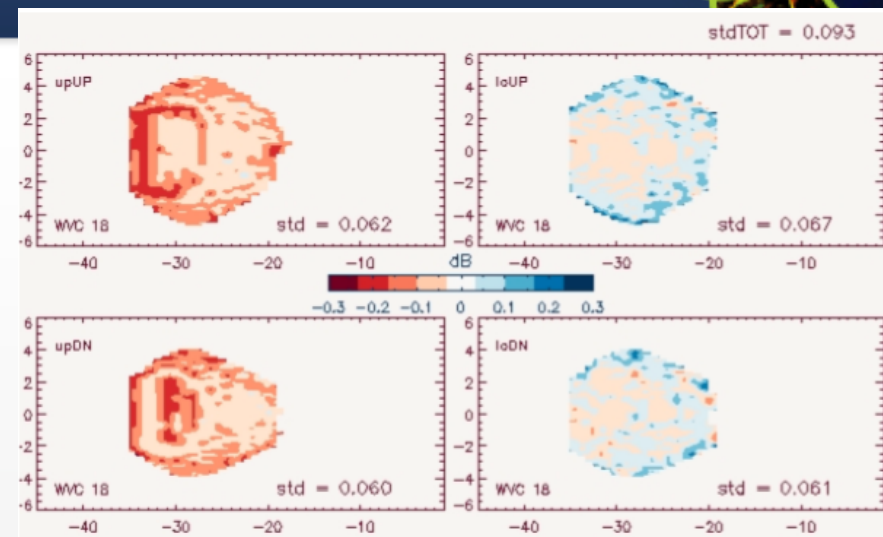
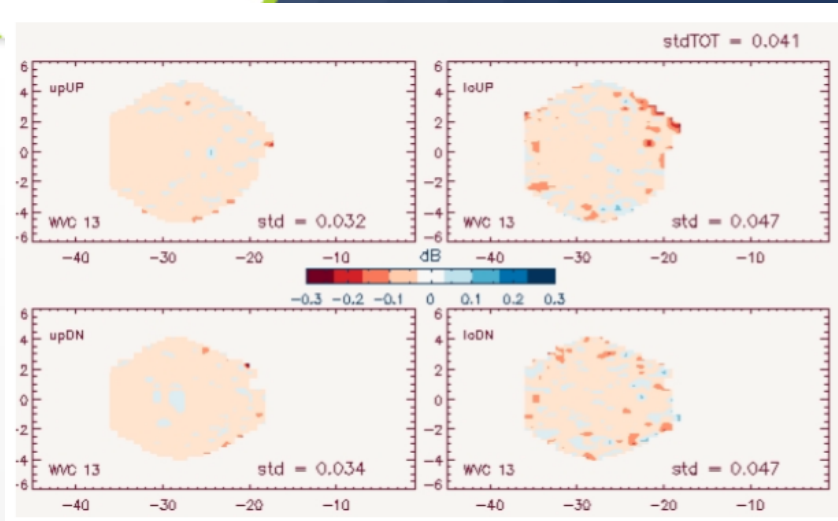
- **The CEOS guidelines/international standards for calibration;**
- **Retrieval data validation guidelines;**
- **Best practices of calibration and validation data sharing and collaborations.**



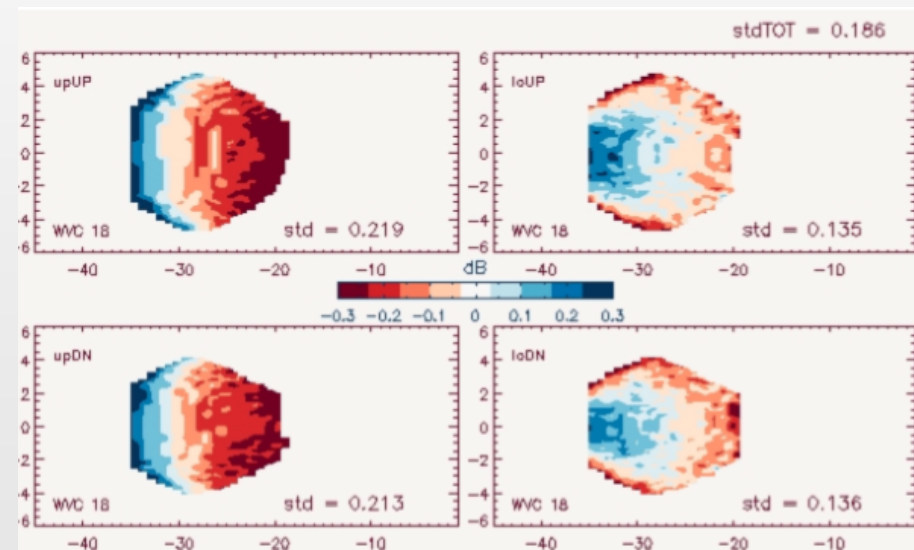


Development and validation of algorithms and methods for calibration of Sigma 0 using different reference or metrics

- Documentation of the calibration process and the data properties;
- Evaluation and assessment.
 - 1) active calibrator (EUMETSAT)
 - calibration requirements, methodology and procedure;
 - 2) global ocean data methodology and procedure, quality control
 - Cone metrics: fixed fan-beam and rotating beam (KNMI)
 - NWP (KNMI, NUIST)
 - 3) natural terrestrial targets (ISRO, NOAA, NUIST, NSOAS, KNMI)
 - methodology and procedure;
 - C and Ku band standard data and standard variation curves;
 - Data quality control;

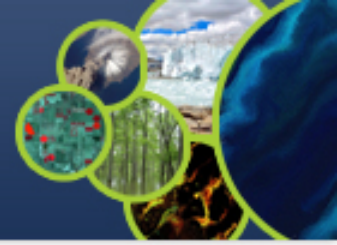


Cone branch residuals between the ASCAT 2009 and ASCAT 2013 datasets (ASCAT WVC 13, right side) after linear shift correction. In the upper right corner, the RMS of the cone shape fit (KNMI)

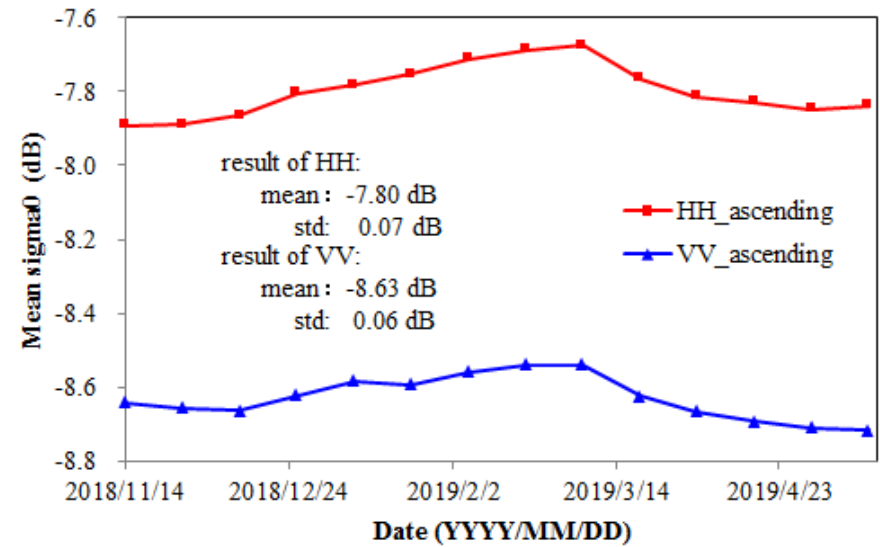
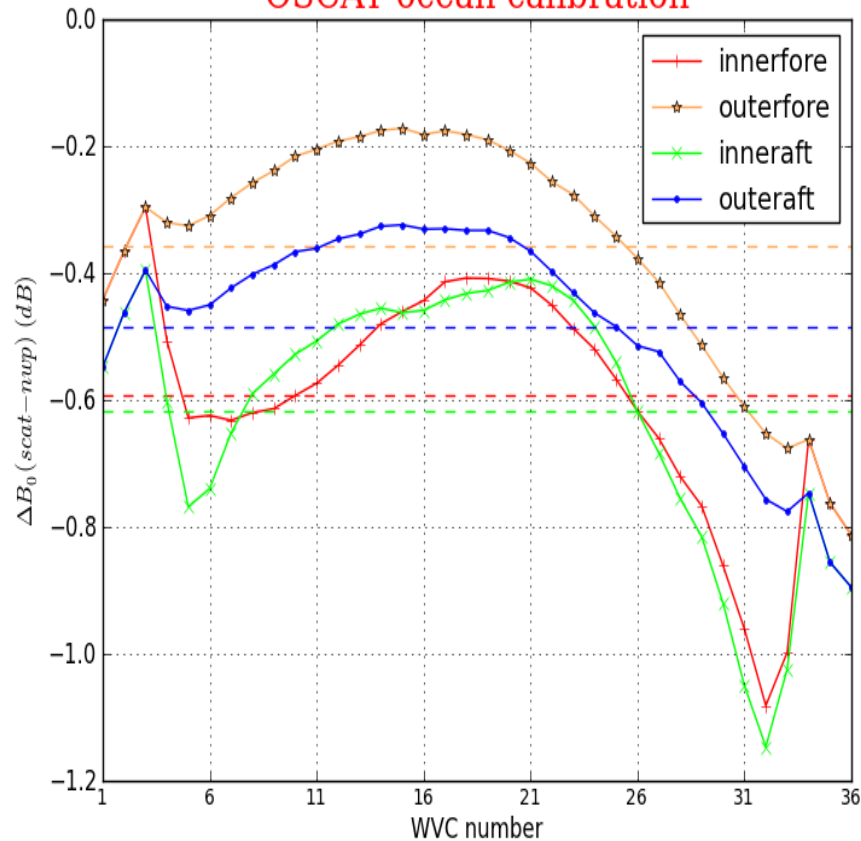


Right Top: cone branch residuals between the ERS-1 1995 and ASCAT 2013 datasets (ERS WVC 18) (KNMI)

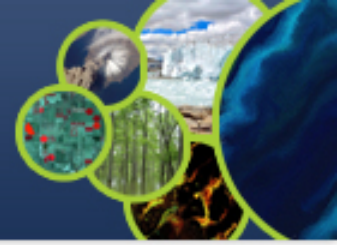
Right Bottom: Cone branch residuals between the ERS-2 1997 and ASCAT 2013 datasets (ERS WVC 18) (KNMI)



OSCAT ocean calibration



The seasonal variation of the sigma0 measured by HSCAT-B in selected validation zone in Amazon rainforest for the validation period (NSOAS)



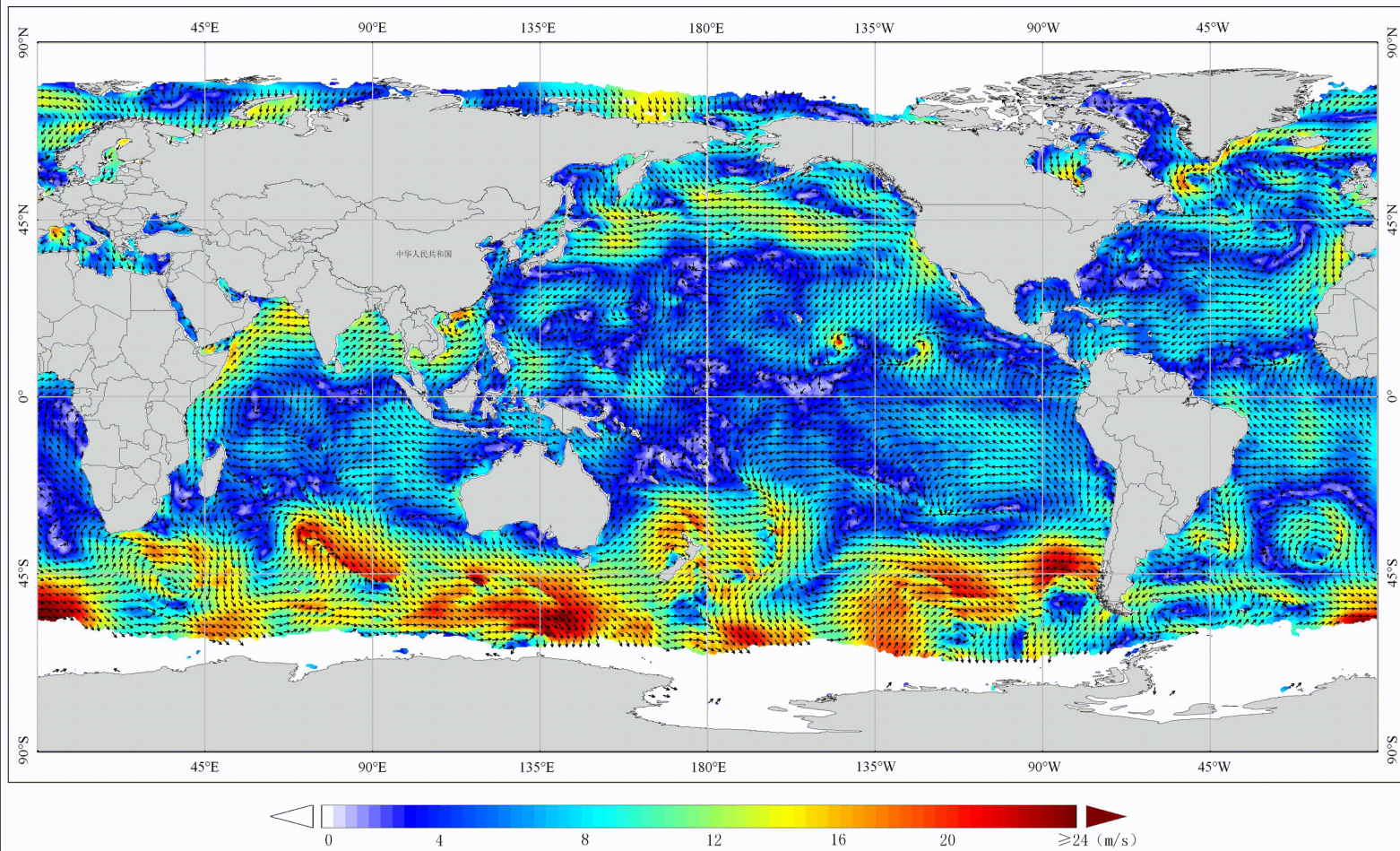
Standardization/best practices of retrieval approaches of ocean surface winds (L2b data) by radar scatterometer data and guidelines to users

(Contributing agencies: KNMI, NSOAS, ISRO, ICM, NOAA)

- GMF;
- Auxiliary data;
- Retrieval and direction ambiguity-removal algorithms;
- Quality control

海面风场全球分布专题图

数据时间: 20190731T00:00:00 UTC



制图单位: 国家卫星海洋应用中心

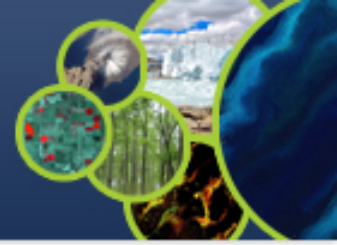
制图时间: 2019年08月01日

坐标系: CGCS2000

比例尺: 1:100,000,000

数据类型: 多源融合

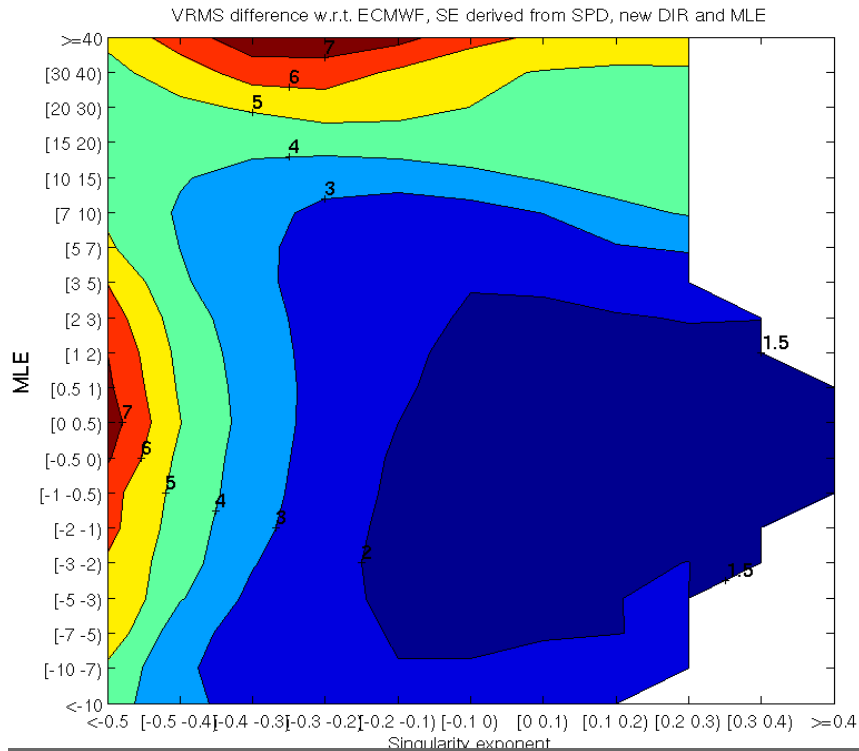
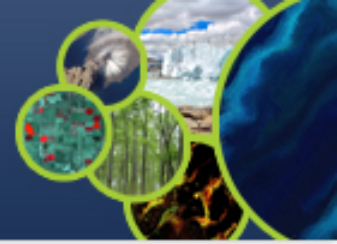
要素名称: 海面风场



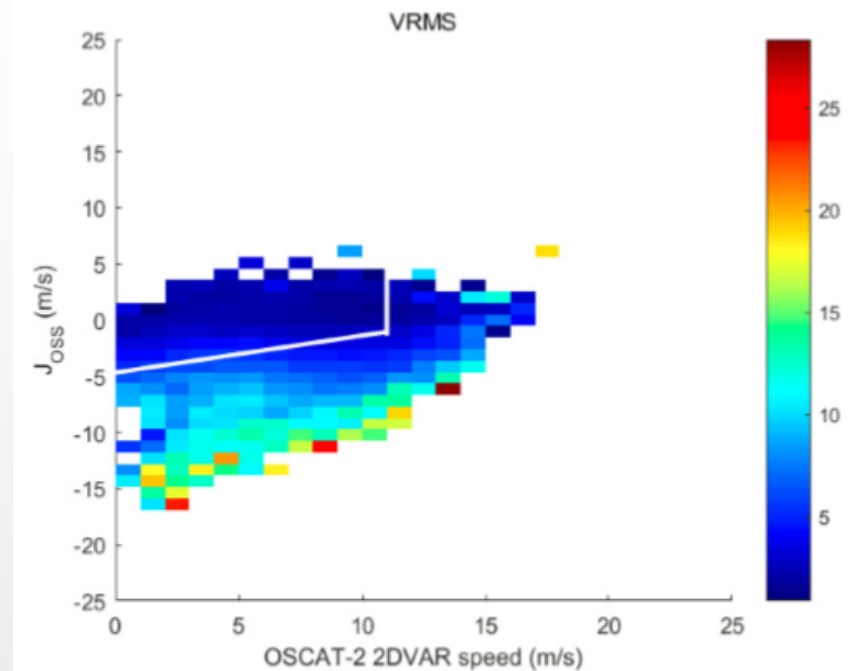
Development of guidelines/standards of validation of ocean surface winds (L2b data) by radar scatterometer data

(Contributing Agencies: NOAA, ICM, KNMI, ISRO)

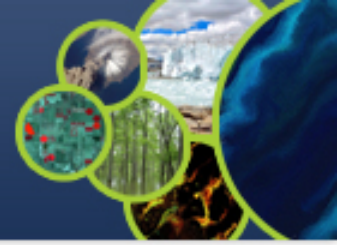
- Reference, auxiliary data and data quality control;
- Methodology and procedure;
- Evaluation criteria;
- Evaluation and error assessment.



The mean VRMS difference w.r.t. ECMWF as a function of the QC indicator singularity exponents and the QC indicator MLE. (NUIST, ICM)

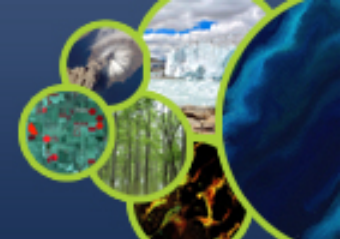


Data sorted by 2-DVAR speed of (a) OSCAT-2 and the QC indicator Joss versus rain rates, (b) VRMS to ASCAT-B (KNMI, NSSC)

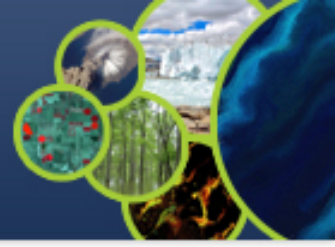


- Identifying and organizing collocation data, including both satellite data and in-situ measurements, for calibration and validation for ocean surface vector wind, which aims at the portal for calibration and validation of spaceborne scatterometer measurements for ocean surface vector winds. (to be discussed with GSICS-MW)
- Demonstration of applications and establishment of portal.





Activity	Milestone	Target Date
Organize the team	Contribution/team member commitment; Consolidate objective and tasks; Task assignment.	June 16, 2020
Progress discussion	Preparation of implementation: Including data collection, Campaign preparation	August, 2020 (tbc)
Draft outline	Propose invited session of IGARSS 2021	September 30, 2020
Progress discussion	Midterm discussion	January 15, 2021
Discussion of draft	IOVWST 2021	May-June, 2021
Discussion of draft	IGARSS 2021	July 31, 2021
Review of campaign and applications		November, 2021
Demonstration of applications and deliverable release	For examples, see, e.g., www.wmo-sat.info/oscar/applicationareas	December 31, 2021
Finalize the document		December 31, 2021



- Task team meeting: August, 2020
- Special sessions at IGARSS 2021 & IOVWST Meeting 2021

