



Joint JAXA-ESA Session on the Mutual Cooperation using Synthetic Aperture Radar Satellites in Earth Science and Applications

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→ THE EUROPEAN SPACE AGENCY

“The Mutual Cooperation using Synthetic Aperture Radar Satellites in Earth Science and Applications”

Objectives

- Mutual cooperation in satellite based environmental monitoring and disaster monitoring science
- Joint Research between ESA and JAXA on using C- and L-band SAR data
- Data are regularly acquired over 23 sites for 10 applications

3 main elements of cooperation include

- Focused systematic ALOS-2 observation activities coordinated with Sentinel-1 (limited areas) and data analyses through PIs
- Use of ALOS-2 archive within EO application projects e.g. ESA wetlands project
- Explore direct reception framework future of ALOS-4 in Europe



- Data acquisitions going well; ALOS-2 and Sentinel-1 providing excellent coverage of all agreed areas
- 2482 ALOS-2 scenes currently available on ESA server, more have been acquired (as April 5, 2022)
- Over 23 sites and 10 applications
- Back-to-back Sentinel-1 and ALOS-2 **observations Belgica Bank for Ship Cruise from 26 April until 8 May, 2022**, Continuous Sentinel-1 and ALOS-2 observations of international Arctic MOSAiC campaign site near Polarstern icebreaker and also **Sea Ice** comparison / integration study
- **Ship detection** – excellent observation database near Bornholm, Denmark incl. popcorn experiment
- **Hurricanes/Typhoon** – recent release of Typhoon datasets near Japanese coast to study added information content and L- and C-band synergies
- **Soil moisture** – correlative field (ground based and airborne) data collected in 2019 and 2020 in Selhausen, DE
- **Snow Water Equivalent** – correlative field data on snow conditions collected during winter 2019-2020 to support analyses of L- and C-band datasets
- Volcano monitoring – Mayotte volcano routine monitoring by L- and C-band datasets
- Forest monitoring – Biomass estimation as a part of CEOS/GEO activity to develop integrate biomass product development
- Paddy monitoring in Vietnam
- Optimised **Ionospheric observation scenario** elaborated
- Multilateral cooperation with NASA, CSA and VNSC

JAXA-ESA ALOS-2 cooperation observation



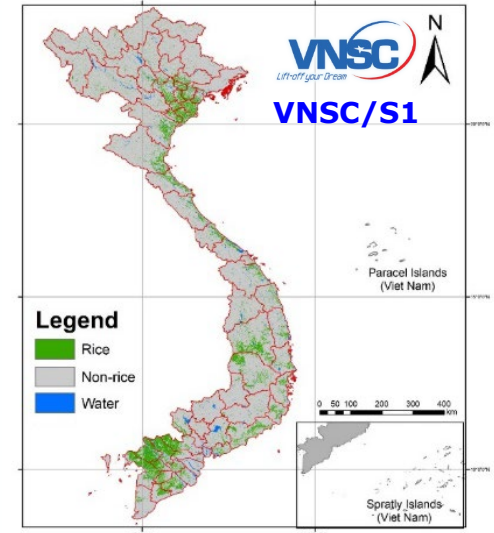
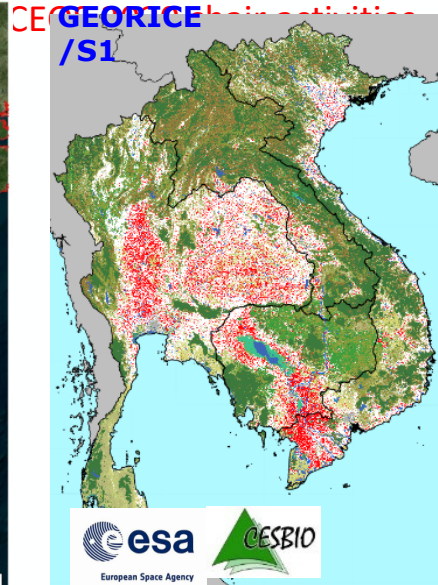
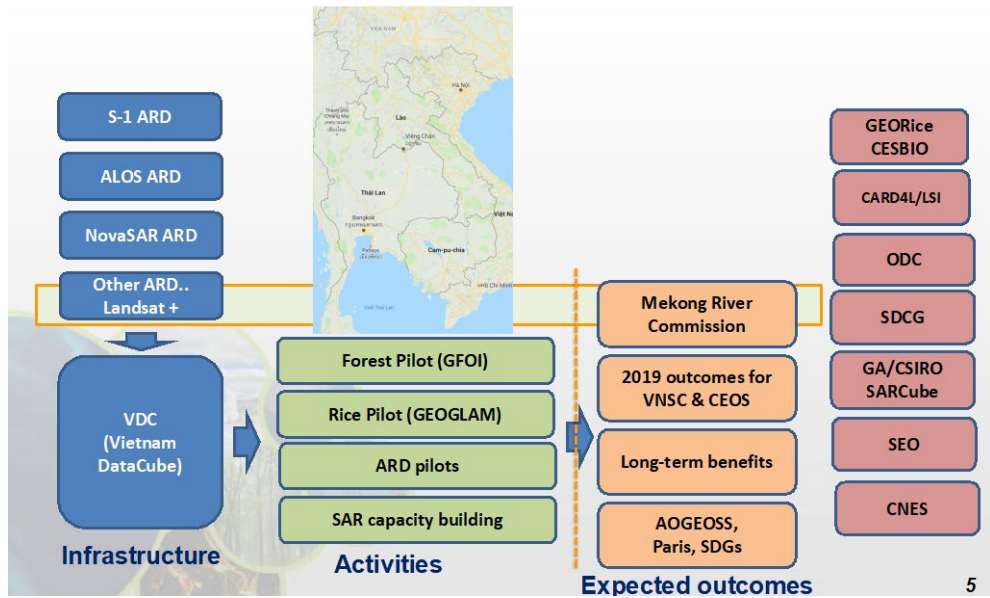
Application	Location
Ship detection	Bornholm
Snow Water Equivalent	Upper Engadin(Swiss Alps)
	Sodankyla(Finland)
	Upper Engadin(Swiss Alps)
Soil moisture	Selhausen(Germany)
	Tavoliere(Southern Italy)
	Tibetan plateau
	SPAIN
Agriculture and GHG	SE Asia (Mekong delta)
Sea Ice /Polar	Arctic Ocean (MOSAIC)
	Baffin Bay West
	Belgica Bank
	Greenland Kap Farvel
	Labrador Sea
	Perennial
Permafrost	Norway
	Yukatan lake
Iono and validation	Alaska
	Brazil
	California
	Canada(Churchill)
	Hawaii
	New Zealand
	North Europe(Kiruna)
	North Europe(Longyearbyen)
North Europe(Tromso)	
Volucano	Pitons Management Area
	Saar Area
	Etna
	Mayotte
Hurricane/Cyclone/Typhoon	
Urban and natural forests	Vienna
	Košice
Forest and Wetland and Inundation Mapping	West Tanzania (Mtendeli Refugee camp)
	Bangladesh (Kutupalong Rohingya)
Flooding and wetland inundation	State of Louisiana

JAXA-ESA for Agriculture (Paddy Field monitoring with VSNC - CEOS 2019 VNSC chair initiative)



CEOS Proposed Initiative Summary

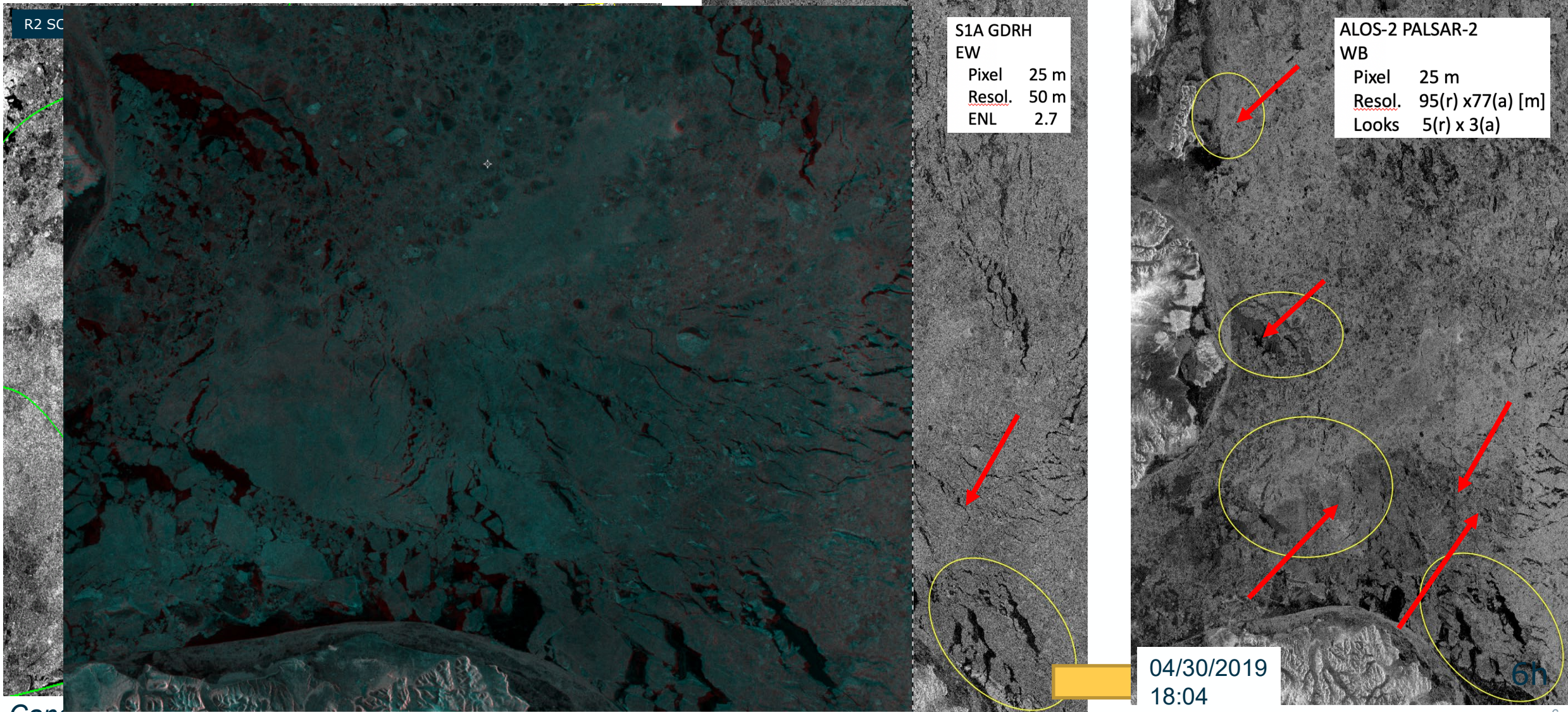
Cross comparison among rice crop growth map of Mekong region by VNSC, JAXA and GEORICE by ALOS-2 and S1 in cooperation with respecting countries (space agencies and ministries of agriculture) under APRSAF SAFE and other regional framework



1. Rice crop maps (crop season product) of the Mekong area (Cambodia, Laos, Thailand, Vietnam) linked with ESA GEORice, JAXA and GEO GEOGLAM Asia Rice team
2. Rice Phenology / Growth Stage (monthly product) of the Mekong Delta and Red River Delta, Vietnam.
3. Rice Crop Production / Yield Estimation (crop season product) of provinces in the Mekong Delta and Red River Delta, Vietnam.
4. Continued development of GEOGLAM National Crop Monitor with NASA Harvest.

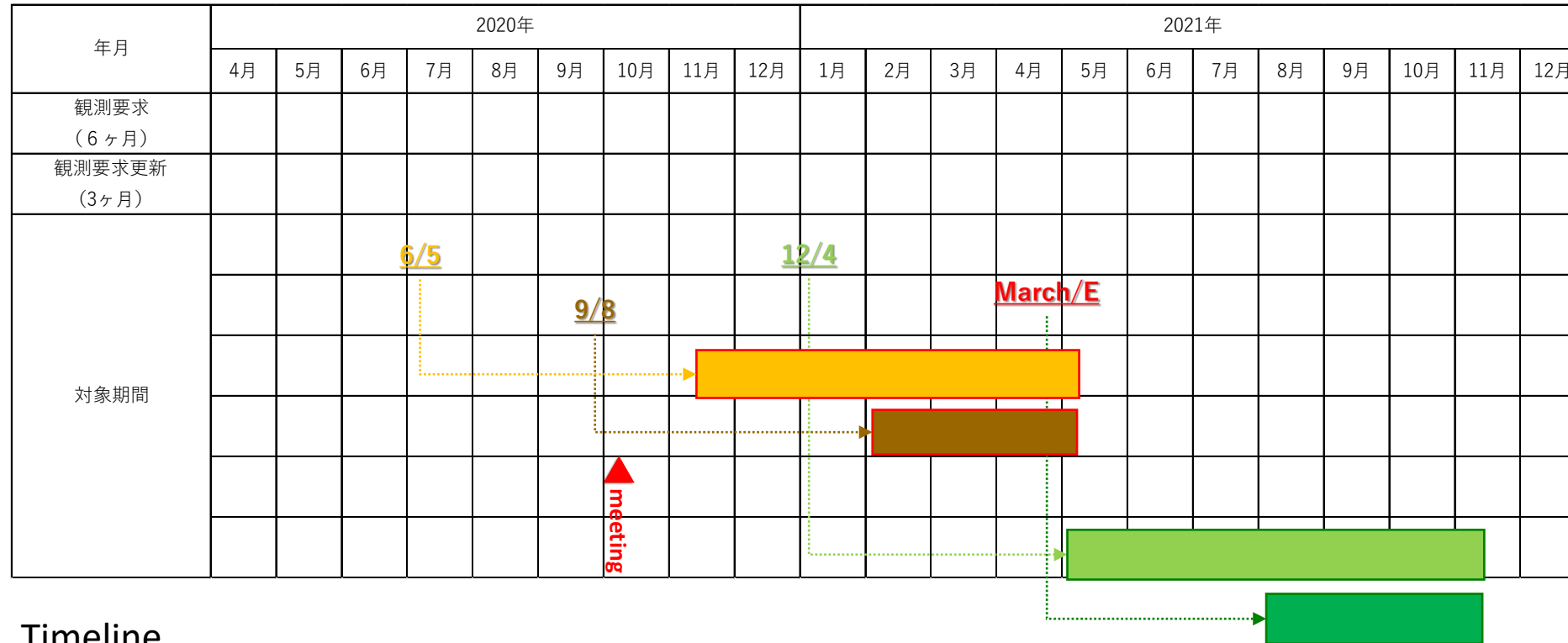


Seaice of L- and C-band synergy (Baffin Bay)



Canadian Ice Service

ALOS-2 Timeline to develop next 6 months basic observation scenario (BOS)



Timeline

- September 2020 : Revision of later 3 months observation request (from January 2021 to April 2021)
- Priority of observation: Emergency > 6 months > 3 months revision > weekly (2 weeks before observation)

-> HOWEVER, to confirm the value of back-to-back observation by ALOS-2 and Sentinel-1 -> Deploy sea ice monitoring campaign observation with high priority weekly observation planning for **Belgica Bank for Ship Cruise from 26 April until 8 May**

Challenge to joint campaign observation example

- Belgica Bank for Ship Cruise from 26 April until 8 May



Browser address: https://auig2.jaxa.jp/ips/home

Navigation: ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)

Menu: ID: N0120028 ホーム 観測要求 観測計画 情報表示 プロダクト検索 カート 注文履歴 ヘルプ ログアウト

検索条件

ALOS-2

- PALSAR-2
 - 観測幅 25km/分解能 3m
 - 観測幅 50km/分解能 3m
 - 観測幅 50km/分解能 6m
 - 観測幅 70km/分解能 10m
 - 観測幅 350km/分解能 100m
 - 観測幅 490km/分解能 60m
- ALOS
 - AVNIR-2
 - 観測幅 70km/分解能 10m-20m
 - PRISM
 - 観測幅 35km/分解能 2.5m
 - 観測幅 70km/分解能 2.5m
 - PALSAR
 - 観測幅 70km/分解能 10m-20m
 - 観測幅 350km/分解能 100m

観測日: 2022/04/24 - 2024/03/31

雨量: 0% - 100%

検索 条件リセット

Greenland

(79.28, -10.36)

100 km

100 mi

検索結果 検索件数: 11 表示件数: 11 フィルタ件数: 0

チェック行のみ表示 ハイライト一覧を表示 ハイライト行を選択

シーンID	センサ	衛星種別	観測開始日時	観測終了日時	運用モード	観測パス番号	中心フレーム番号
ALOS2427672000-220424	PALSAR-2	ALOS-2	2022/04/24 14:06:05	2022/04/24 14:07:01	WD1	118	2000
ALOS2427822000-220425	PALSAR-2	ALOS-2	2022/04/25 14:26:57	2022/04/25 14:27:53	WD1	121	2000
ALOS2428262000-220428	PALSAR-2	ALOS-2	2022/04/28 13:52:20	2022/04/28 13:53:04	SM3	116	2000
ALOS2428411990-220429	PALSAR-2	ALOS-2	2022/04/29 14:13:13	2022/04/29 14:13:48	SM3	119	1990
ALOS2428412000-220429	PALSAR-2	ALOS-2	2022/04/29 14:13:13	2022/04/29 14:13:48	SM3	119	2000
ALOS2428561990-220430	PALSAR-2	ALOS-2	2022/04/30 14:33:57	2022/04/30 14:34:40	SM3	122	1990
ALOS2428561990-220430	PALSAR-2	ALOS-2	2022/04/30 14:33:57	2022/04/30 14:34:40	SM3	122	2000
ALOS2428702010-220501	PALSAR-2	ALOS-2	2022/05/01 13:17:42	2022/05/01 13:18:17	SM3	111	2010

シーン詳細

画像

項目名	値
センサ	PALSAR-2
運用モード	WD1
シーンID	ALOS2427672000-220424
観測パス番号	118
中心フレーム番号	2000
軌道データ種別(シーン情報作成時)	確定軌道番
観測開始日時	2022/04/24 14:06:05
観測終了日時	2022/04/24 14:07:01
衛星種別	ALOS-2
衛星進行方向	ディセンディング
観測方向	右側観測
ポインティング角(N)	
ポインティング角(F)	
ポインティング角(B)	
ポインティング角	0
オフティア角	34.9
偏波	HH+HV
テーブル番号	6552
ビームNo	W2
REV補正	
ゲイン(N)	
ゲイン(F)	
ゲイン(B)	
ゲインステータス	
位置X成分	1533.959673
位置Y成分	169.238047
位置Z成分	6828.444681
速度X成分	6.236766

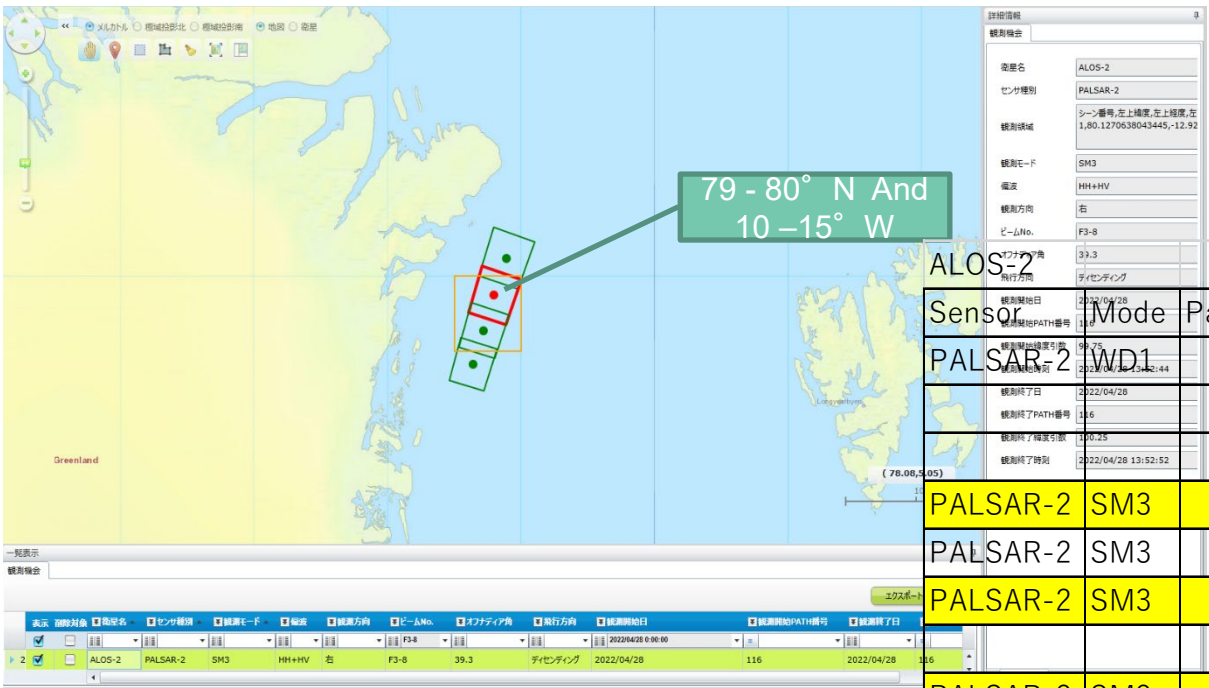
Windows taskbar: 22°C 曇り 11:10 2022/05/06



ALOS-2 and Sentinel-1 back-to-back Observation result



High temporal observation by ALOS-2 SM3 (10m) with Sentinel-1 EW (25m)



ALOS-2					Sentinel-1				
Sensor	Mode	Path	Frame	Obs date		Mode	Path	Frame	Obs date
PALSAR-2	WD1	118	2000	2022/4/24 14:06					
					17 hours	EW	240	155	2022-04-25T07:53:55
						EW	359	1709	2022-04-26T08:34:51
PALSAR-2	SM3	116	2000	2022/4/28 13:52	5 hours	EW	325	24	2022-04-28T08:18:14
PALSAR-2	SM3	119	1990	2022/4/29 14:13					
PALSAR-2	SM3	122	1990	2022/4/30 14:33	6 hours	EW	331	53	2022-04-30T08:01:51
					3 hours	EW	194	59	2022-04-30T17:47:39
PALSAR-2	SM3	111	2010	2022/5/1 13:17	5 hours	EW	18	68	2022-05-01T08:43:19
					17 hours	EW	334	82	2022-05-02T07:45:31
PALSAR-2	SM3	117	2000	2022/5/3 13:59	5 hours	EW	332	97	2022-05-03T08:26:26
PALSAR-2	SM3	109	2010	2022/5/5 13:03	5 hours	EW	422	126	2022-05-05T08:10:24
PALSAR-2	WD1	115	2000	2022/5/7 13:45					
PALSAR-2	SM3	118	2000	2022/5/8 14:06					



Context of ESA-JAXA Mutual SAR Cooperation



- JAXA operates ALOS-2 L-SAR and ESA operates Sentinel-1 C-band SAR missions to study synergistic use of L+C
- JAXA and ESA are both developing new generation L-band SAR missions
 - ALOS-4 and Copernicus ROSE-L – Radar Observing System for Europe – L-band



- Synergistic use of L+C band spaceborne assets needs to be more systematically explored in various contexts
 - Operational services, environmental science, application projects
- Experience in operational use of L-band SAR in Europe limited but required to support preparations for future ROSE-L mission

Purpose of this JAXA-ESA SAR joint session



ESA and JAXA recognize and agree to have an agreement for SAR cooperation. Since ESA and JAXA have both developed new generation L-band SAR missions, ESA and JAXA recognize the value to share an important experience in operational use of L-band SAR and intend to increase the benefits of synergies in the use of C- and L- band spaceborne assets. To proceed this cooperation, ESA and JAXA agreed to share the existing available SAR data from Sentinel-1 in Copernicus program and from ALOS-2 in JAXA to validate the value of C-band and L-band data to mutual interest area.

Both agencies jointly work for Polar Area Monitoring, Forest and Wetland Mapping, Ocean Monitoring, Snow Water equivalent, Soil Moisture, Monitoring Agriculture and GHG, Urban Monitoring, Natural and Urban Forest Monitoring, Monitoring of Geohazards and Joint validation Algorithm development of SAR.

In this session, invited speakers are expected to report ongoing and planning SAR satellites missions including ALOS-2, ALOS-4, Sentinel-1 and ROSE-L. Invited speakers are also expected to report the joint science and application early results using Sentinel-1 and ALOS-2 with ground-based observation data.



Today's our session agenda #1



08:30 am

inv-63113: COOPERATION ESA-JAXA USING SAR SATELLITES IN EARTH SCIENCES AND APPLICATIONS

Dr. Shinichi Sobue | JAXA | Japan

08:45 am

inv-63177: Fully-polarimetric L- and C-band Synthetic Aperture Radar data analysis from the yearlong MOSAiC expedition

Dr. A. Malin Johansson | UiT the Arctic University of Norway | Norway

09:00 am

inv-66595: Hurricane ocean surface winds retrieval by ALOS-2/PALSAR-2 and comparison with Sentinel-1 products

Dr. Osamu Isoguchi | Remote Sensing Technology Center of Japan (RESTEC) | Japan

09:15 am

inv-67586: Combination of C- and L-band SAR image analysis for sea ice mapping and iceberg detection

Dr. Wolfgang Dierking | Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research | Germany

09:30 am

inv-64245: Volcano monitoring using ALOS-2 and Sentinel-1 satellites

Dr. Masato Ohki | Japan Aerospace Exploration Agency | Japan



Today's our session agenda #2



10:40 am

inv-66518: L-band SAR-based ground deformation monitoring in Japan: Application of ALOS-2 InSAR time series analysis to volcano monitoring

Dr. Yudai Sato | Geospatial Information Authority of Japan | Japan

10:55 am

inv-67628: Field Campaigns on InSAR retrieval of snow mass in preparation of Copernicus ROSE-L

Dr. Thomas Nagler | ENVEO IT GmbH | Austria

11:10 am

inv-67629: Rice-planted area mapping using ALOS-2 PALSAR-2 data with machine learning over Southeast Asia

Dr. Kei Oyoshi | Japan Aerospace Exploration Agency (JAXA) | Japan

11:25 am

inv-67642: REMOTE SENSING OF SOIL MOISTURE FOR AGRICULTURAL AREAS USING COMBINED HIGH-RESOLUTION C-BAND SENTINEL-1 AND L-BAND ALOS-2 SAR TIMESERIES

David Mengen | Projektträger Jülich, FZJ GmbH | Germany