

Kyoto & Carbon Initiative – 2025 update

Ake Rosenqvist
K&C Science Coordinator
solo Earth Observation (soloEO)

K&C Science Team meeting #29
Tokyo, Japan, October 20-24, 2025

Year	Meeting	Host	Location
1996	GFM#1	NASDA	Tokyo, Japan
1997	GFM#2	JPL	Pasadena, USA
1998	GFM#3	EC-JRC	Ispra, Italy
1999	GFM#4	INPE	Sao Jose dos Campos, Brazil
2000	GFM#5	SSC	Stockholm, Sweden
2001	GFM#6	ASF	Fairbanks, USA
2001	KC#1	NASDA	Tokyo, Japan
2002	GFM#7	UNSW	Cairns, Australia
2002	KC#2	UCSB	Santa Barbara, USA
2002	KC#3	FSU-Jena	Jena, Germany
2003	KC#4	NASDA	Tokyo, Japan
2003	KC#5	JAXA	Tokyo, Japan
2005	KC#6	JAXA	Tokyo, Japan
2007	KC#7	JAXA	Tsukuba, Japan
2007	KC#8	JAXA	Tsukuba, Japan
2008	KC#9	RESTEC	Tokyo, Japan
2008	KC#10	RESTEC	Tokyo, Japan
2009	KC#11	JAXA	Tsukuba, Japan
2009	KC#12	RESTEC	Tokyo, Japan
2010	KC#13	JAXA	Tsukuba, Japan
2010	KC#14	JAXA	Tsukuba, Japan
2011	KC#15	JAXA	Tsukuba, Japan
2011	KC#16	JAXA	Tsukuba, Japan
2012	KC#17	RESTEC	Tokyo, Japan
2012	KC#18	RESTEC	Tokyo, Japan
2013	KC#19	RESTEC	Tokyo, Japan
2013	KC#20	RESTEC	Tokyo, Japan
2014	KC#21	JAXA	Kyoto, Japan
2016	KC#22	JAXA	Tokyo, Japan
2017	KC#23	TDU	Hatoyama, Japan
2018	KC#24	RESTEC	Tokyo, Japan
2019	KC#25	RESTEC	Tokyo, Japan
2020	KC#26	JAXA	Tokyo, Japan
2023	KC#27	JAXA	Tokyo, Japan
2024	KC#28	JAXA	Tokyo, Japan

A bit of history...

- 1995: JERS-1 Global Forest Mapping (GFM) project
- 2001: Scope expanded to Kyoto & Carbon (K&C) Initiative
- 30 years of continuous R&D on L-band SAR



Some crazy* ideas in 1995...

- How about collecting JERS-1 SAR data over *the entire* Amazon?
- How about mapping *all* tropical and boreal forests?
- How about doing it several times? (wet/dry seasons; summer/winter)
- How about mosaicking all data into giant SAR mosaics for easy analysis?

→ Pathfinder to the development of Global Systematic Observation plans

Spatial and temporal consistent observations over global scales:

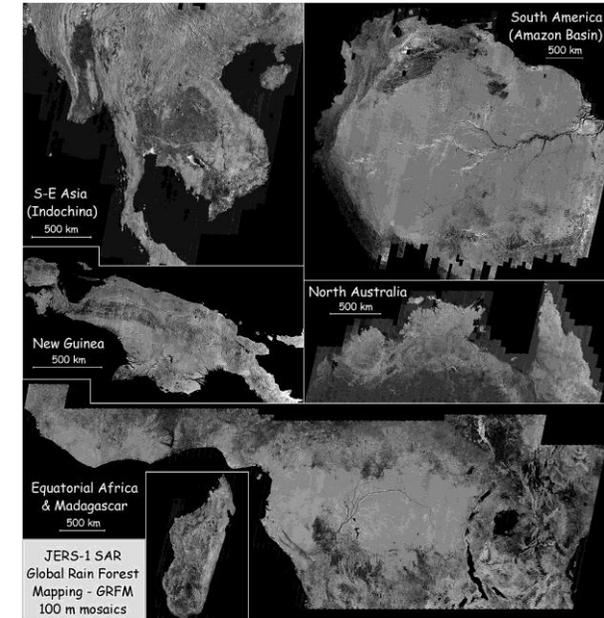
- Reducing satellite tasking and user conflicts
- Building **long-term time-series** over all global land areas
- Increasing value of historical archive

JAXA the first SAR space agency to develop and implement a global systematic observation strategy (for ALOS PALSAR).

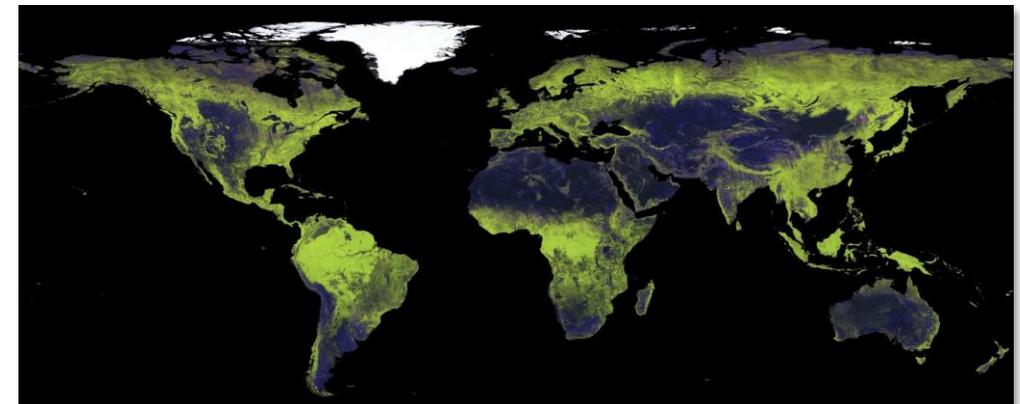
Systematic Observations now standard for most SAR missions:

- ALOS-2 PALSAR-2
- ALOS-4 PALSAR-3
- Sentinel-1 (global)
- SAOCOM-1 (global)
- NISAR (global)
- NovaSAR (regional - Australia)
- RCM (regional - Canada)

* ~~Not~~ so crazy in 2025, but in 1995 no agency had attempted this!



Then: JERS-1 SAR first continental mosaics



Today: ALOS-2 PALSAR Annual 25m global mosaics

Kyoto & Carbon Initiative – Objectives

Rebranding of the GFM project in the era of ALOS-1/2/4.

Aims: Science advisory group to support JAXA SAR mission development & lead the development of advanced L-band SAR applications in support of information needs posed by the “4 C’s”:

- Terrestrial **C**arbon Cycle science;
- Multinational Environmental **C**onventions;
- Environmental **C**onservation
- **C**limate Change

Thematic focus areas:

Forestry, Wetlands, Glaciers, (Deserts)
(Global mosaic generation)

Keywords:

- * Global/regional scale applications
- * Time-series analysis

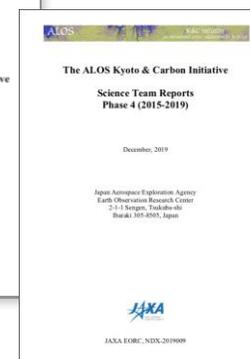
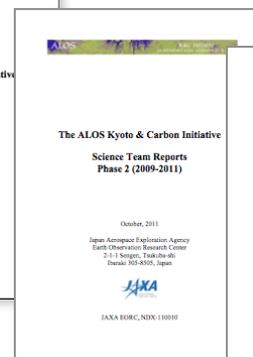
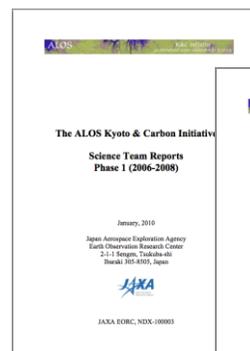
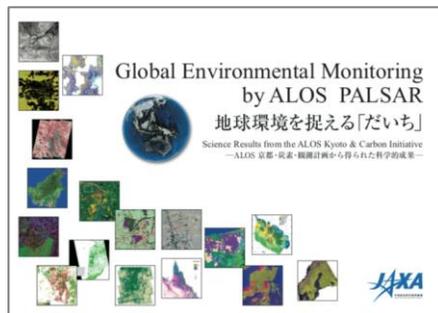
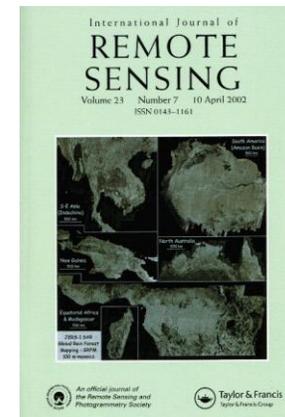
The K&C Science Team –
engaging world-leading SAR experts*
and application specialists



* e.g. Science Leads of ESA BIOMASS mission & CCI Biomass, NISAR Science Team members, ...

Scientific Output

- **200+ publications** in peer-reviewed journals and int'l conferences
- Journal special issues on L-band SAR applications:
 - Int'l J of Remote Sensing (Vol 23, No. 7, 2002)
 - Aquatic Conservation (Vol 17, No. 3, 2007)
 - IEEE J-STARS (Vol 3, No. 4, 2010)
 - Remote Sensing of Environment (Vol 155, 2014)
 - Wetland Ecology & Management (Vol 23, issue 1, 2015)
 - MDPI Remote Sensing (Vol 10, 2018)
 - Remote Sensing of Environment (Vol 270, 2022)
- K&C Science Team reports (@ JAXA EORC www)
- L-band SAR short stories for general public



K&C Wiki
Blog for K&C members

MEETINGS MISC **K&C PUBLICATIONS LIBRARY** BACKGROUND

ALOS K&C Initiative
An international science collaboration led by JAXA

K&C Publications Library

Publications relating to research undertaken, directly or indirectly, within the framework of the ALOS Kyoto & Carbon Initiative and the JERS-1 Global Rain Forest and Boreal Forest Mapping (GRFM/GBFM) project (as of April 2022, not comprehensive).

2023

Bunting P., Hilarides L., Rosenqvist A., Lucas R.M., Kuto E., Gueye Y., Ndiaye L., Global Mangrove Watch: Monthly Alerts of Mangrove Loss for Africa. *Remote Sens.* 2023, [In press]

2022

Bunting P., Rosenqvist A., Hilarides L., Lucas R.M., Thomas N., Tadono T., Worthington T.A., Spalding M., Murray N.J., Rebelo L-M., Global Mangrove Extent Change 1996–2020: Global Mangrove Watch Version 3.0. *Remote Sens.* 2022, 14, 3657; doi.org/10.3390/rs14153657

Bunting P., Rosenqvist A., Hilarides L., Lucas R., Thomas N., *Global Mangrove Watch: Updated 2010 Mangrove Forest Extent (v2.5)*. *Remote Sens.* 2022, 14, 1034; doi.org/10.3390/rs14041034

2021

Sano E. et al. Comparing SAR and optical-based Forest/Non-Forest Maps over the Brazilian Amazon and Cerrado. *FY2020 Joint PI Meeting of JAXA Earth Observation Missions*. Virtual, Jan 19-22, 2021.

Santoro M., Cartus O., Fransson J. 2021, Dynamics of the Swedish forest carbon p 2010 and 2015 estimated from satellite L-band SAR observations. *Remote Sensing Environment*, 270, 112846. doi.org/10.1016/j.rse.2021.112846

Scheuchl B. et al. Ice Sheet Monitoring using Spaceborne SAR. *FY2020 Joint PI Meeting of JAXA Earth Observation Missions*. Virtual, Jan 19-22, 2021.

Schmullius C. et al. Forest Parameter Retrievals with PALSAR-2 Interferometry. *FY Meeting of JAXA Earth Observation Missions*. Virtual, Jan 19-22, 2021.

Simard M. et al. Interferometric Mapping of Coastal Wetlands. *FY2020 Joint PI Meeting of JAXA Earth Observation Missions*. Virtual, Jan 19-22, 2021.

Urban M. et al. Comparative Analysis of C- and L-Band SAR Data for Aboveground Biomass

<https://kcwiki.wordpress.com/kc-library/>

ALOS

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MEETINGS THEMES **K&C PUBLICATIONS LIBRARY** BACKGROUND

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2019

ALOS Kyoto & Carbon Initiative Phase 4 Science Team Reports, Dec. 2019, JAXA EORC, NDX-2019009. https://www.eorc.jaxa.jp/ALOS/en/kyoto/phase_4/KC-Phase-4-report_NDX-2019009_dec2019.pdf

Cassol H.L.G., Carreiras J.K.B., Moraes E.C., Aragão L.E.O., Silva C.V.J., Quegan S. and Shimabukuro Y.E. (2018). *Retrieving Secondary Forest Aboveground Biomass from Polarimetric ALOS-2 PALSAR-2 Data in the Brazilian Amazon*. Remote Sens. 2019, 11(1), 59; doi.org/10.3390/rs11010059

2018

Arai H., Takeuchi W., Oyoshi K., Nguyen L.D., and Inubushi K. (2018). *Estimation of Methane Emissions from Rice Paddies in the Mekong Delta Based on Land Surface Dynamics Characterization with Remote Sensing*. Remote Sens. 2018, 10, 1438. doi.org/10.3390/rs10091438

Bouvet A., Mermoz S., Le Toan T., Villard L., Mathieu R., Naidoo L. and Aster G. *An above-ground biomass map of African savannahs and woodlands at 25 m resolution derived from ALOS PALSAR*. Remote Sensing of Environment, 206 (2018) pp.156-173. [doi:10.1016/j.rse.2017.12.030](https://doi.org/10.1016/j.rse.2017.12.030)

Bunting P., Rosenqvist A., Lucas R., Rebelo L-M., Hilarides L., Thomas N., Hardy A., Itoh T., Shimada M. and Finlayson C.M. (2018). *The Global Mangrove Watch – a New 2010 Global Baseline of Mangrove Extent*. Remote Sens. 2018, 10, 1669; [doi:10.3390/rs10101669](https://doi.org/10.3390/rs10101669)

Acknowledgements

Proper acknowledgement of JAXA and the K&C Initiative in all related publications is essential.

Please include the following paragraph in all publications where data obtained from the K&C have been used:

“This work has been undertaken [in part] within the framework of the JAXA Kyoto & Carbon Initiative. ALOS-2 PALSAR-2 data have been provided by JAXA EORC.”

ALOS

K&C Initiative
An international science collaboration led by JAXA

The screenshot shows the LinkedIn group page for 'ALOS Kyoto & Carbon Initiative'. The group is private and listed. A pinned post by Ake Rosenqvist, Admin, from 2 months ago, announces the completion of re-processing PALSAR and PALSAR-2 global 25m mosaics. The post includes four world maps: '2009 PALSAR 25m Mosaic', '2009 PALSAR Forest/Non-Forest', '2015 PALSAR-2 25m Mosaic', and '2015 PALSAR-2 Forest/Non-Forest'. A 'Dataset' link to eorc.jaxa.jp is provided at the bottom.

The screenshot shows the LinkedIn group page for 'Global Mangrove Watch'. A pinned post by Ake Rosenqvist, Admin, from 8 months ago, features a 'Remote Sensing MDPI' article titled 'Global #Mangrove Extent Change 1996-2020: #GlobalMangroveWatch Version 3.0'. The post includes a large satellite image of mangroves and a grid of maps showing mangrove extent changes from 1996 to 2020. A legend indicates 'Loss' (red/orange) and 'Gain' (green/blue) in various years.

LinkedIn Groups:

ALOS Kyoto & Carbon Initiative

K&C-related information and announcements on L-band SAR products from JAXA EORC

Global Mangrove Watch

GMW and broader mangrove related updates.

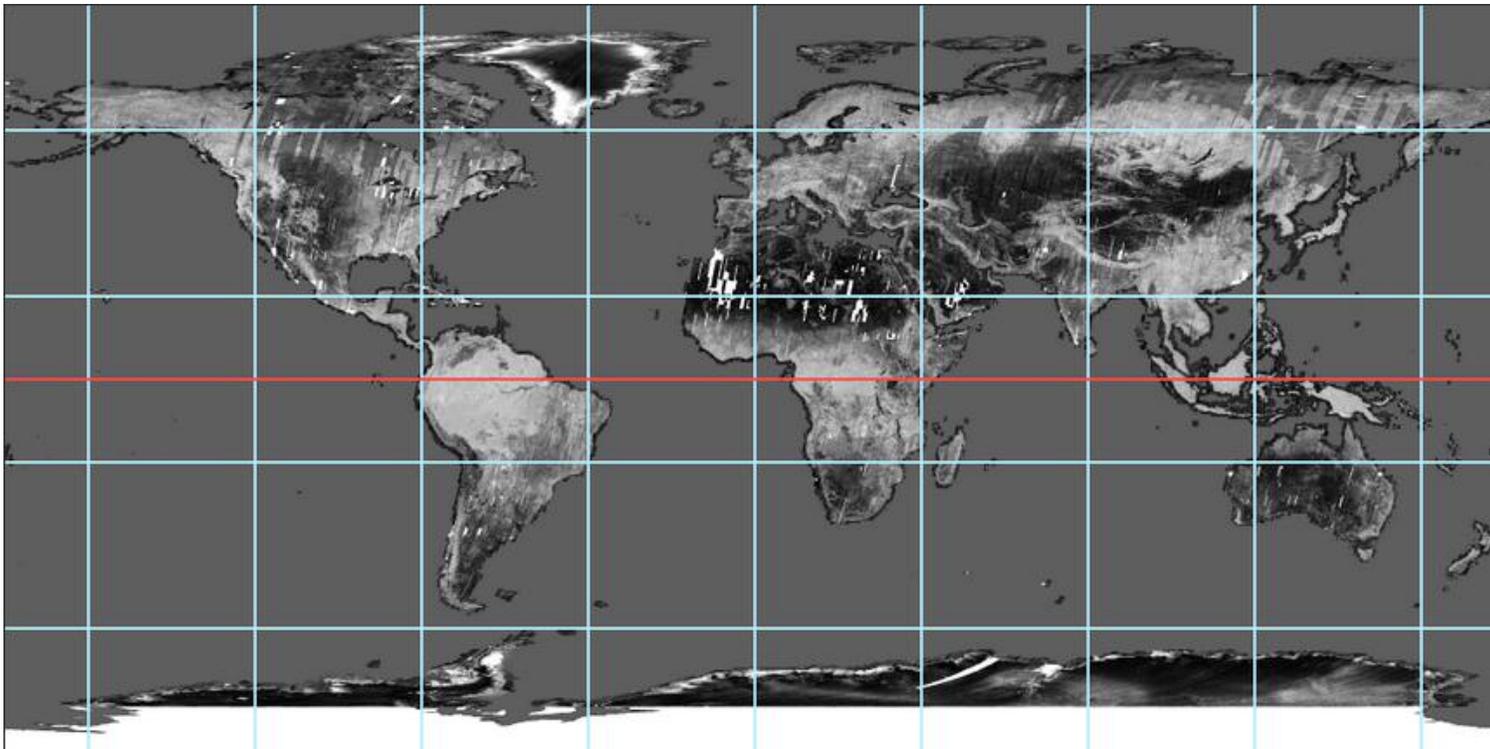
Request membership directly at group page at <http://www.linkedin.com>

Global PALSAR-2/PALSAR/JERS-1 Mosaic and Forest/Non-Forest map

EORC, JAXA

JERS-1 Global Mosaic Map "1992-1998"

| 1992-1998 | 1998 | 1997 | 1996 | 1995 | 1994 | 1993 | 1992 |



JERS-1 SAR

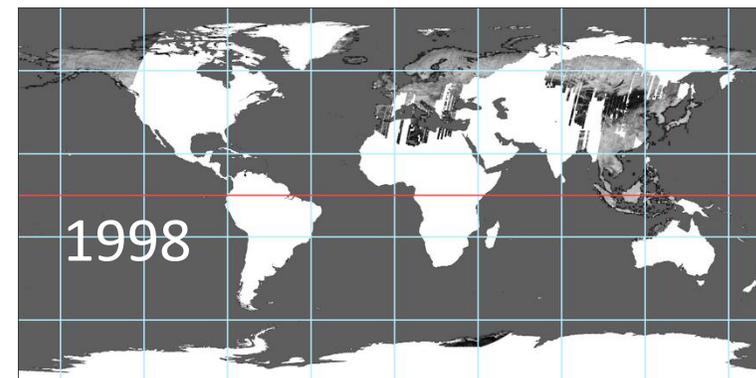
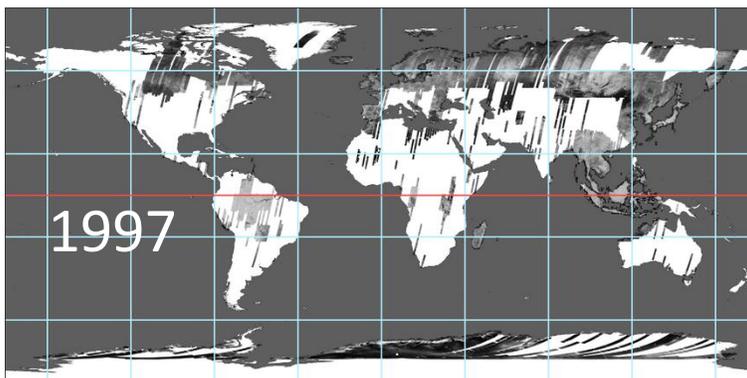
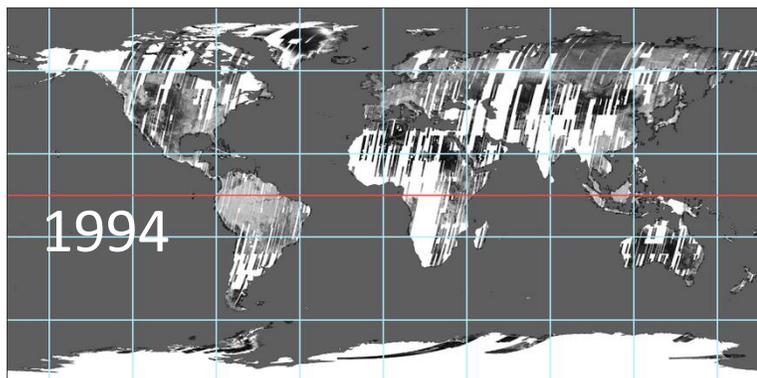
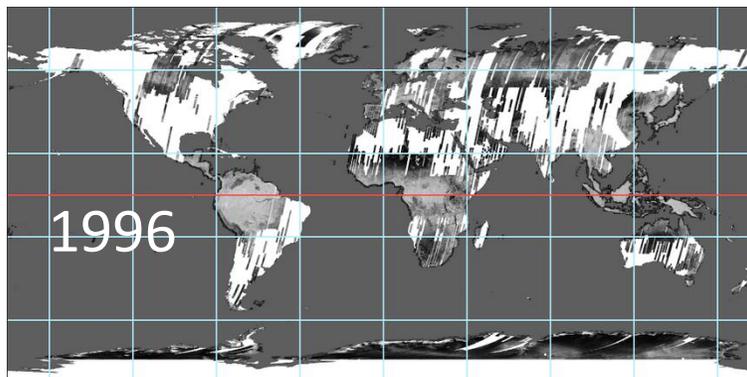
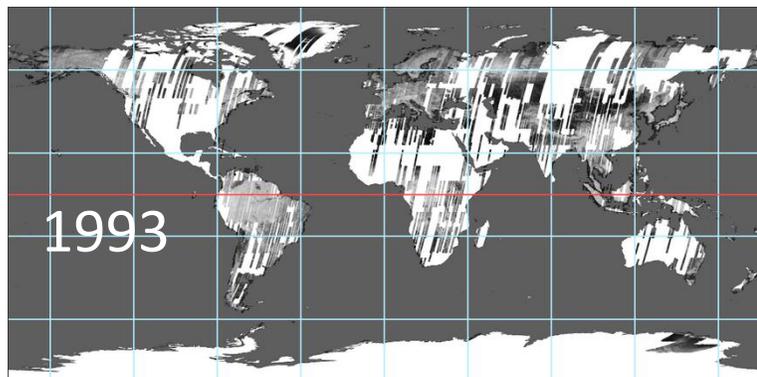
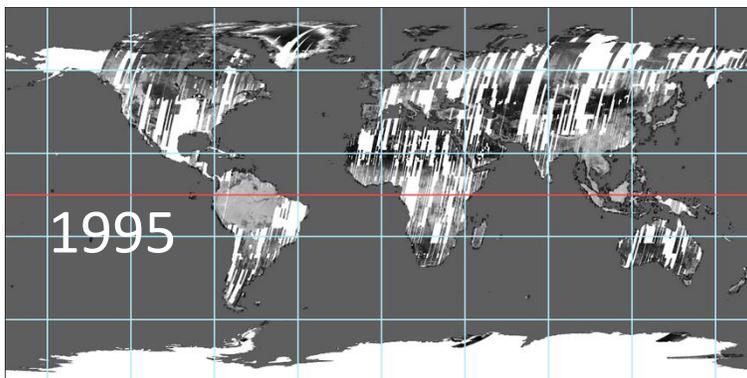
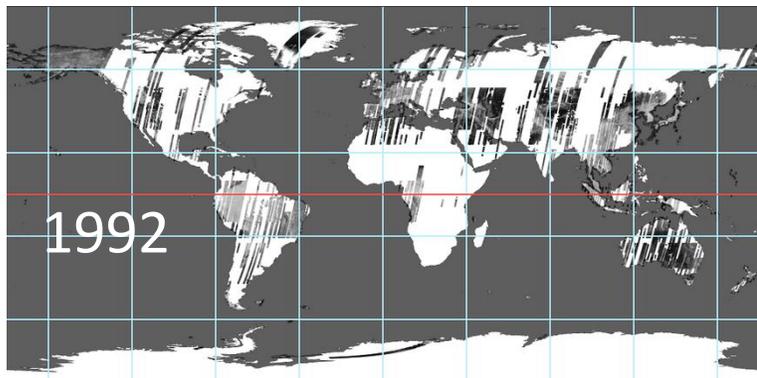
Through collaboration with Gamma Remote Sensing, the full JERS-1 SAR archive has been re-processed.

Annual mosaics for 1992 to 1998
+ Composite "best of" mosaic

- 25 m pixel spacing
- 1° x 1° tiles
- L2.2: Ortho & RTC
- CEOS Analysis Ready Data

Open public access from EORC [www](http://www.eorc.jaxa.jp)





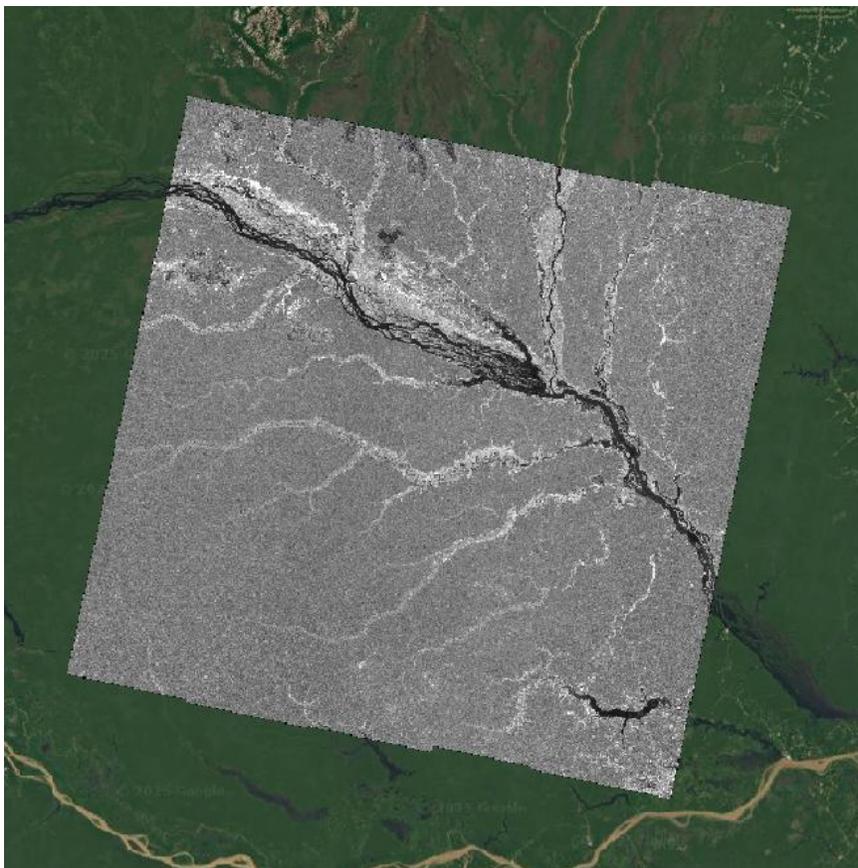
JERS-1 SAR

Through collaboration with Gamma Remote Sensing, the full JERS-1 SAR archive has been re-processed.

Annual mosaics for 1992 to 1998
+ Composite "best of" mosaic

- 25 m pixel spacing
- 1° x 1° tiles
- L2.2: Ortho & RTC
- CEOS Analysis Ready Data

Open public access from EORC [www](http://www.eorc.jaxa.jp)



ALOS-2 PALSAR-2 ScanSAR scene-based L2.2 products

- Full ScanSAR archive (2014-08-04 – 2025-09-30) re-processed.
- Available (amongst others) in the AWS Open Data Repository.
- As of today (2025-10-22): 248,500+ scenes

```
ake-m4$ aws s3 ls --no-sign-request s3://jaxaalos2/palsar2/L2.2/2025/
2025-09-24 08:31:50      8.5 KiB ALOS2010632250-140804_WBDR2.2GUD
2025-09-24 08:32:40      8.5 KiB ALOS2010632300-140804_WBDR2.2GUD
2025-09-24 08:32:44      8.9 KiB ALOS2010633700-140804_WBDR2.2GUD
2025-09-24 08:33:19      8.9 KiB ALOS2010633750-140804_WBDR2.2GUD
2025-09-24 08:33:23      8.9 KiB ALOS2010633800-140804_WBDR2.2GUD
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```

[s3://jaxaalos2/palsar2/L2.2/2025/](https://s3.amazonaws.com/jaxaalos2/palsar2/L2.2/2025/)

More info in today's presentation by Kobayashi-san.



Wednesday October 22, 2025
29th K&C Science Team meeting

K&C Session 1: Wetlands & Glaciers

#	Item	Presenter(s)	Duration	Start	End
0	Welcome	Takeo Tadono, JAXA EORC	5	13:00	13:05
1	K&C Update	Ake Rosenqvist, soloEO	15	13:05	13:20
2	ALOS-4 Basic Observation Scenario - relevance to K&C	Fumi Ohgushi, RESTEC	15	13:20	13:35
3	CEOS-ARD Compliant PALSAR-2 Products for K&C	Kazufumi Kobayashi, RESTEC	15	13:35	13:50
4	Global Mangrove Watch	Pete Bunting, Aberystwyth U.	25	13:50	14:15
5	Developing a Comprehensive Peatland Degradation Mitigation and Monitoring Based on ALOS2-PALSAR2 and ALOS4-PALSAR3 Time Series Imagery to Support Sustainable Peatland Management	Dandy Novresianti, BRIN	25	14:15	14:40
6	Multi-sensor fusion for accurate aboveground carbon estimation in Southeast Asia's tropical peatlands.	Akash Verma, Forest Carbon	25	14:40	15:05
	Break		15	15:05	15:20
7	Mapping Inundated Forest Ecosystems Using ALOS-4 PALSAR-3	Ake Rosenqvist, JAXA/soloEO	25	15:20	15:45
8	Use of ALOS-2 and ALOS-4 for generating ice sheet geophysical data products	Bernd Scheuchl, UC Irvine	25	15:45	16:10
9	NISAR update	Paul Siqueira, Umass	25	16:10	16:35
-	Open floor discussions	All	25	16:35	17:00
	PI meeting Poster Session		60	17:00	18:00
	Adjourn			17:00	



Thursday October 23, 2025
29th K&C Science Team meeting

K&C Session 2: Forest & Biomass

#	Item	Presenter(s)	Duration	Start	End
10	L-band SAR Precision Forest Monitoring in Amazonia — ALOS-4 joins ALOS-2	Christian Koyama, JAXA EORC	25	10:00	10:25
11	The use of ALOS-4 data sets for monitoring spatio-temporal dynamic of agricultural expansion in the Brazilian Cerrado and in the Amazon/Cerrado ecotone	Edson Sano, EMBRAPA	25	10:25	10:50
12	Monitoring deforestation and degradation in the Brazilian Amazon using the ALOS-4 stripmap data	Nara Pantoja, IBAMA	25	10:50	11:15
13	Assessing multi-sensor PALSAR and LiDAR data for estimating and mapping aboveground carbon in terrestrial forests of Southeast Asia	Roanna Pang/Carl Santos, NUS	25	11:15	11:40
	Lunch		80	11:40	13:00
14	Imaging radar for woodland clearing detection	Jason Dail, Univ Queensland	25	13:00	13:25
15	Time series Signatures and Classification of Repeat-Pass ALOS-2, ALOS-4 and NISAR Observations for Forest and Wetland monitoring	Josef Kellndorfer, EBD (by Paul Siqueira, UMass)	25	13:25	13:50
16	Retrieval of forest above-ground biomass and above-ground biomass change using time-series of ALOS, ALOS-2 and ALOS-4 L-band SAR data	Johan Fransson, LNU	25	13:50	14:15
17	BC Wildfire Fuel Type Layer Project	Ashlin Richardson, BC Wildfire Service	25	14:15	14:40
18	Multi-decadal forest biomass change with ALOS PALSAR time series	Maurizio Santoro, Gamma RS	25	14:40	15:05
	Break		25	15:05	15:30
19	(1) L-band Sensitivity to Biomass and Landcover Structure in the ABoVE domain (2) Sensitivity of Vegetation and Agriculture Physical Characterization to Repeat-Pass ALOS-2, ALOS-4 and NISAR PolInSAR Observations	Paul Siqueira, UMass	25	15:30	15:55
20	K&C polarimetric requests	Ake Rosenqvist, JAXA/soloEO	25	15:55	16:20
-	Open floor discussions & wrap up	All	25	16:20	16:45

炉端と海鮮 だい炭 日本橋店

Robata-to Kaisen Koshitsuizakaya Daitan

Credit Card | Wi-Fi | Private Room | Smoking | English Menu



Izakaya (Japanese Style Pub), Sashimi (Raw Sliced Fish)

Dinner 4,500 JPY

03-6262-0201 (+81-3-6262-0201)

Monday - Friday Dinner: 17:00 - 23:00 (L.O. 22:00, Drink L.O. 22:30)
Saturday & Sunday & Holiday Dinner: 15:00 - 23:00 (L.O. 22:00, Drink L.O. 22:30) ()Nishinjicho (Tokyo)
Subway Ginza Line Nishinjicho Station 3-minute walk