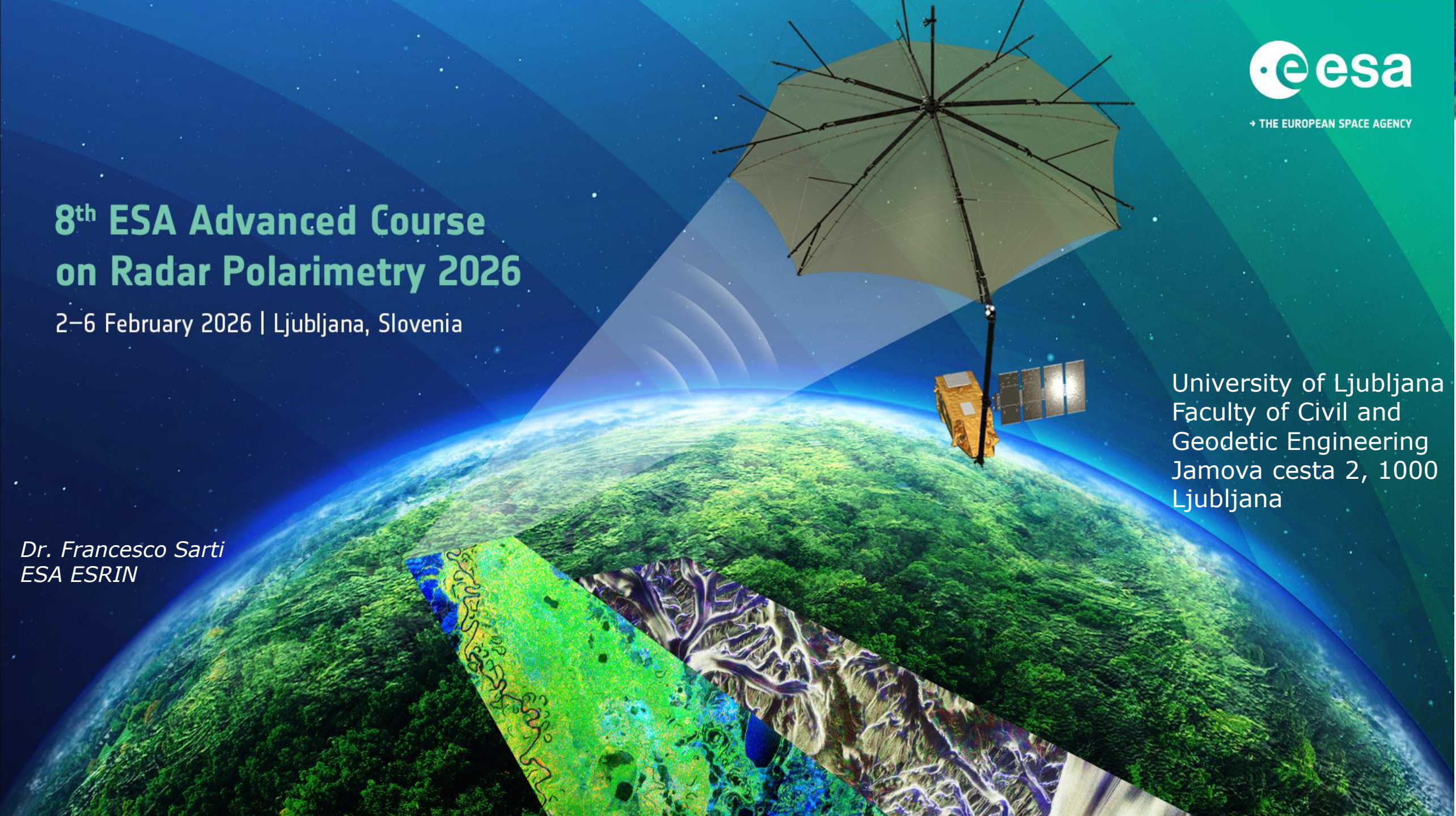

esa
THE EUROPEAN SPACE AGENCY
8th ESA Advanced Course
on Radar Polarimetry 2026
2–6 February 2026 | Ljubljana, Slovenia
University of Ljubljana
Faculty of Civil and
Geodetic Engineering
Jamova cesta 2, 1000
Ljubljana
Dr. Francesco Sarti
ESA ESRIN

Course Objectives and Content

Objectives include:

- Train the next generation of users of SAR polarimetric data;
- Explain theoretical principles, processing algorithms, products, applications;
- Introduce available tools & methods for the exploitation of dual-pol and full-pol data;
- Provide overview of BIOMASS mission and hands-on training on BIOMASS data processing

Content:

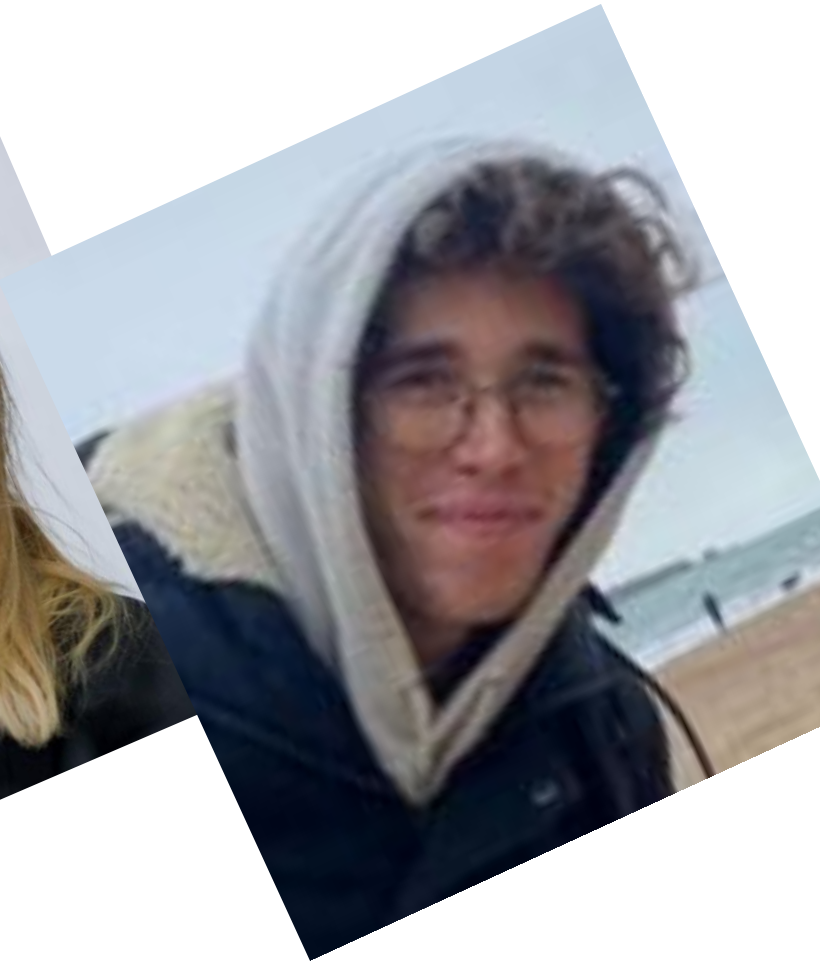
- Reminders of SAR data
- Theory and applications of radar interferometry (InSAR), radar polarimetry (POLSAR), InSAR polarimetry (POLinSAR), SAR Tomography (TomoSAR)
- Prepare for the scientific exploitation of the data from past, current and future SAR Polarimetric Missions

Course Programme

08:30-09:00	Welcome from ESA Introdcution Biomass Mission	Multi-baseline InSAR basics *L. Ferro-Famil (ISAE-SUPAERO)*	Pol-InSAR Theory *K. Papathanassiou, M.Pardini (DLR)*	Advanced Applications *I. Hajnsek (ETH Zurich)* *A. Marino (Stirling University)*	Group Pitch
09:00-10:15	SAR Basics *S.Tebaldini (POLIMI)*				
10:15-10:45	Coffee / Tea Break				
10:45-12:00	SAR Tomography Basics *S.Tebaldini (POLIMI)*	PolSAR Theory *Alberto Alonso-Gonzalez (UPC)*	(continutation)	(continutation)	Quizz & Q/A
12:00-13:30	Lunch Break				Closing Ceremony
13:30-15:00	SAR & TomoSAR Practical *F.Banda (Aresys)* *S.Tebaldini (POLIMI)* *L.Ferro-Famil (ISAE-SUPAERO)*	InSAR Basics Practical *F.Banda (Aresys)* *S.Tebaldini (POLIMI)* *L.Ferro-Famil (ISAE-SUPAERO)*	Pol-InSAR Practical 1 *K. Papathanassiou, M.Pardini (DLR)*	Advanced Applications 1 *I.Hajnsek (ETH Zurich)*	
15:00-15:30	Coffee / Tea Break				
15:30-17:00	InSAR Basics *F. Banda (Aresys)* *L.Ferro-Famil (ISAE-SUPAERO)*	PolSAR Practical *Alberto Alonso-Gonzalez (UPC)*	Pol-InSAR Practical 2 *K. Papathanassiou, M.Pardini (DLR)*	Advanced Applications 2 *A. Marino (Stirling University)*	

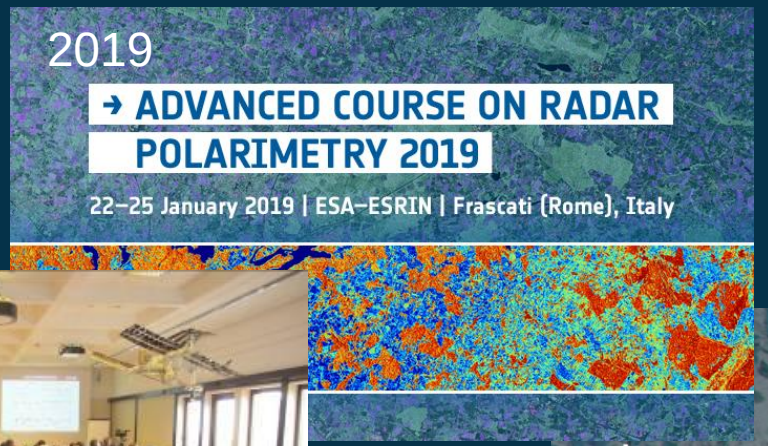
With contributions from: POLIMI, ISAE-SUPAERO, Aresys, UPC, DLR, ETH, Stirling Univ.

Course organizers include:



Prof. Krištof Oštir, Ana Potočnik Buhvald, Magdalena Fitzryk, Connor Heeney

23 years of SAR Polarimetry in ESA, incl. training

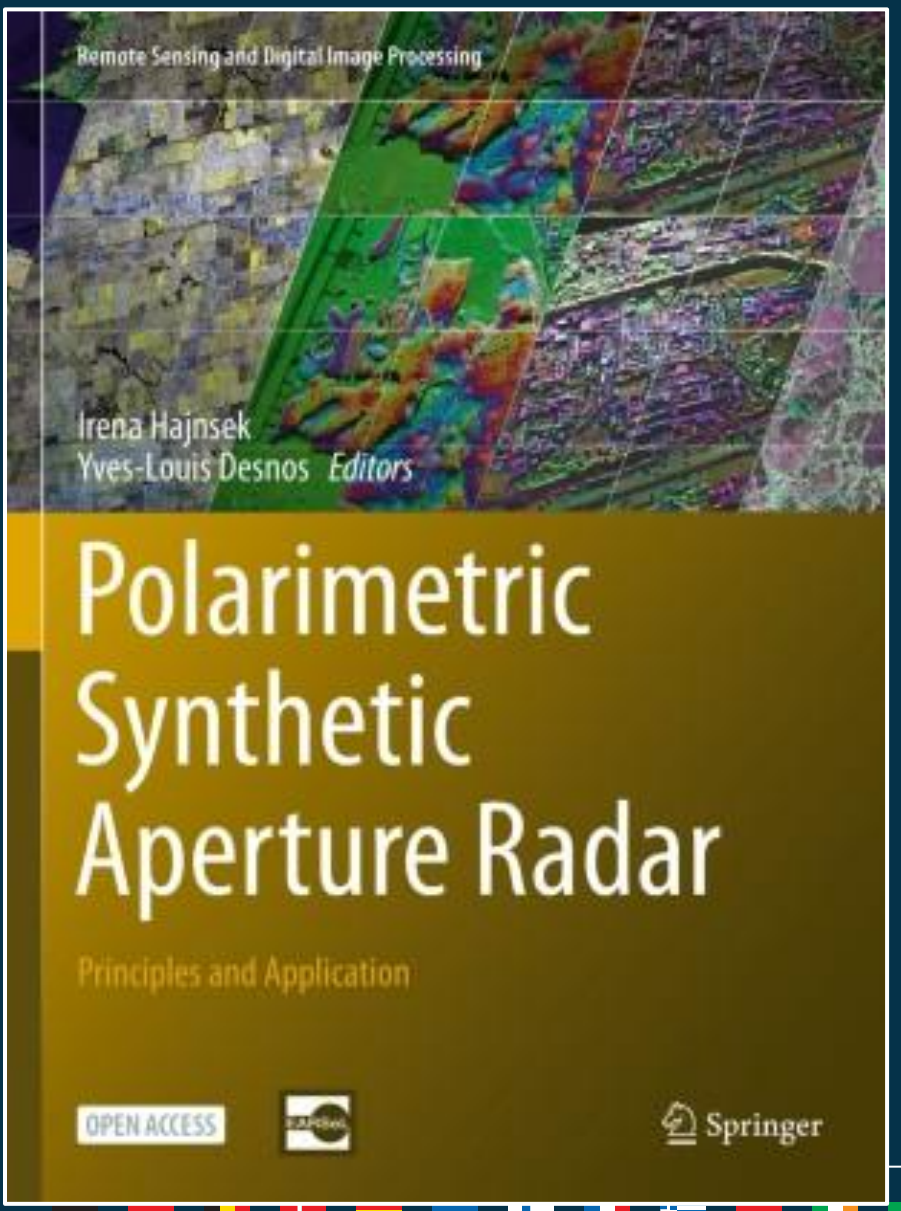


Complemented by:

DLR/ESA open PolInSAR training courses (online, twice/year) https://eo4society.esa.int/event/9th-edition-of-the-dlr-esa-open-polinsar-training-course-2025/

ESA SAR MOOC Echoes in Space https://eo-college.org/courses/echoes-in-space

2021: Book on Polarimetric Radar, Polarimetric Interferometry SAR



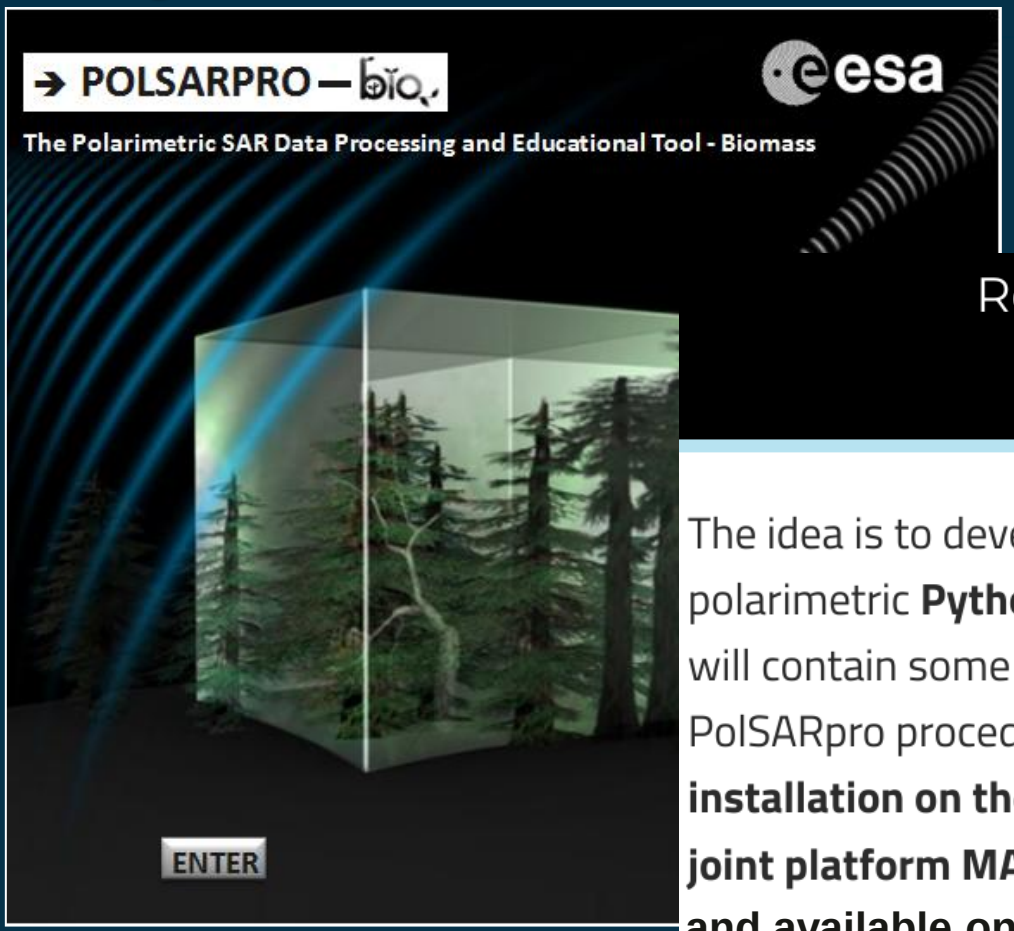
Presenting ***all progress in PolSAR and PolInSAR made over 20 years***, covering many different applications

"***Polarimetric Synthetic Aperture Radar : Principles and applications***"
Irena HAJNSEK – Yves-Louis DESNOS editors
Springer, 1st edition (March 30, 2021),
ISBN 978-3-030-56502-2

https://link.springer.com/content/pdf/10.1007%2F978-3-030-56504-6.pdf

Source: Eric Pottier

23 years of SAR Polarimetry in ESA: TOOLBOXES



Re-implementation of selected PolSARPro functions in Python, following the scientific recommendations of PolInSAR 2021

The idea is to develop a dedicated polarimetric **Python Library** which will contain some selected PolSARpro procedures, **for easy installation on the ESA/NASA joint platform MAAP and available on GitHub**

PolSARpro Bio, version 6.0.

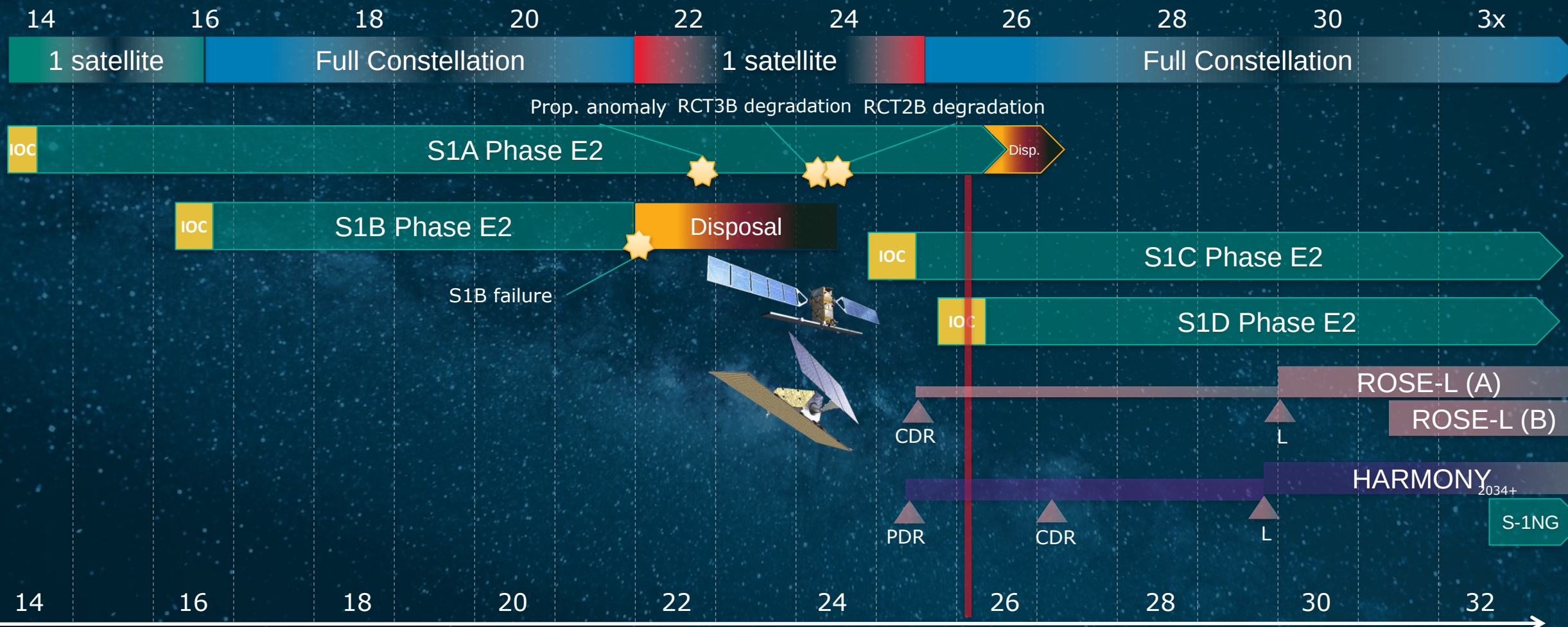
Toolbox used for decades by worldwide scientists working on techniques and applications of polarimetric radar data

PolSARpro Python library

Polarimetric toolbox evolution, in view of the joint ESA/NASA MAAP platform for the joint exploitation of the ESA P-band SAR Biomass mission and the NASA/ISRO SAR NISAR mission.

Current ESA SAR missions

COPERNICUS: Sentinel-1 and Expansion



N.B. HARMONY is ESA EE-10. It is not a Copernicus mission, but it consists of two identical satellites that will fly in tandem with a Copernicus S-1 satellite

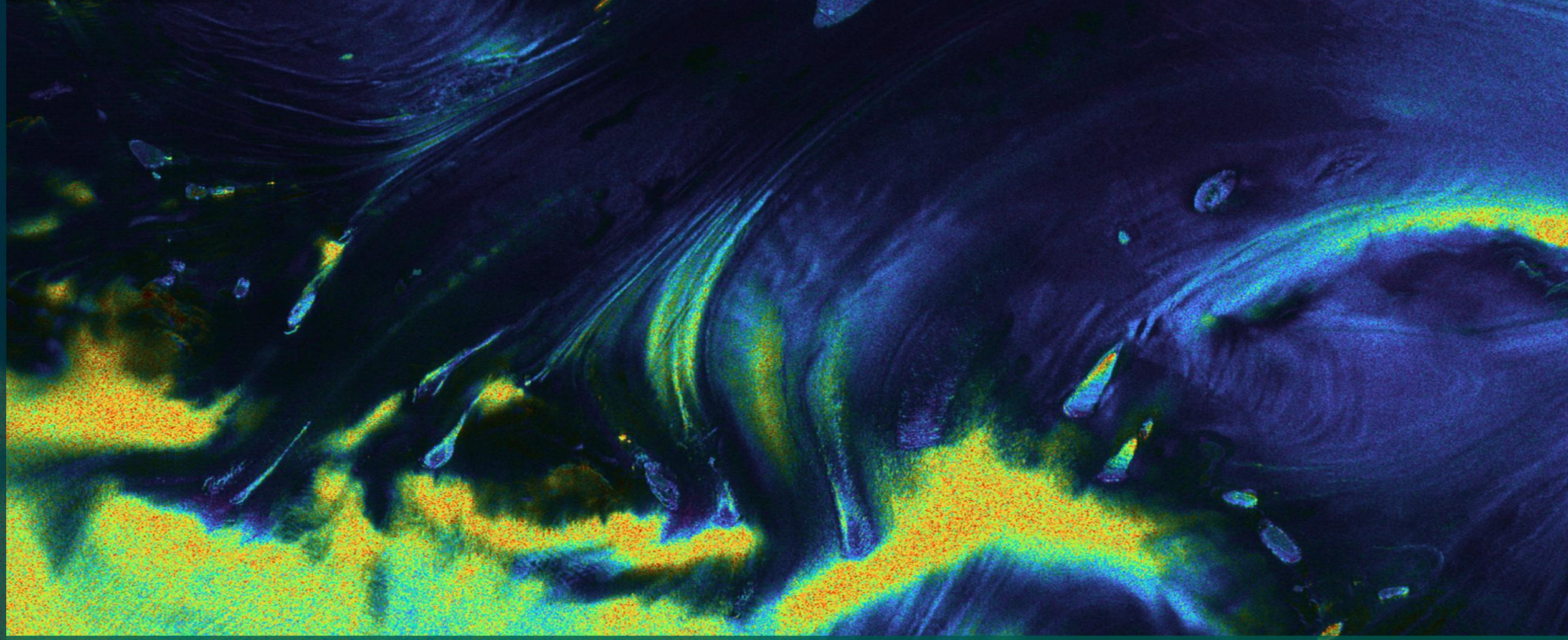
BIOMASS

EE-7, launched on April 29, 2025. First spaceborne mission to carry a **(full-pol) P-band SAR** penetrating forest canopies.
Primary objective: provide global measurements of forest biomass and its changes over time

ESA POLINSAR BIOMASS 2026

12th International Workshop on Science and Applications of SAR Polarimetry and Polarimetric Interferometry and
6th Biomass Science Workshop and 1st Cal/Val meeting

https://eo4society.esa.int/event/esa-polinsar-biomass-2026-12th-international-workshop-on-science-and-applications-of-sar-polarimetry-and-polarimetric-interferometry-6thbiomass-science-workshop-and-1st-cal-val-meeting/

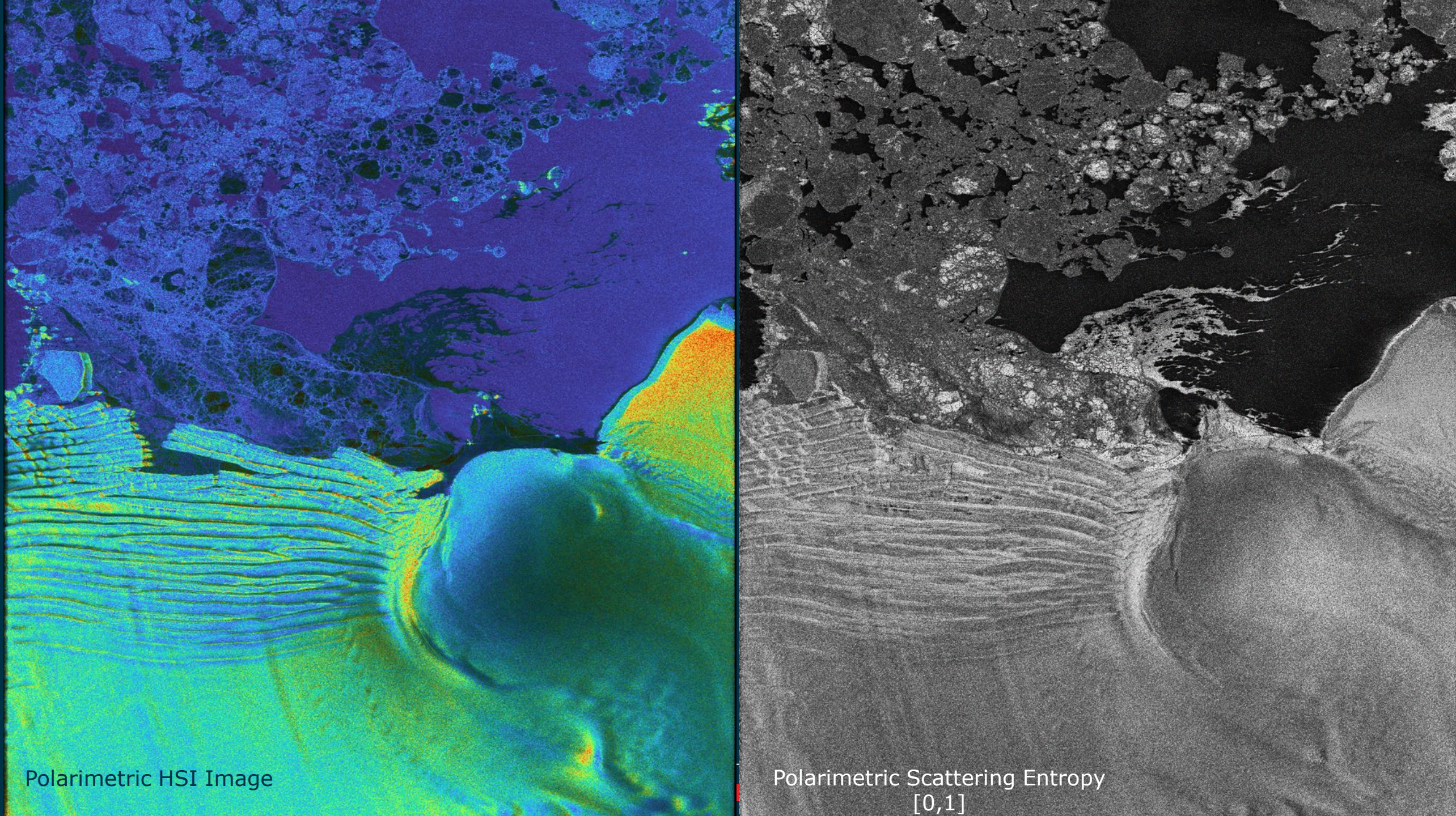


BIOMASS: Suprises and Challenges – A Pol-InSAR Perspective

The Pol-InSAR DLR-HR Team

German Aerospace Center (DLR), Microwaves and Radar Institute (DLR-HR)

Work partially carried out under the ESA „Biomass In-Orbit Commissioning" Programme

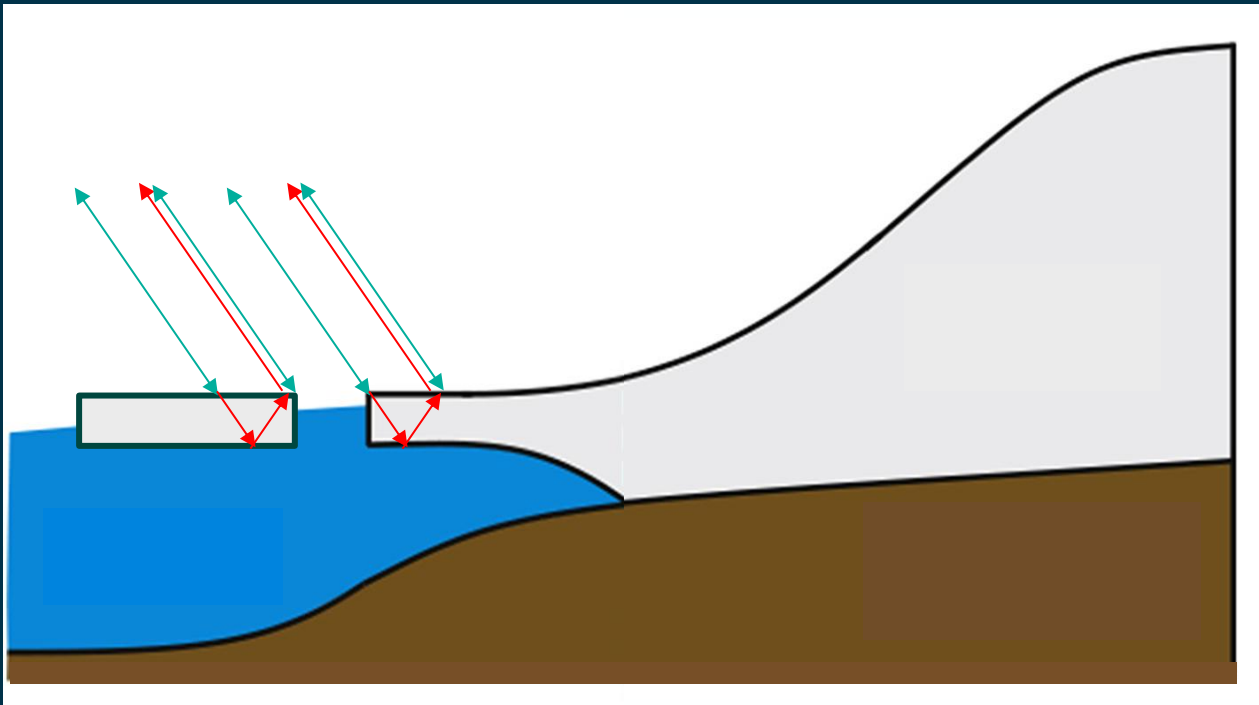

Polarimetric HSI Image
Polarimetric Scattering Entropy
[0,1]

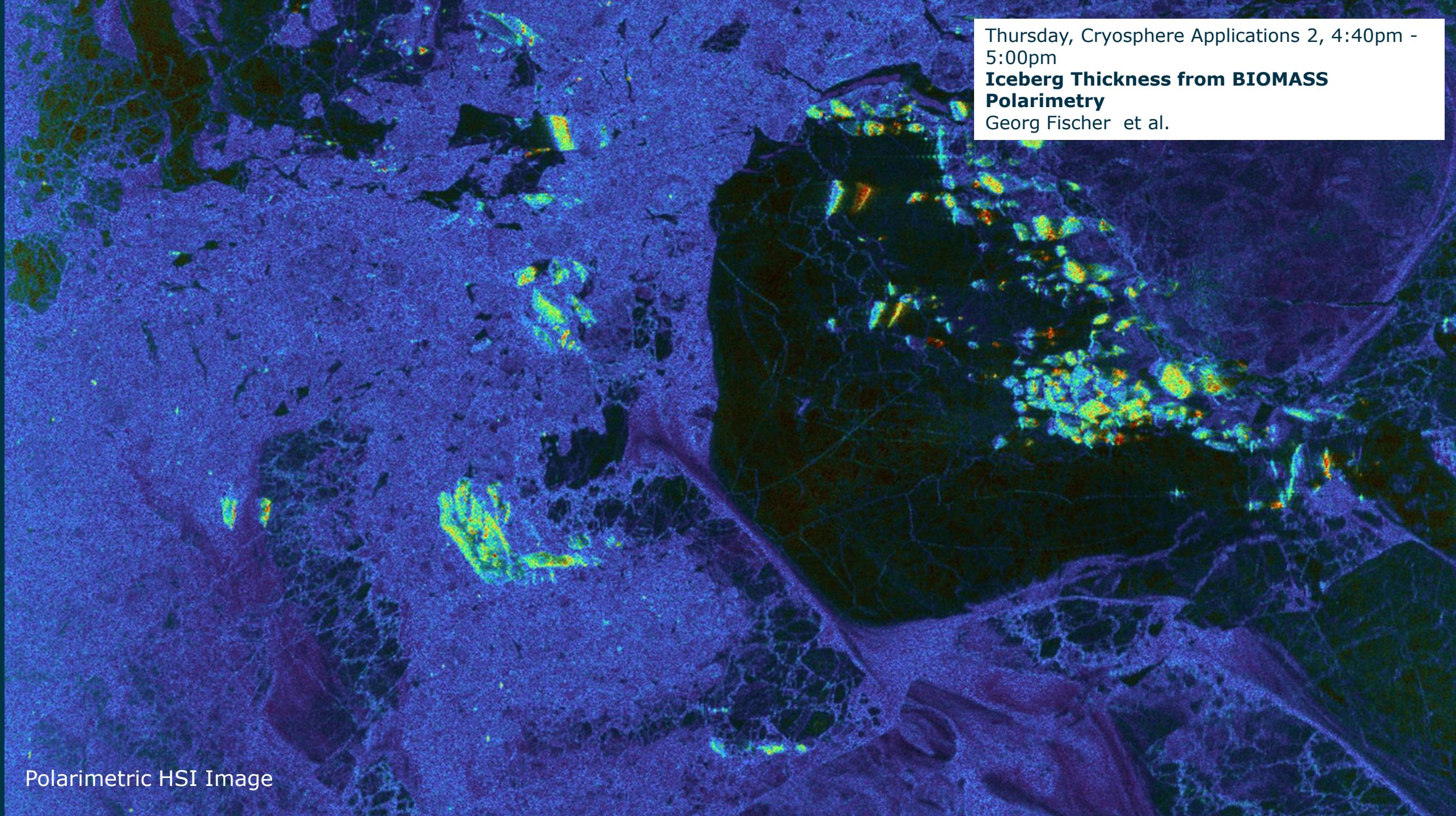
Thursday, Cryosphere Applications 2, 4:40pm - 5:00pm

Iceberg Thickness from BIOMASS Polarimetry

Georg Fischer et al.

Polarimetric HSI Image





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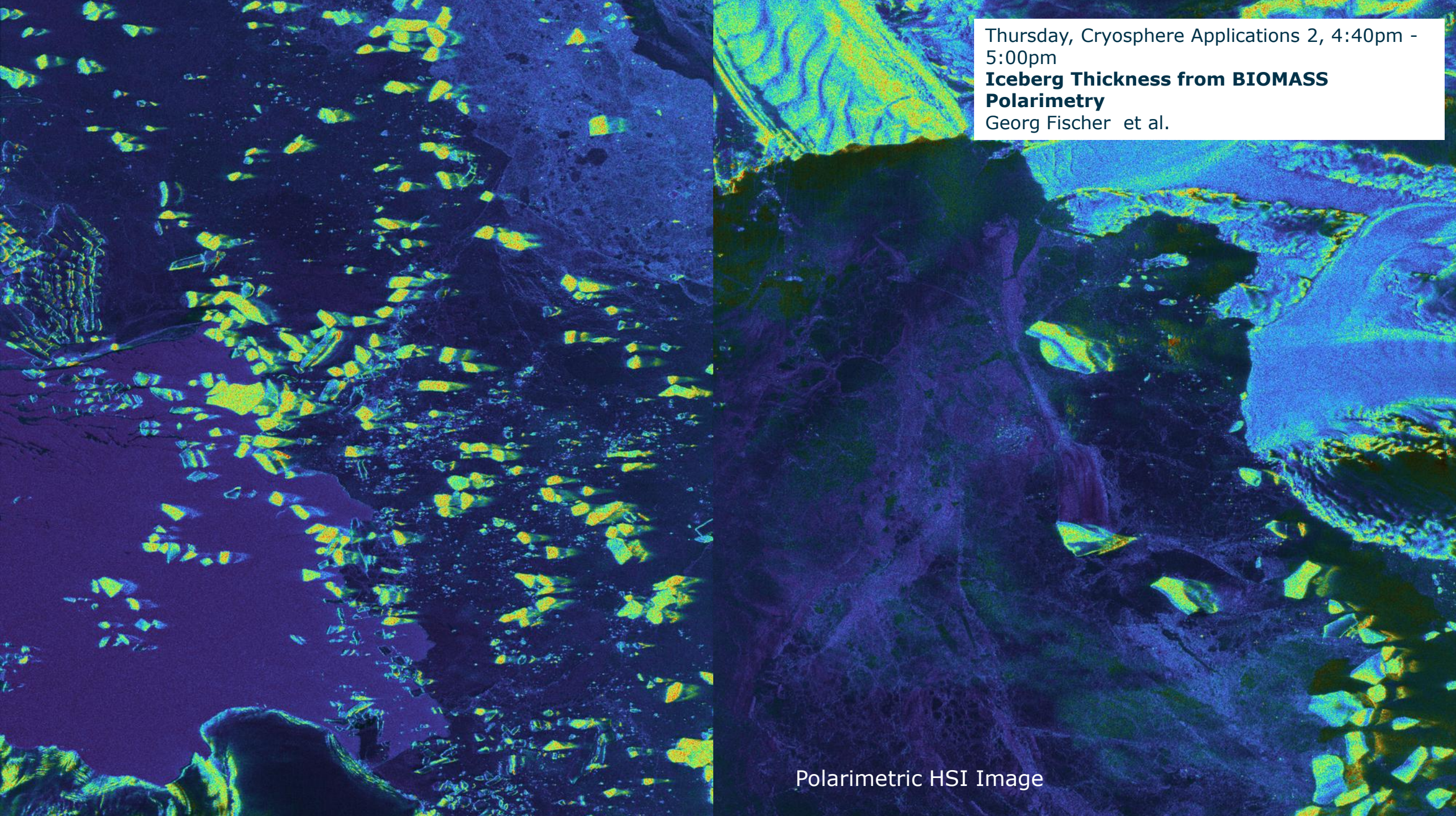

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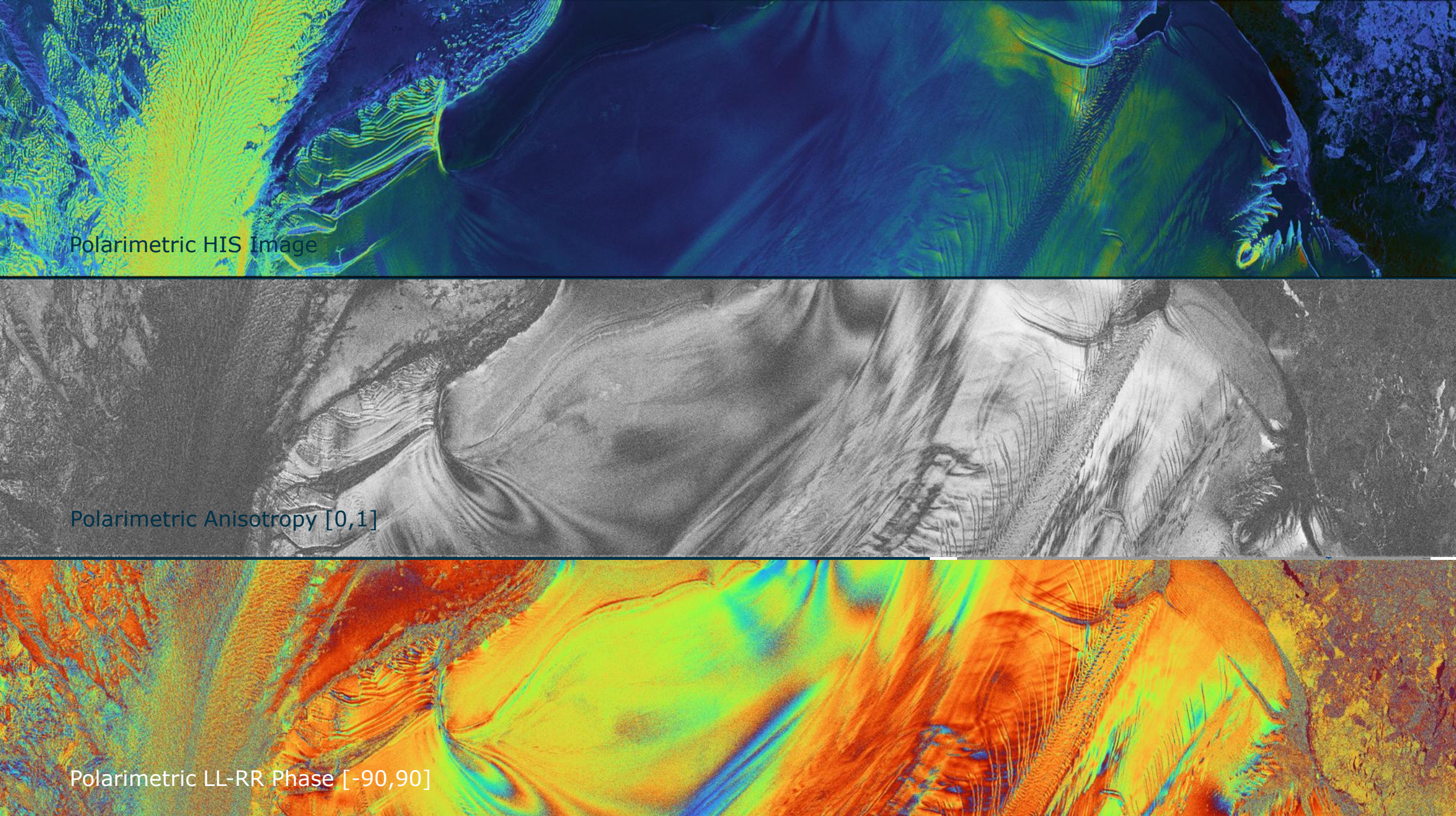
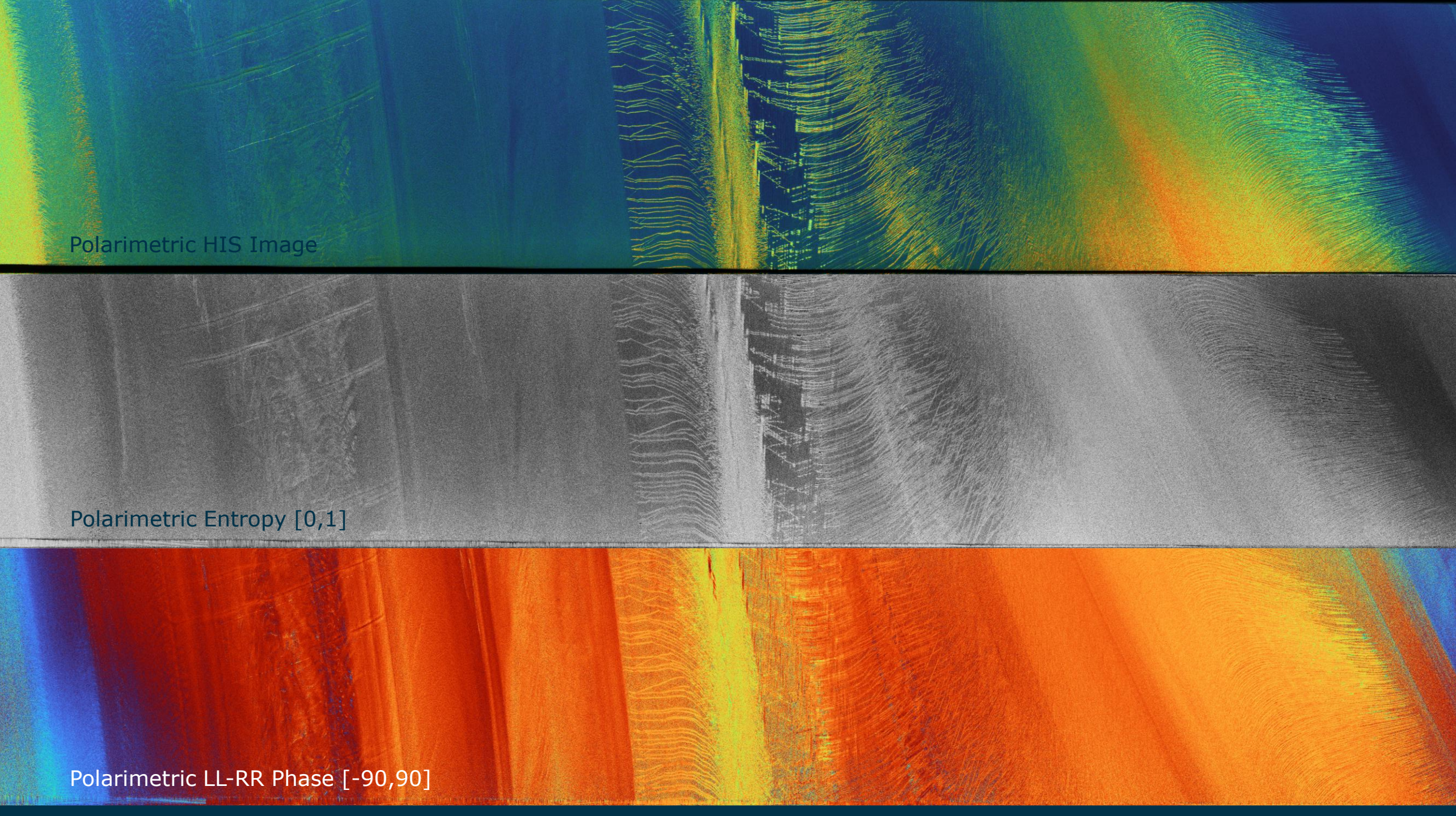

Polarimetric HIS Image
Polarimetric Anisotropy [0,1]
Polarimetric LL-RR Phase [-90,90]


Polarimetric HIS Image
Polarimetric Entropy [0,1]
Polarimetric LL-RR Phase [-90,90]