



# **7<sup>th</sup> International Workshop on Retrieval of Bio- & Geophysical Parameters from SAR Data for Land Applications**



## **FINAL PROGRAM**

November 12 – 15, 2018  
DLR-Oberpfaffenhofen  
Münchner Str. 20, 82234 Weßling



## Welcome to the BioGeoSAR-18 Workshop

The German Aerospace Center (DLR), European Space Agency (ESA) and the Science Committee warmly welcome you to the BioGeoSAR-18 workshop. It is the 7th meeting since the late 1990s, with a goal of providing a vibrant and dynamic forum for discovery and discussion of the latest research in SAR remote sensing and geomatics for the extraction of bio- & geophysical parameters.

Based on the numerous abstract submissions we organized an compelling program of presentations and tutorials around the five main themes: (1) Ice and Snow, (2) Soil and hydrology, (3) Forestry, (4) Agriculture, (5) Land-use and classification. In order to trigger the discussion at the workshop and to provide some guidance to authors, the following seed questions have been prepared:

- For the development of new and/or the improvement of existing products based on bio-/geo-physical parameters retrieved from SAR data:
  - What is the impact of multi-temporal acquisitions? What temporal resolutions (i.e. revisit times) are required?
  - What is the importance of combining measurements at different frequencies? What is the added value of simultaneous multi-frequency acquisitions?
  - How important are repeat-pass interferometric observables?
  - How critical are quad- / dual-polarimetric measurements?
- What are the SAR applications that have an unquestionable added value with respect to other non-SAR techniques? Which new applications are suitable for commercialisation?
- What is the importance of Ku- and Ka-band SAR measurements for the development/improvement of applications? Which applications have the potential to profit the most?
- What are potential new bio- and geophysical products that can be derived from either tomographic SAR measurements or through exploiting multi-static SAR geometries?
- What applications would mostly profit from a combined use of space-borne optical remote sensing data with SAR data? What is the complementary nature of such a combination?
- To what extent are new machine learning algorithms able to complement EM modelling and inversion practices?

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## BioGeoSAR-18 organizing committee

Björn Rommen, ESA-ESTEC  
Konstantinos Papathanassiou, DLR-HR  
Sandra Reigber, DLR-HR

		am				pm																			
		08:30	09:00	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30	18:00	18:30	19:00		
Monday, 12th Nov.		Registration				The role of remote sensing products in hydrologic modelling				Lunch Break				Assimilation of SAR data for land applications				Coffee Break				Linking remote sensing and vegetation modelling			
Tuesday, 13th Nov.	Welcome	Snow and Ice				Coffee Break				Snow and Ice				Discussion				Soil & Hydrology				Soil & Hydrology			
Wednesday, 14th Nov.		Forest Session I				Coffee Break				Forest Session I				Lunch Break				Forest Session II				Forest Session II			
Thursday, 15th Nov.	Agriculture	Coffee Break				Agriculture				General Land Use				General Land Use				Lunch Break				General Land Use			
																		Discussion & Coffee Break				Review & Closing Discussion			

- Tutorials
- Oral Talks
- Round Table Discussions
- Dinner (for registered participants only)

### **General workshop information**

The BioGeoSAR workshop will take place November, 13-15 from 8.30 am to 6.00 pm in building 112 at the DLR site in Oberpfaffenhofen, Germany.

Lunch is not provided by the organizers and can be taken in the cafeteria in building 102.

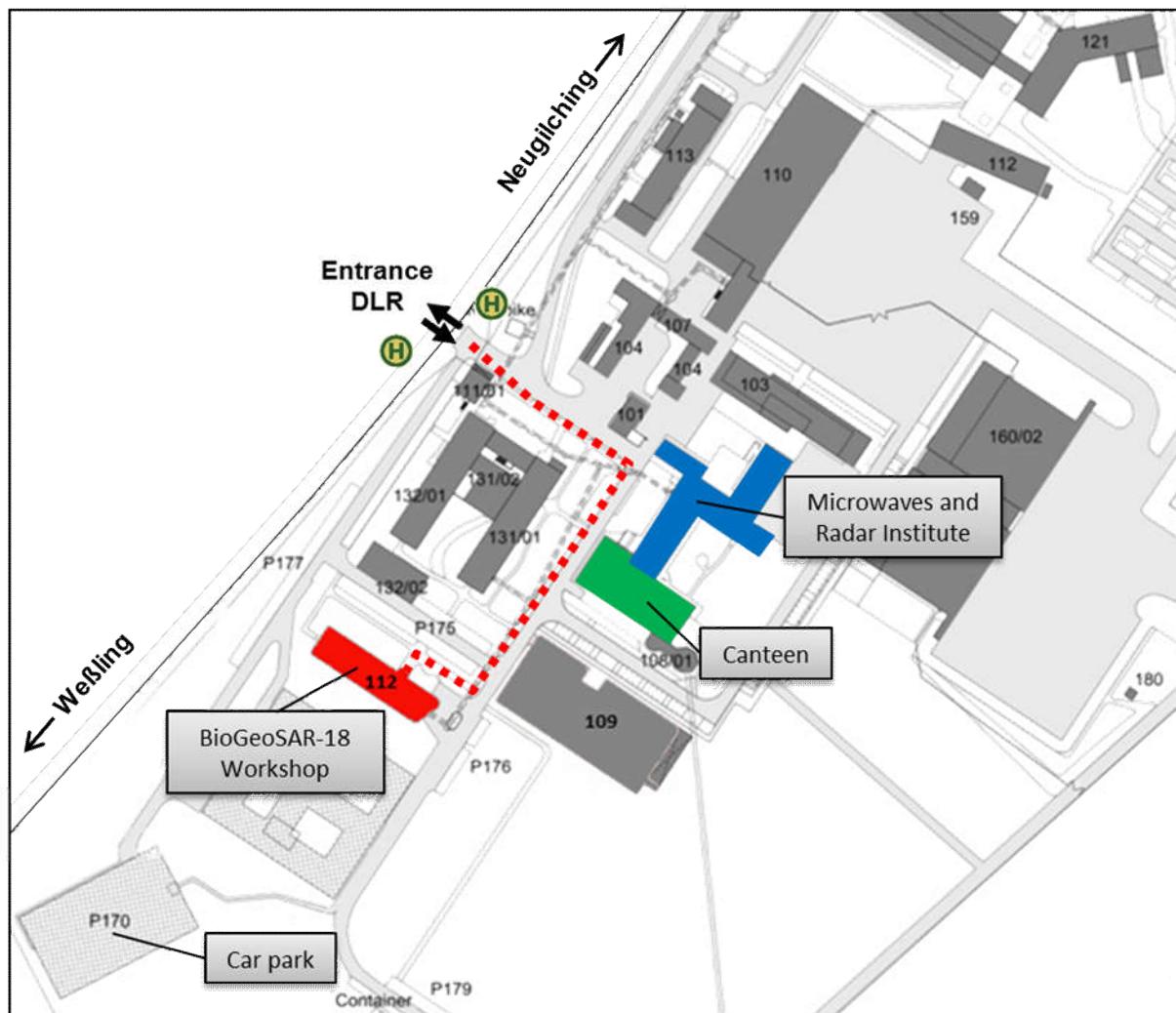
On Wednesday evening you will have the opportunity to participate in our welcome dinner. The restaurant easily accessible by public transportation. If you would like to attend the dinner, please contact Sandra Reigber ([sandra.reigber@dlr.de](mailto:sandra.reigber@dlr.de)) for registration, no later than October 26.

### **Tutorial courses**

Most of the tutorial courses will be held Monday, November 12. The first tutorial starts at 9.30 am (see agenda) also in building 112. On Tuesday evening Gerhard Krieger will give a tutorial about...

### **Registration at the DLR site**

Upon arrival at the DLR site you will have to register at the entrance gate. Please bring a valid identity with you. You will receive your guest card which you must carry during your stay on the premises of DLR. You will find your conference badges at the entrance of the workshop in building 112, 3<sup>rd</sup> floor.



**Possible connections to DLR in Oberpfaffenhofen (OP) by public transport (approx. arrival time 8:15)**

Munich Central Station to DLR-OP. [Single-Ticket: Einzelfahrt Erwachsene (2 Zonen) -> 5:80 €]

1.	Time	Departure	Arrival	Direction
	7:05	S8 Central station (tunnel, platform 2)	Neugilching (platform 2)	Herrsching
	7:38	Neugilching (platform 2)	Neugilching (bus stop)	
	7:44	MVV 947 Neugilching	Oberpfaffenhofen, DLR	Weßling (S)
	7:52	Oberpfaffenhofen, DLR		

2.	7:25	S8 Central station (tunnel, platform 2)	Weßling (platform 2)	Herrsching
	8:01	Weßling (platform 2)	Weßling (bus stop)	
	8:10	ExpressBus X910	Oberpfaffenhofen, DLR	Klinikum Großhadern
	8:15	Oberpfaffenhofen, DLR		

Munich, Pasing to DLR-OP. [Single-Ticket: Einzelfahrt Erwachsene (2 Zonen) -> 5:80 €]

1.	7:17	S8 Pasing (platform 7/8)	Neugilching (platform 2)	Herrsching
	7:38	Neugilching (platform 2)	Neugilching (bus stop)	
	7:44	MVV 947 Neugilching	Oberpfaffenhofen, DLR	Weßling (S)
	7:52	Oberpfaffenhofen, DLR		

2.	7:37	S8 Pasing (platform 7/8)	Weßling (platform 2)	Herrsching
	8:01	Weßling (platform 2)	Weßling (bus stop)	
	8:10	ExpressBus X910	Oberpfaffenhofen, DLR	Klinikum Großhadern
	8:15	Oberpfaffenhofen, DLR		

Herrsching to DLR-OP [Single-Ticket: Einzelfahrt Erwachsene (2 Zonen) -> 5:80 €]

1.	7:25	S8 Herrsching (platform 1/2)	Weßling (platform 2)	Flughafen München
	7:36	Weßling (platform 2)	Weßling (bus stop)	
	7:40	ExpressBus X910	Oberpfaffenhofen, DLR	Klinikum Großhadern
	7:45	Oberpfaffenhofen, DLR		

2.	7:45	S8 Pasing (platform 7/8)	Weßling (platform 2)	Herrsching
	7:56	Weßling (platform 2)	Weßling (bus stop)	
	8:10	ExpressBus X910	Oberpfaffenhofen, DLR	Klinikum Großhadern
	8:15	Oberpfaffenhofen, DLR		

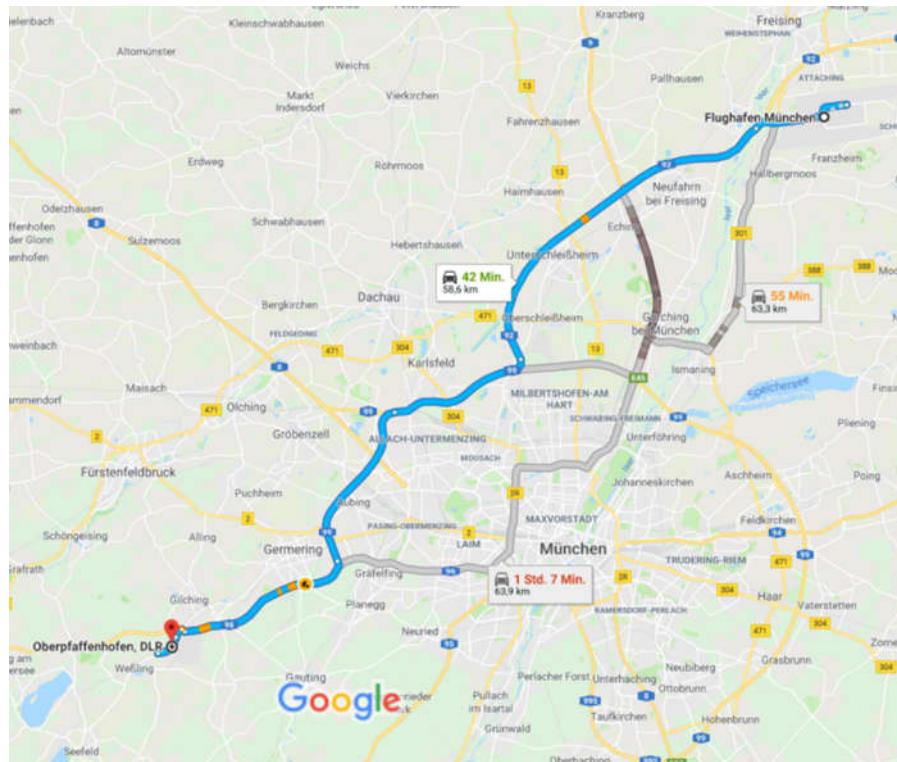
If you need more information about your journey, tickets etc., please have a look at  
<https://efa.mvv-muenchen.de/> or use the Android App Öffi which you can download in the google playstore.

# How to reach the DLR



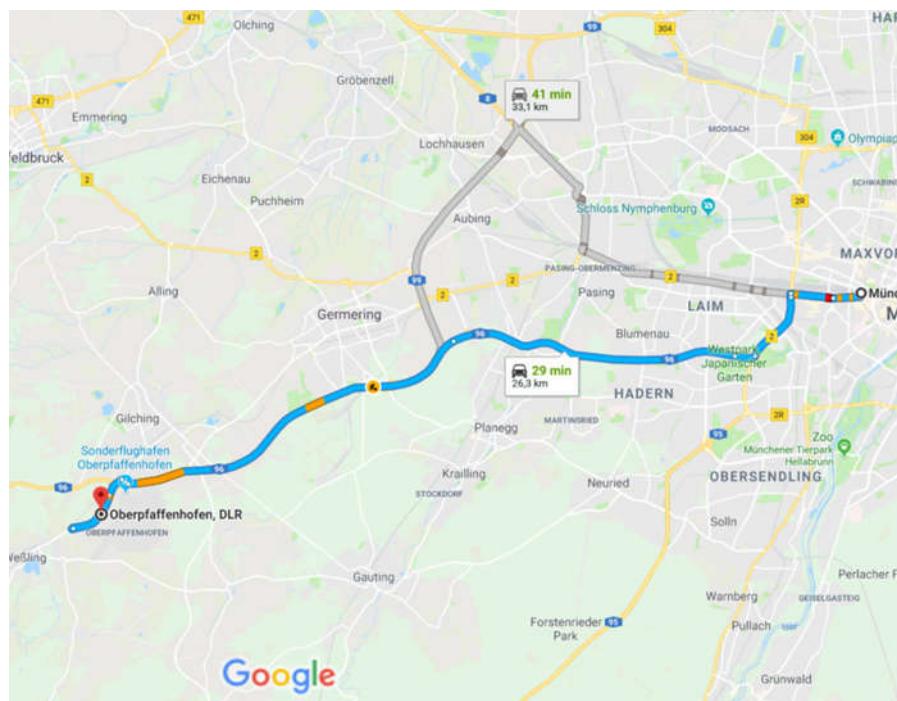
If you arrive by car, please register at the gate of the DLR campus and park your car in the multi-storey car park (see map on the page general information)

## How to reach DLR from Munich Airport by car



- Munich International Airport Nordallee
- Continue to Freising
- Follow A92, A99 and A96 direction Lindau
- Take exit 32-Oberpfaffenhofen from A96
- Turn left onto Landsberger Str. until DLR campus (2nd traffic light)
- Destination will be on the left site

## How to reach DLR from Munich Central Station by car



- Get on A96 from Landsberger Str. and B2/B2R 10 min
- Follow A96 to exit Oberpfaffenhofen
- Take exit 32-Oberpfaffenhofen from A96
- Turn left onto Landsberger Str. until DLR campus (2nd traffic light)
- Destination will be on the left site

Monday November 12th, 2018

## Tutorials

10:30      **Registration**

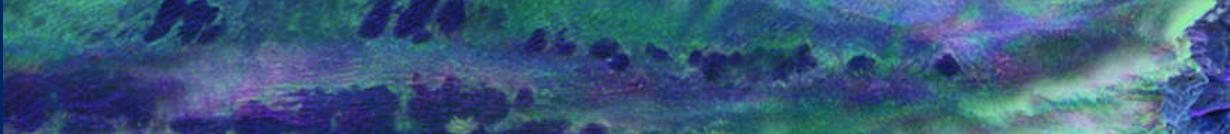
11:00      **Tutorial I: The role of remote sensing products in hydrologic modelling**  
*Luis Samaniego – Centre for Environmental Research UFZ*

**12:30      Lunch Break**

14:00      **Tutorial II: Assimilation of SAR data for land applications**  
*Susan Steele-Dunne – Technical University Delft*

**15:30      Coffee Break**

16:00      **Tutorial III: Linking remote sensing and vegetation modelling**  
*Andreas Huth – Centre for Environmental Research UFZ*



Tuesday November 13th, 2018

08:30      **Welcome to the BioGeoSAR-18 Workshop**

**09:00 – 13:00      Snow & Ice Session**

09:00      **TanDEM-X and TerraSAR-X for the mass balance of the Patagonian calving glaciers**

*Dana Floricioiu, Wael Abdel Jaber, Erling Johnson – German Aerospace Center; Helmut Rott – ENVEO IT*

09:20      **Surface elevation change of outlet glaciers in NE Greenland from TanDEM-X and Cryosat-2**

09:40      **X-Band SAR Signal Penetration and Interferometric Bias in Antarctic Snow**

*Helmut Rott, Stefan Scheiblauer – ENVEO IT; Dana Floricioiu, Lukas Krieger, Paola Rizzoli – German Aerospace Center; Jan*

10:00      **Wet snow depth from TanDEM-X single pass InSAR DEM Differencing**

*Silvan Leinss – ETH Zurich; Oleg Antropov – Aalto University; Juho Vehviläinen, Juha Lemmetyinen – Finnish Meteorological*

**10:20      Coffee Break**

10:50      **Advancements in Snow Cover Monitoring Based on Synergy of Sentinel-1 SAR and Sentinel-3 SLSTR Data**

*Thomas Nagler, Helmut Rott, Joanna Ossowska, Gabriele Schwaizer – ENVEO IT GmbH; David Small – University of Zurich; Eirik Malnes – NORUT; Kari Luojus, Sari Metsamaeki – Finnish Meteorological Institute; Simon Pinnock – ESA Climate Office*

11:10      **snow: modeling vs. field measurements: chances and challenge**

*Silvan Leinss – ETH Zurich*

11:30      **Analysis of Multi-Frequency Polarimetric SAR Data Across Different Ice Zones of Greenland**

*Giuseppe Parrella, Konstantinos Papathanassiou – German Aerospace Center; Irena Hajnsek – ETH Zurich / German Aerospace Center*

11:50      **Time series of high-res vertical snow profiles obtained from tomographic profiling using SnowScat**

*Othmar Frey – Gamma Remote Sensing / ETH Zurich; Charles Werner, Rafael Caduff, Andreas Wiesmann – GAMMA Remote*

12:10      **Recent Advances Towards Glacier Subsurface Information Retrieval by Means of Tomographic SAR Techniques**

*Georg Fischer, Konstantinos Papathanassiou – German Aerospace Center; Irena Hajnsek – German Aerospace Center/ETH Zurich*

12:30      **Discussion**

**13:00      Lunch Break**

Tuesday November 13th, 2018

**14:00 – 17:40     Soil & Hydrology Session**

**14:00     Surface Moisture and Vegetation Cover Analysis for Drought Monitoring in the southern Kruger National Park using Sentinel-1, Sentinel-2 and Landsat-8**

*Marcel Urban, Christian Berger – Friedrich-Schiller-University Jena; Tami E. Mudau – Council for Scientific and Industrial Research; Kai Heckel, John Truckenbrodt, Victor Onyango Odipo – Friedrich-Schiller-University Jena; Izak P.J. Smit – Scientific Services, South African National Parks; Christiane Schmullius - Friedrich-Schiller-University Jena*

**14:20     Hyper-temporal Water Body Dynamics Mapping using Sentinel-1 Time Series Clustering**

*John Truckenbrodt, Victor Onyango Odipo, Jan Bongard, Stefan Werner, Marcel Urban, Mikhail Urbazaev, Christiane Schmullius – Friedrich-Schiller-University Jena; Kathrin Weise - Jena-Optronik GmbH*

**14:40     Validation activity of a Sentinel-1 Soil Moisture product**

*Francesco Mattia, Anna Balenzano, Giuseppe Satalino, Francesco Lovergine – CNR-IREA; Jian Peng – LMU University & Oxford University; Urs Wegmüller, Oliver Cartus – Gamma Remote Sensing; Malcolm Davidson - ESA-ESTEC*

**15:00     SenThIS – A project for generating information from Copernicus Sentinel satellite data for the administration of the Free State of Thuringia: The application case soil moisture.**

*Carsten Pathe, Max Tobaschus, Martyna Stelmaszuk-Górska – Earth Observation Services GmbH; Christiane Schmullius – Friedrich-Schiller University Jena; Peter Krause, Sandra Naue – Turingian State Agency of Environment and Geology*

**15:20     Coffee Break**

**15:50     Soil moisture retrieval over Europe based on a fusion of Sentinel-1 and SMAP data implemented in the Google Earth Engine platform**

*Jan Musial – Institute of Geodesy and Cartography*

**16:10     Performance analysis of different SAR radiative transfer models for soil moisture estimation over the a test site in south Germany**

*Thomas Weiß, Thomas Ramsauer, Philip Mahrzahn – Ludwig-Maximilians-Universität München*

**16:30     Use of SAR-derived surface soil moisture to initialize the WRF model: effect on the forecast of two extreme weather events occurred in the Mediterranean region**

*Luca Pulvirenti, Martina Lagasio, Antonio Parodi, Lorenzo Campo – CIMA Research Foundation; Nazzareno Pierdicca – Sapienza University of Rome; Björn Rommen – ESA-ESTEC*

**16:50     Water status inversion from SAR closure phases**

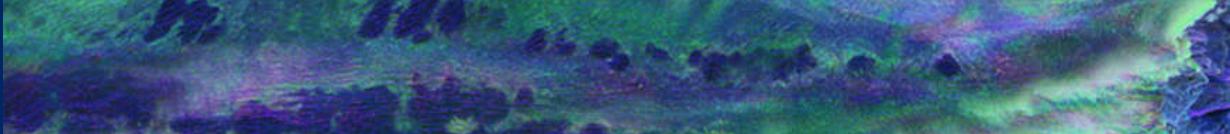
*Francesco de Zan, Giorgio Gomba – German Aerospace Center*

**17:10     Discussion**

**17:40     Break**

**18:10     Tutorial IV: Future Perspectives of SAR Systems and Missions**

*Gerhard Krieger – German Aerospace Center*



Wednesday November 14th, 2018

## 08:30 – 12:30 Forest Session I

- 08:30 **Experiences on biomass retrieval with spaceborne SAR backscatter at C- and L-band in Swedish forest**

*Maurizio Santoro, Oliver Cartus – GAMMA Remote Sensing; Johan Fransson – Swedish University of Agricultural Sciences*

- 08:50 **Exploiting multi-temporal and multi-frequency radar backscatter for above-ground biomass estimation in boreal and tropical forest**

*Oliver Cartus, Maurizio Santoro, Urs Wegmüller - GAMMA Remote Sensing; Björn Rommen – ESA-ESTEC*

- 09:10 **Forest Mapping exploiting Sentinel-1 interferometric time-series**

*Francescopaolo Sica, Andrea Pulella, Paola Rizolli – German Aerospace Center*

- 09:30 **Potential of Sentinel-1 time series for deforestation and forest degradation mapping in temperate and tropical forests**

*Mikhail Urbazaev, Felix Cremer, Christiane Schmullius, Christian Thiel – Friedrich-Schiller-University Jena*

- 09:50 **Biomass with InSAR**

*Svein Solberg – Norwegian Institute of Bioeconomy Research*

## 10:10 Coffee Break

- 10:40 **A Case for Polarimetric Phase: Dielectric Constant in Volume Scattering**

*Shane Cloude – AEL Consultants*

- 11:00 **A Machine Learning Approach to PolInSAR and LiDAR Data Fusion for Improved Tropical Forest Canopy Height Estimation Using NASA AfriSAR Campaign Data**

*Maryam Pourshamsi – University of Leicester; Mariano Garcia – University of Alcalá; Marco Lavalle – Jet Propulsion Laboratory; Heiko Balzter – Centre for Landscape and Climate Research*

- 11:20 **Retrieval of Forest biophysical parameters using L-band airborne multi-baseline UAVSAR datasets**

*Shubham Awasthi, Kamal Jain – Indian Institute of Technology Roorkee*

- 11:40 **TropiScat-2: A multifrequency tower-based scatterometer experiment at P,L,C bands for a better characterization of temporal effects impacting tropical forests backscatter**

*Salma El Idrissi Essebtey – ONERA/CESBIO; Ludovic Villard - CESBIO; Thierry Koleck - CNES; Pierre Borderies - ONERA; Thuy le Toan - CESBIO*

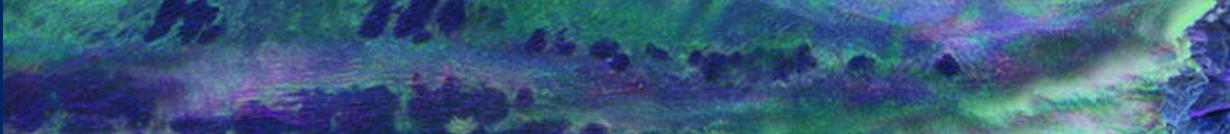
- 12:00 **Insights on temporal decorrelation from the AfriScat campaign: implications for the BIOMASS mission and beyond**

*Ludovic Villard – CESBIO; Alia Hamadi – ONERA/CESBIO; Pierre Borderies – ONERA; Salma El Idrissi Essebtey – ONERA/CESBIO; Thierry Koleck – CNES; Thuy le Toan – CESBIO*

## 12:30 Lunch Break

Wednesday November 14th, 2018

<b>14:00 – 18:00</b>	<b>Forest Session II</b>
14:00	<b>Forest remote sensing in Sweden</b> <i>Henrik Persson, Johan Fransson – Swedish University of Agricultural Sciences</i>
14:20	<b>Retrieval of terrain topography in tropical forest by P-Band SAR Tomography</b> <i>Mauro Mariotti d'Alessandro, Stefano Tebaldini – Politecnico di Milano</i>
14:40	<b>TomoSAR Focusing Through Statistical Regularization: A Way to Ease the Characterization of the Forest Structure</b> <i>Gustavo D. Martín del Campo Becerra, Andreas Reigber, Matteo Nannini – German Aerospace Center</i>
15:00	<b>P-Band Interferometry and Tomography for tropical forest parameters retrieval: lessons learned from BIOMASS preparatory studies</b> <i>Stefano Tebaldini, Mauro Mariotti d'Alessandro – Politecnico di Milano</i>
15:20	<b>Towards a Physical Interpretation of SAR Tomography for Forest Structure Estimation</b> <i>Victor Cazcarra-Bes, Matteo Pardini, Konstantinos Papathanassiou - German Aerospace Center</i>
<b>15:40</b>	<b>Coffee Break</b>
16:10	<b>An assessment of the contribution of multiple frequencies to the observation of 3-D forest structure by means of multi-baseline SAR data</b> <i>Matteo Pardini, Victor Cazcarra-Bes, Konstantinos Papathanassiou – German Aerospace Center</i>
16:30	<b>Ground and Volume Scattering Decomposition: The Pol-InSAR Perspective</b> <i>Konstantinos Papathanassiou, Matteo Pardini – German Aerospace Center</i>
16:50	<b>Understanding the link between Lidar and SAR measurements towards enhanced forest structure products: The model-based and the structure-based frameworks</b> <i>Matteo Pardini – German Aerospace Center; John Armston – University of Queensland; Wenlu Qi – University of Maryland; Seung Kuk – NASA/GSFC; Changhyun Choi, Victor Cazcarra-Bes, Maria Tello Alonso, Konstantinos Papathanassiou – German Aerospace Center; Ralph Dubayah – University of Maryland; Lola Fatoyinbo - NASA/GSFC</i>
17:10	<b>Discussion</b>
<b>18:00</b>	<b>Dinner</b>



Thursday November 15th, 2018

08:30 – 11:50	<b>Agriculture Session</b>
08:30	<b>Identification of Soil Tillage Change by Temporal Series of Sentinel-1 &amp; Sentinel-2</b> <i>Giuseppe Satalino – CNR-IREA; Francesco Mattia – CNR/ISSIA; Anna Balenzano, Francesco Lovergine – CNR-IREA; Michele Rinaldi, Angelo De Santis, Salvatore A. Colecchia – CREA-CI</i>
08:50	<b>Synergistic use of Sentinel-1 and Sentinel-2 data for the retrieval of bio- and geophysical parameters using a data assimilation approach</b> <i>Philip Marzahn – Ludwig-Maximilians-Universität Munich; Thomas Kaminski, Michael Vossbeck – The InversionLab; Tristan Quaife, Ewan Pinnington – University of Reading; Joris Timmermans – University College London; Björn Rommen, Claudia Isola – ESA-ESTEC</i>
09:10	<b>Using Sentinel-1 in Agricultural Applications - A case study in the Netherlands</b> <i>Susan Steele-Dunne – TU-Delft</i>
09:30	<b>Potential of Sentinel-1 time-series for crop monitoring and disturbance mapping in Thuringia</b> <i>Linara Arslanova, Nesrin Salepci, Marcel Urban, Felix Cremer – Friedrich-Schiller-University Jena; Carsten Pathe – Earth Observation Services GmbH; Larissa Torney, Christiane Schmullius – Friedrich-Schiller-University Jena</i>
09:50	<b>Separating Ground and Volume Scattering in Agricultural Crops using MB Polarimetric Interferometric SAR Data</b> <i>Hannah Joerg, Matteo Pardini, Alberto Alonso-Gonzales, Konstantinos Papathanassiou – German Aerospace Center; Irena Hajnsek - German Aerospace Center/ETH Zurich</i>
10:10	<b>Coffee Break</b>
10:40	<b>Automated time-series analysis integrating optical and SAR based biophysical indices for agricultural applications</b> <i>Neha Pankaj Hunka, Jana Slacikova, Lubos Kucera – GISAT s.r.o.</i>
11:00	<b>Evaluation of the double-bounce contribution in the retrieval of biophysical parameters of vegetation using Pol-InSAR with TanDEM-X bistatic data</b> <i>Noelia Romero-Puig, Juan M. Lopez-Sanchez, J. David Ballester-Berman – University of Alicante</i>
11:20	<b>Discussion</b>

Thursday November 15th, 2018

<b>11:50 – 15:40</b>	<b>General Land Use Session</b>
11:50	<b>Advanced Sentinel-1 Analysis Ready Data for the Ghana Open Data Cube and Environmental Monitoring</b> <i>Jörg Haarpaintner – Norut-Northern Research Institute; Brian Killough – NASA-CEOS; Stella Ofori-Ampofo, Edward O. Boamah – CERSGIS</i>
12:10	<b>Demonstrations of Wide-area Radar Backscatter Time Series Applications</b> <i>David Small, Christoph Rohner – University of Zurich; Nuno Miranda – ESA-ESRIN; Stephen Howell – Environment and Climate Change Canada; Marius Rüetschi, Lars Waser – Swiss Federal Institute for Forest, Snow and Landscape Research WSL</i>
<b>12:30</b>	<b>Lunch Break</b>
13:30	<b>Use of L-band polarimetric data to classify flooded areas beneath vegetation</b> <i>Nazzareno Pierdicca – Sapienza University of Rome; Luca Pulvirenti, Giorgio Boni, Giuseppe Squicciarino – CIMA Research Foundation; Marco Chini – Luxembourg Institute of Science and Technology</i>
13:50	<b>SInCohMap: Land Cover Classification and Vegetation Mapping based on Sentinel-1 Multi-Temporal Interferometric Coherence</b> <i>Fernando Vicente-Guijalba - Dares Technology; Alexander Jakob – Eurac Research; Juan Manuel Lopez-Sanchez – University of Alicante; Carlos López-Martínez – Luxembourg Institute of Science and Technology); Dariusz Ziolkowski – IGIK; Claudia Notarnicola – Eurac Research; Javier Duro – Dares Technology; Ruth Sonnenschein – Eurac Research; Agata Hoscilo, Katarzyna Dqbrowska, Zbigniew Bochenek – IGIK; Jordi J. Mallorqui – Universitat Poltecnica de Catalunya; Erik Pottier – Universite de Rennes 1; Marco Lavalle – JPL; Marcus Engdahl – ESA-ESRIN</i>
14:10	<b>Land observations with L-band bistatic systems</b> <i>Leila Guerriero – University of Rome Tor Vergata; Nazzareno Pierdicca – Sapienza University of Rome; Marco Brogioni – IFAC-CNR; Davide Comite, Fabio Fascati – Sapienza University; Nicolas Floury – ESA-ESTEC</i>
14:30	<b>Improved multi satellite retrieval by combining SAR with Optical observations - The MULTIPLY framework</b> <i>Joris Timmermans, Peter van Bodegom – Leiden University; Philip Marzahn, Thomas Weiss, Thomas Ramsauer – Ludwig-Maximilians-Universität Munich; Jose Gomez Dans, Feng Yin - University College London; Tonio Fincke – brockmann consulting; Nicola Pounder, Gerardo Lopes Saldana – Assimila</i>
14:50	<b>Multi-temporal approach for the detection of temporary flooded vegetation based on Sentinel-1 data</b> <i>Viktoriya Tsyganskaya – Ludwig-Maximilians-Universität Munich; Sandro Martinis – German Aerospace Center; Philip Marzahn - Ludwig-Maximilians-Universität Munich</i>
<b>15:10</b>	<b>Coffee Break &amp; Discussion</b>
15:40	<b>Review of the BioGeoSAR workshop</b>