

The Pol-InSAR Course

...an (experimental) SAR Training Course

Prepared by DLR-HR's Pol-InSAR Team

German Aerospace Center (DLR), Microwaves & Radar Institute (HR), Pol-InSAR Research Group

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ESAMAAP

EEBIOMASS



Course Content & Outline

Synthetic Aperture Radar - SAR

1. **1D Focusing in Range & Azimuth:** Spatial resolution, SAR principle, Matched Filter, ...
2. **2D Focusing of a SAR image:** 2D array processing, speckle, multi-looking, ...

SAR Polarimetry - PolSAR

1. **Scattering matrix:** basis dependent interpretation of scattering mechanisms, ...
2. **Covariance matrix:** depolarization, eigen-vectors/–values, decomposition, ...

SAR Interferometry - InSAR

1. **Interferogram formation:** image co-registration, flat earth removal, geometric interpretation, ...
2. **Coherence estimation:** coherence estimators, decorrelation contributions, volume decorrelation, ...

Polarimetric SAR Interferometry - PolInSAR

1. **Forest height inversion – Part 1**
2. **Forest height inversion – Part 2**

SAR Tomography - TomoSAR

1. **3D Focusing – Part 1**
2. **3D Focusing – Part 2**

Course Content & Outline

Synthetic Aperture Radar - SAR

1. 1D Focusing in Range & Azimuth: Spatial resolution, SAR principle, Matched Filter, ...
2. 2D Focusing of a SAR image: 2D

SAR Polarimetry - PolSAR

1. Scattering matrix: basis dependence
2. Covariance matrix: depolarization

SAR Interferometry - InSAR

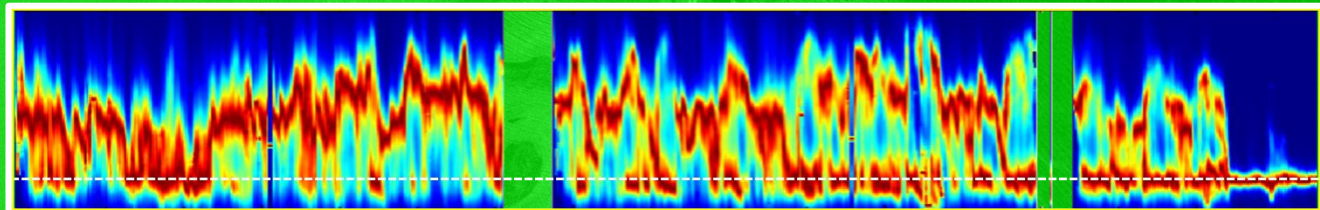
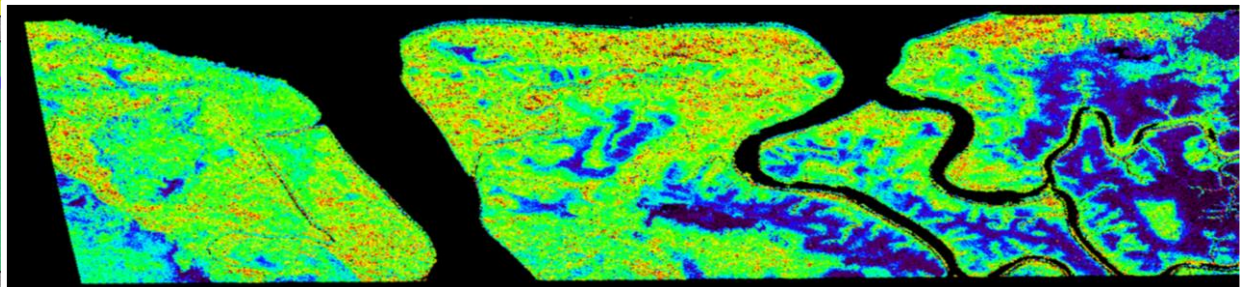
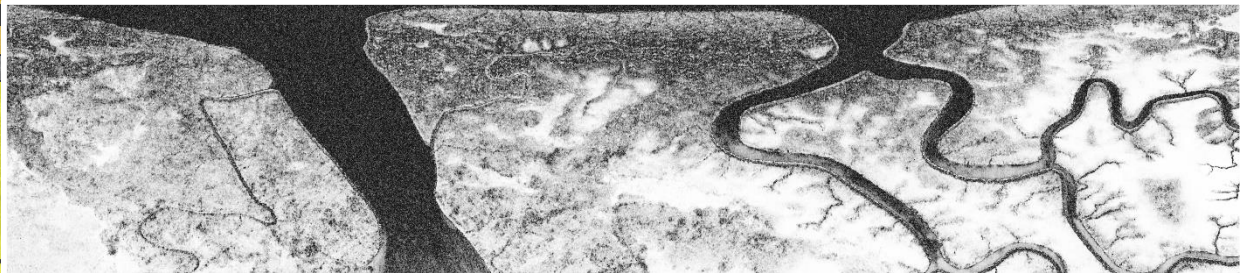
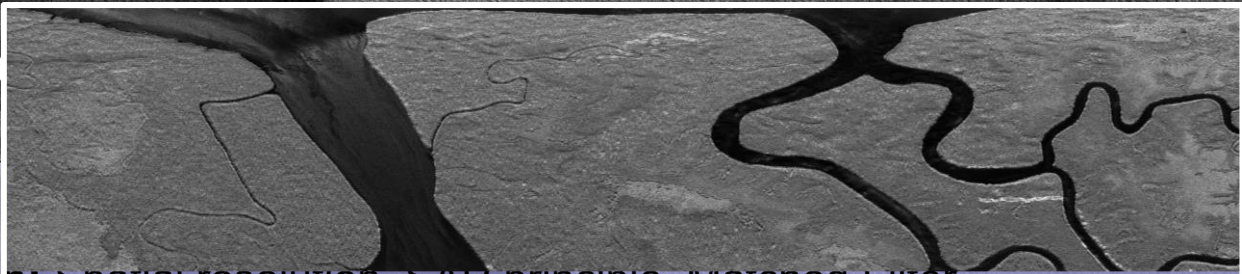
1. Interferogram formation: image
2. Coherence estimation: coherence

Polarimetric SAR Interferometry - PolInSAR

1. Forest height inversion – Part 1
2. Forest height inversion – Part 2

SAR Tomography - TomoSAR

1. 3D Focusing – Part 1
2. 3D Focusing – Part 2



Course Format

Mon

Theoretical Background (~60min) + Introduction of Exercise(s) (~60min)

Tue

Wed

Check Point: Discussion of problems & results, questions & answers (~60min)

Thu

Fri

Closing Session: Discussion of results, questions & answers (~60min)

Sat

Sun

Course Keywords

- Python – Exercises in Jupiter Notebooks to be resolved by each participant.
- No background- / prior-knowledge on SAR is expected – but knowledge is always useful !
- Some basic-knowledge on programming (... in Python ?) could make life easier.
- BIOMASS Mission Algorithm & Analysis Platform (MAAP)
- This is an experiment and you are part of it ... this also means you can / should form it !

Course Timeline

Synthetic Aperture Radar - SAR

- | | |
|-----------------------------------|---------------------|
| 1. 1D Focusing in Range & Azimuth | Week 22 31.05-06.06 |
| 2. 2D Focusing of a SAR image | Week 23 07.06-12.06 |

SAR Polarimetry - PolSAR

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|-------------------------------------|---------------------|
| 1. Scattering matrix interpretation | Week 24 13.06-20.06 |
| 2. Covariance matrix interpretation | Week 25 21.06-27.06 |

SAR Interferometry - InSAR

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|------------------------------|---------------------|
| 1. Interferogram formation | Week 26 28.06-04.07 |
| 2. Interferometric coherence | Week 27 05.07-11.07 |

Polarimetric SAR Interferometry - PolInSAR

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|-------------------------------------|-----|
| 1. Forest height inversion – Part 1 | tbd |
| 2. Forest height inversion – Part 2 | tbd |

SAR Tomography - TomoSAR

- | | |
|-------------------------|-----|
| 1. 3D Focusing – Part 1 | tbd |
| 2. 3D Focusing – Part 2 | tbd |

Course Shedule

Mon

14:00 – 16:00 The first Monday (31.05 may be 30 min longer)

Tue

Wed

16:00 – 17:00

Thu

Fri

15:00 – 16:00

Sat

Sun

Times can change with / adapt on the development of the course. But we start with this and will see ☺

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