3D SAR IMAGING OF NATURAL MEDIA AND GEOPHYSICAL PARAMETER RETRIEVAL

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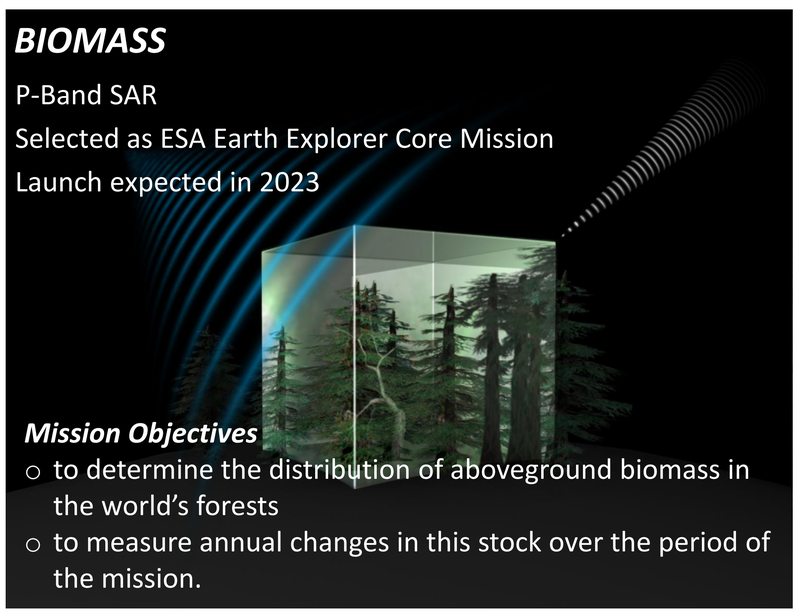
SYNTHETIC APERTURE RADAR TOMOGRAPHY

Spaceborne SAR Tomography will extend the EO capabilities of SAR systems to provide 3D imaging

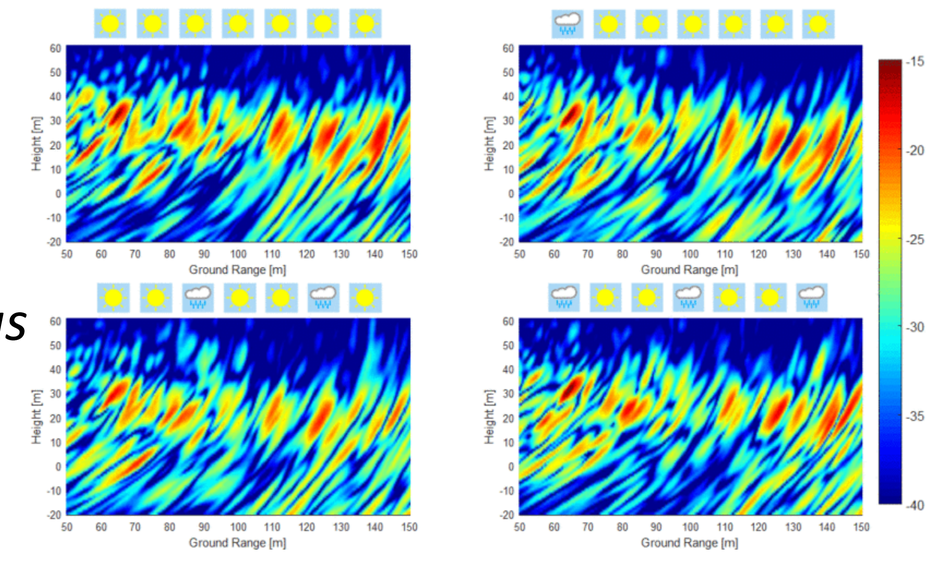
⇒ high-res, wide coverage imaging of the interior structure of natural media from space



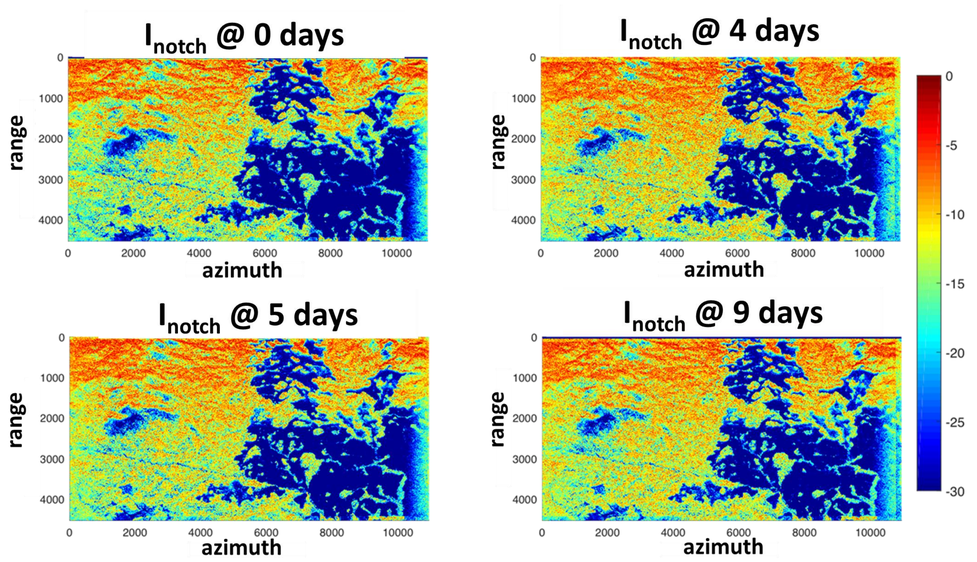
TEMPORAL DECORRELATION

Experiments based on airborne and ground-based InSAR and TomoSAR data indicate that the impact of temporal variations is larger on scarcely vegetated areas, whereas in high biomass regions the radiometric error is limited to within 1dB.

Tomography under changing weather conditions (multi-temporal TropiSCAT data)



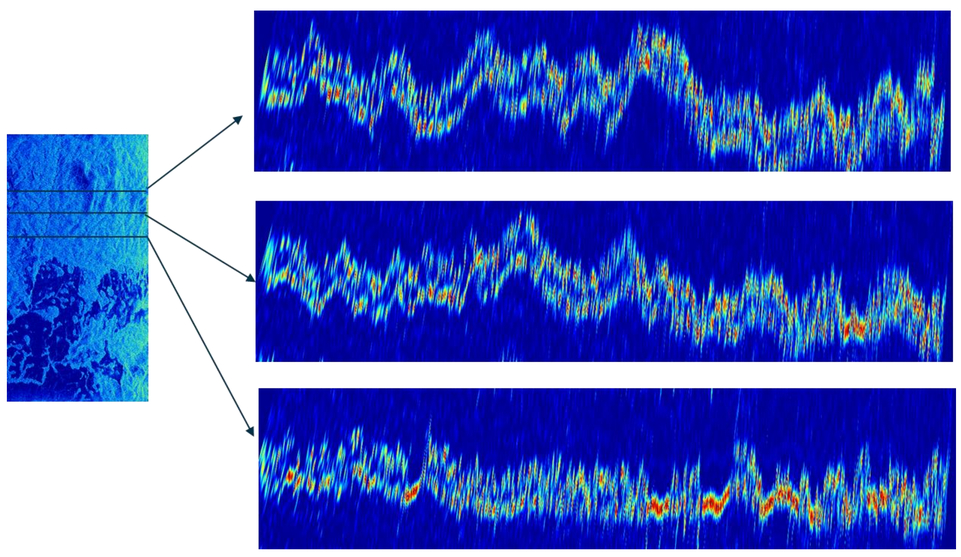
Intensity after ground-cancellation (multi-temporal AfriSAR data)



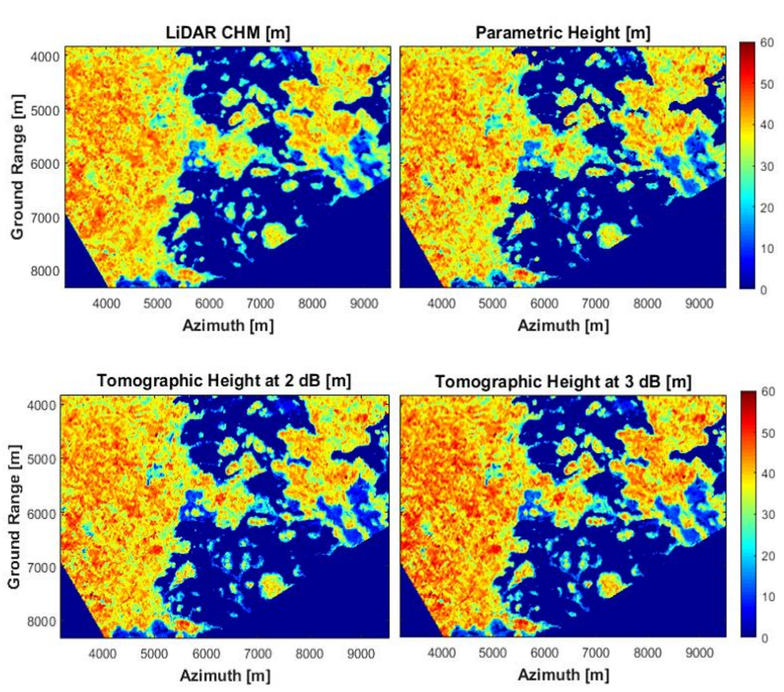
FOREST HEIGHT RETRIEVAL

Comparison between model-based inversion vs tomographic retrieval.

Results suggest joint use of non-parametric and parametric methods, to merge unbiasedness of model-based retrieval and the computational efficiency and accuracy of SAR tomography



Accuracy ≈ 3 m over 30-50 m height range (AfriSAR data)



PROCESSING OPTIONS FOR HIGH RESOLUTION TOMOGRAPHY

Analysis of imaging accuracy achievable by 1D, 2D, 3D imaging methods vs. resolution, depth, and trajectory regularity

Fast method for simultaneous trajectory correction and 3D focusing

High-resolution L-Band tomography of an Alpine glacier (AlpTomoSAR data)