POTENTIALS OF SAOCOM-CS TOMOGRAPHY FOR BOREAL FOREST BIOMASS RETRIEVAL

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This paper concerns the evaluation of the performance of the future SACOOM-CS spaceborne mission for the characterization of boreal forests. This assessment is based on estimates and indicators obtained from airborne tomographic acquisitions led during the BioSAR 2 campaign. A comparison is led between results obtained from original high-quality measurements to those derived from degraded data sets, resulting from the transformation of the airborne signal according to the SAOCOM-CS mission specifications.

Apart from obvious changes between airborne and spaceborne configurations, particular features are accounted for in this study:

- Unlike classical tomogarphic sensors, SAOCOM-CS will not acquire N SLC 2-D data sets, but instead (N-1) pairs of interferometric images with a low level of correlation between every two pairs. This aspect needs to be handled by a specific tomographic focusing scheme
- The reduced range resolution in a spaceborne configuration deteriorates the spatial resolution of the retrieved results and affects tomographic performance through the range decorrelation effect.
- Compared to airborne measurements, spaceborne acquisitions are affected by lower SNR figures as well as by potential temporal decorrelation between the acquisitions

The influence of each of these factors on the estimation performance is first tested individually and is then assessed globally.

Forest biomass retrieval was based on two key observables that can be easily computed from tomographic products:

- the total integrated volumetric backscatter from 10m above the ground and up.
- average scatterer height, computed as the mean of the height above ground weighted by the returned intensity for each voxel.

As a result, simulated SAOCOM-CS tomographic data have been observed to produce biomass retrievals from boreal forest matching or surpassing those obtained from L-band ESAR full resolution backscatter images.