EXTRAPOLATION OF AIRBORNE POLARIMETRIC AND INTERFEROMETRIC SAR DATA FOR VALIDATION OF BIO-GEO-RETRIEVAL ALGORITHMS FOR FUTURE SPACEBORNE SAR MISSIONS

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1. INTRODUCTION

Spaceborne SAR system concepts and mission design is often based on algorithms developed and the experience gathered from airborne SAR experiments and associated dedicated campaigns. However, airborne SAR systems have better performance parameters than their future space-borne counterparts as their design is not impacted by mass, power, and storage constraints.
This paper describes a methodology to extrapolate spaceborne quality SAR image products from long wavelength airborne polarimetric SAR data which were acquired especially for the development and validation of bio/geo-retrieval algorithms in forested regions. For this purpose not only system (sensor) related parameters are altered, but also those relating to the propagation path (ionosphere) and to temporal decorrelation.

2. SIMULATION SUMMARY

The following simulation steps are performed:

- reduction of processed bandwidth (to reduce resolution)
- insertion of Gaussian noise (to increase the NESZ)
- insertion of range and azimuth ambiguities [1]
- insertion of phase noise for temporal decorrelation
- insertion of ionospheric effects (Faraday rotations and scintillations) [2]

The selected polarimetric and interferometric data sets have been acquired by the E-SAR sensor in L- and P-band during different campaigns over tropical rain forest in Indonesia [3], as well as over boreal forest in Sweden [].

The extrapolated space-borne quality data are meant to serve for algorithm validation supporting different mission concepts like TerraSAR-L [4] and BIOMASS [5].

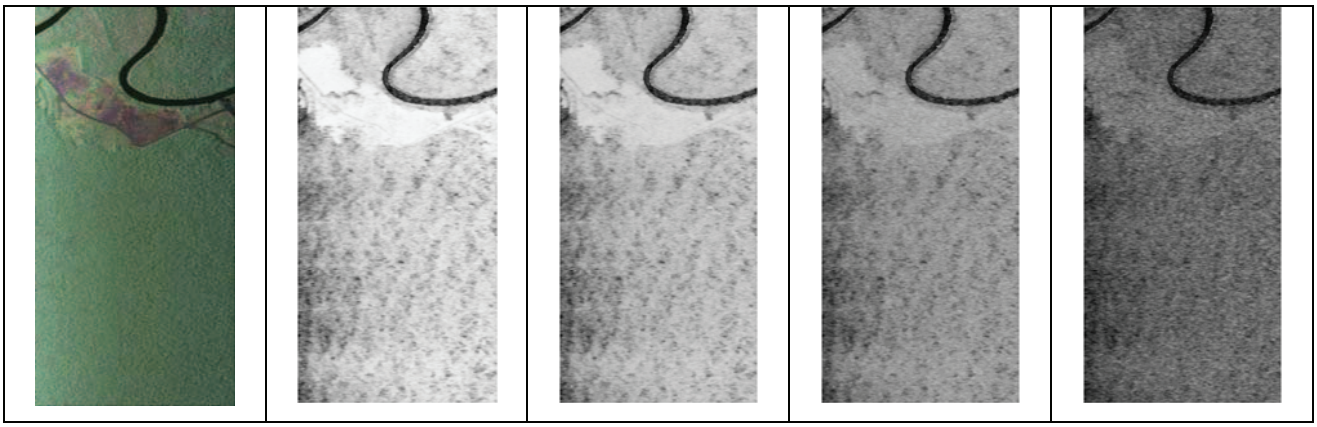

Figure 1: Controlled insertion of temporal decorrelation: polarimetric color composite after spaceborne simulation, and four levels of coherence (unmodified original, and temporal coherence = 0.9, 0.7, and 0.5)

An example of space-borne simulated interferometric L-band data with controlled insertion of temporal decorrelation is presented in Figure 1 according to TerraSAR-L specification. The data were acquired in 2004 during the INDREX-II campaign in Kalimantan, Indonesia. The area includes distorted (close to the river) and undistorted tropical rain forest.

The ionospheric effects to alter the data have been obtained by numerical simulation using the parameterized WBMOD ionospheric model [2].

3. REFERENCES

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