VEGETATION STRUCTURE ANALYSIS AND VISUALIZATION FRAMEWORK FOR MB–POLINSAR DATA IN RAT

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1. ABSTRACT

This paper presents a free software framework for the analysis of vegetated areas using SAR data. In particular, the new module is directed towards the analysis and visualization of vegetation characteristics and vertical structure using (single- and multi-baseline (SB/MB)) polarimetric SAR interferometry (PolInSAR). This module is based on the free and open–source software package RAT (Radar Tools), which provides a large amount of import, processing and visualization procedures for single–channel, polarimetric, interferometric, and SB/MB–PolInSAR radar data, including for sensors such as ESAR, FSAR, UAVSAR, RAMSES, PI-SAR, CONVAIR, EMISAR, ENVISAT, TerraSAR, RadarSAT-2, ALOS, and others.

2. INTRODUCTION

The combination of SAR Polarimetry (PolSAR) and SAR Interferometry (InSAR) into Polarimetric SAR Interferometry (PolInSAR) has shown great potential for vegetation parameter retrieval from radar data. Several approaches have been developed to retrieve indicators about the vegetation characteristics and the vertical structure [4–12]. In this paper we present a framework for the analysis and visualization of these indicators for multi–baseline polarimetric interferometric data. The features include analysis and visualization of these indicators on the level of pixels, regions, and range and azimuth profiles. Considered are the common polarimetric and interferometric characteristics, as well as the visualization of vertical profiles using different approaches. The goal of this framework is to provide a comparison of these different approaches, and to enable a fast and easy way to get an overview of the data.

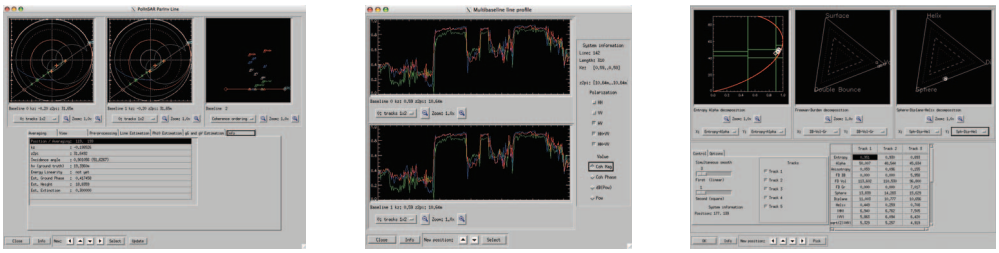

Fig. 1. Some vegetation area analysis and visualization tools for polarimetric interferometric SAR data.

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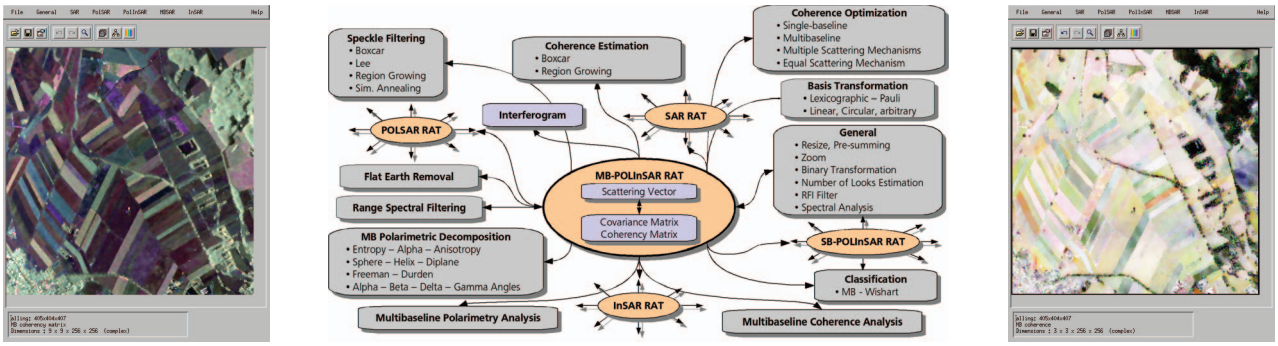

Fig. 2. RAT: Radar Tools for SAR data import, processing, visualization, and analysis.

This vegetation structure module is based on the RAT (Radar Tools) software, which has been started by Andreas Reigber as a students' project at the Berlin University of Technology in 2003–2004. RAT provides an open source platform for radar software development and discussion. It contains a collection of tools for advanced image processing and analysis of SAR remote sensing data, including single channel SAR, PolSAR, InSAR and SB/MB–PolInSAR [1, 2]. It is programmed in IDL (Interactive Data Language) and uses IDL widgets as graphical user interface. RAT is available on the web and is distributed under a free software license [3]. It is developed by the core development team, with the valuable help and contributions from many individual volunteers around the world including Tisham Dhar, Masaki Kawai, Marcus Steiof, Stephane Guillaso, Franz Meyer, Marcus Saemmang, Jan-Christoph Unger, Marc Jäger, Thomas Weser, Oliver Bach, Bert Wolff, Andre Lehmann, Nicole Bouvier, Mathias Weller, and others.

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