ASSESSMENT OF TROPICAL FOREST BIOMASS: A CHALLENGING OBJECTIVE FOR THE BIOMASS MISSION

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Forests have an important role in tropical countries by providing renewable resources, raw materials and energy, maintaining biological diversity, and protecting land and water resources. Moreover, tropical forests hold a large fraction of the terrestrial carbon, and they thus play a major role in the global carbon cycle. When forests are cleared or degraded, the stored carbon is released to the atmosphere, and the carbon sinks are altered. Central to these carbon flux calculations is forest biomass, for which there are no current source of global gridded biomass data except at very coarse resolution. To quantify tropical forest biomass and its dynamics is therefore required for approaches to managing climate, e.g. of the UNFCCC initiative known as Reducing Emissions through Degradation and Deforestation (REDD+).

In response to the need for greatly improved mapping of global biomass, the BIOMASS mission was proposed to the European Space Agency for the third cycle of Earth Explorer Core missions. Over the five-year mission lifetime, it will map the full range of the world's above-ground biomass with accuracy and spatial resolution compatible with the needs of national scale inventory and carbon flux calculations. The mission will carry a polarimetric P-Band SAR, capable of providing polarimetric interferometry (Pol-InSAR), and tomographic SAR data, for both measurements of biomass and measurements of forest height derived. During the first phase of the project, biomass retrieval algorithms were developed and validated in temperate to boreal forest environments for a biomass range up to 300 t/ha, a high end for such forests. One important question which remained to be addressed is the performances of the retrieval algorithms in dense tropical forests. In situ estimation of biomass is difficult in tropical forests, and there is no spaceborne sensors capable of measuring such high range of biomass. To address this question, the TropiSAR airborne campaign has been conducted in August 2009 over the tropical rain forests in French Guiana. The forests have high biomass density (up to 450-500 ton/ha at 1 ha scale), and are well monitored by an extensive in situ dataset collected over more than two decades. The database collected by TropiSAR have been used to develop and assess the biomass retrieval methods. In this contribution, we will address the BIOMASS mission, the importance to measure tropical forest biomass, and will summarise the recent results on the retrieval of tropical forest biomass using P-band SAR data.