Final report on techniques deriving land cover and earth surface deformation information from Polarimetric Sar Interferometry

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Due to the successful already launched polarimetric radar sensors, ENVISAT-ASAR (March 02), ALOS-PALSAR (January 06), TerraSAR-X (June 07) and RADARSAT-2 (December 07), it is now shown that the accelerated advancement of PolSAR and PolInSAR techniques is of direct relevance and of priority to local-to-global environmental ground-truth measurement and validation, stress assessment, and stress-change monitoring of the terrestrial and planetary covers. PolSAR and Pol-InSAR remote sensing techniques offer efficient and reliable means of collecting information required to extract biophysical and geophysical parameters about the Earth's surface and have found successful applications in crop monitoring and damage assessment, in forestry clear cut mapping, deforestation and burn mapping, in land surface structure (geology) land cover (biomass) and land use, in hydrology (soil moisture, flood delineation), in sea ice monitoring, in oceans and coastal monitoring (oil spill detection) etc â€¦ Based on the experience accumulated and gained during the DRAGON-1 project, the DRAGON-2 project is intended to strengthen the established and already fruitful collaborations between European and Chinese partners and experts in polarimetric interferometric SAR (PolInSAR) and quantitative forest sciences. The team composition of the ID. 5344 Project is the following: Prof. E. Pottier (IETR, Univ. Rennes 1, France), Dr. S.R. Cloude (AELc, UK), Dr. K.P. Papathanassiou (DLR-HR, Germany), Prof. Zengyuan Li (IFRIT-CAF, China), Pr.-Dr. Erxue Chen (IFRIT-CAF, China), Pr.-Dr. Wen Hong (IECAS-MITL, China), Pr.-Dr. Maosheng Xiang (IECAS-MITL, China), Prof. Chao Wang (CEODE-CAS, China), Dr. Hong Zhang (CEODE-CAS, China) and Dr. Xinwu Li (CEODE-CAS, China). In this paper we provide a final report of all the activities carried out under the DRAGON collaborative program in a project concerned with the application of Pol-InSAR to deriving land cover and Earth Surface deformation information. This project (ID. 5344) is based around four main scientific topics: Land Cover Analysis, Earth Surface Deformation Monitoring and DEM Extraction, Forest Vertical Structure Parameters Extraction and PolSARpro Software Development. We propose a brief summary of the project objectives and a final report of each Work Packages, concentrating on different developments, original results and important highlights that have been carried out during the project.

极化干涉SAR提取土地覆盖和地表形变信息技术报告

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极化雷达传感器ENVISAT-ASAR（2002年3月）、ALOS-PALSAR（2006年1月）、TerraSAR-X9（2007年6月）和RADARSAT-2（2007年12月）的成功发射使得极化SAR技术和极化干涉SAR技术显示加速发展的趋势，该技术是与当地到全球尺度下地面环境真实数据测量和验证、环境压力评估、地面及行星表面环境压力变化监测等直接相关的优先发展方向。极化SAR技术和极化干涉SAR技术为提取地表生物物理参数和地球物理参数提供了高效可靠的方法，并已成功应用于农作物监测和灾害受损评估研究；森林皆伐、采伐、火灾制图研究；地表结构（地质结构）、土地覆盖（生物量估测）及土地利用研究；水文（土壤水分、洪区监测）、海冰监测、海洋和沿海监测（石油泄漏探测）研究。基于龙计划一期项目积累的经验，龙计划二期项目旨在进一步加强极化干涉SAR及定量林业科学领域中中欧合作者及专家间已建立的富有成效的合作交流。其中，5344项目组成员如下：E.Pottier教授（IETR, Univ. Rennes 1, France），S.R.Cloude博士（AELc, UK），K.P.Papathanassiou博士（(DLR-HR, Germany），李增元教授（中国林业科学研究院资源信息研究所，中国），陈尔学教授（中国林业科学研究院资源信息研究所，中国），洪文教授（中国科学研究院电子学研究所-微波成像技术重点实验室，中国），向茂生教授（中国科学研究院电子学研究所-微波成像技术重点实验室，中国），王超教授（中国科学院对地观测与数字地球科学中心，中国），张红博士（中国科学院对地观测与数字地球科学中心，中国），李新武博士（中国科学院对地观测与数字地球科学中心，中国）。 本文提供在龙计划合作框架下关于地表覆盖和形变监测及DEM提取、森林垂直结构参数提取和polSARpro软件开发的所有最终成果。该项目组（项目编号：5344）围绕四个主要的科学问题------地表覆盖分析、地表形变监测及DEM提取、森林垂直结构参数提取、polSARpro软件开发展开。本文提出了针对该项目目标的简要总结和每一模块的最终报告，重点关注项目完成中新颖的进展、原始的创新和关键的亮点。