

Monitoring Cryosphere Dynamics in the Tibetan Plateau with Integrated Earth Observations

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The objective of this project will be concentrated on the Cryosphere dynamics in the Tibetan Plateau by the synergistic use of microwave and optical earth observations as well as ground measurements. According to the data analysis and numerical simulation, the interaction between glacier, permafrost and plateau lake dynamics will be exploited through methodology development and Virtual Geographic Environment (VGE) system integration. The relationship of the plateau environmental condition and global climate change will be further studied in supporting the regional sustainable development, e.g. water balance estimation and engineering structures safety operation.

The primary developed methodologies will be: (1) a synergistic analysis and interpretation of multi-source SAR data, optical satellite imagery and ground-based glaciological data for glacier facies, glacier DEM extraction and surface velocity estimation; (2) new fusion algorithms for lake identification and change detection using multi-temporal, multi-source satellite remote sensing imagery and satellite radar or lidar altimetry data; (3) permafrost geo-parameter extraction and surface deformation monitoring jointly using ground-based measurements, SAR interferometry as well as numerical estimation models; (4) an integrated VGE platform for multi-dimensional visualization, geospatial analysis, dynamical modeling and decision-marking for geological and environmental process.

Under the funding support from National Natural Science Foundation, The National High Technology Research and Development Program (863) of China, this project will be implemented based on the planned schedule. The potential deliverables will include new developed methodologies and an integrated VGE analysis prototype.

青藏高原冰川冻土动态演化模式集成对地观测研究

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本项目研究目标是：综合利用微波/光学遥感和地面实测数据，监测我国青藏高原低温极寒区动态演化过程；即通过数据分析和数值建模，在关键算法研制和虚拟地理环境平台集成基础上，研究冰川、冻土和高原内陆河动态交互过程，探索高原环境因子同全球气候变化之间的响应，支撑区域可持续发展，例如区域水资源平衡和大型基建安全运营。

项目研发的方法包括：1) 综合利用多源SAR/光学遥感数据和地面冰河实测资料，提取冰川剖面、高程和移动速度场；2) 融合多时相/多源卫星遥感和激光雷达数据，研究内陆河信息提取和动态监测算法；3) 利用地面实测、数值模拟和雷达干涉技术，提取冻土地表物理参数和形变信息；4) 研究基于虚拟地理环境的地学环境过程分析平台，用于增值产品多维显示、地理空间分析、动态建模及智能决策。

在国家自然科学基金和国家"863"项目共同支持下，项目将按计划实施；预期成果包括新型算法研制和虚拟地理环境原型研发。