Glacier Change and its Hydrological Effects in the Yigong Zangbo & Palong Zangbo Catchments

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The scope of this study is to illustrate the capabilities of multi-source remote sensing data for an assessment of glacier change and its hydrological effects in the Yigong Zangbo & Parlung Zangbo Catchments. The project will investigate the use of multi-temporal and synergistic use of EO data to accurately identify and monitor dynamics of glaciers and how they are changing over time. The innovative character mainly includes four aspects:

1) Synergistic data sets from optical and microwave images will be used to detect glacier length, area and boundaries change by means of neural network and machine learning methods.
2) InSAR measurement of glacier ice-velocity fields. multi-temporal filtering to reduce speckle in SAR images will be used since it hardly reduces the spatial resolution of the image and preserves fine structures; Minimum Cost Flow (MCF) techniques and a Triangular Irregular Network will be used for phase unwrapping; small baseline SAR interferometry will be used since small baseline should improve the quality of interferogram. The German group can support this task in applying the GAMMA software tools.
3) Synergistic data sets from remote sensing and GIS (DEM) will be used to evaluate glacier volume, elevation, mass balance change and to assess water resource potential.
4) Glacier change, its hydrological effects and climatic change background will be systematically examined based on the integration of remote sensing and GIS, and a comprehensive digital database for glacier inventory in the two catchments will be established under the regime of global warming.

It is expected that frequent acquisition of multi-source remote sensing data improves the ability to correctly and accurately identify glacier change in the two catchments.

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易贡藏布和帕隆藏布流域冰川变化及其水文效应研究

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该项目主要是说明应用多源遥感数据评价易贡藏布和帕隆藏布流域的冰川变化及其水文效应，探讨多时相地球观测数据在精确识别和监测冰川变化的应用，及其随时间变化的规律。有以下四个方面的新意：

1） 基于光学和微波遥感图像数据集，应用神经网络和机器学习的方法分析冰川长度、面积和边界变化。

2） 基于雷达干涉测量的冰川流速场测量。应用多时域的滤波器来去除雷达图像的噪声，已使雷达图像的空间分辨率不降低，而且能够保持图像的细节特征。用MCF技术和TIN方法进行相位解缠。而且只考虑小基线干涉条件下的流速场测量，因为小基线能改善干涉图的质量。

3） 综合应用遥感和GIS数据评价冰川的体积、高度、长度和物质平衡变化，进而分析对水资源的潜在影响。

4） 基于遥感和GIS方法，系统研究冰川变化、水文效应及其气候变化的背景和原因，建立两个流域的冰川变化数据库。

期望多源遥感的高频获取能够改善两个流域冰川变化的精确识别能力。