

X-band multi-temporal InSAR analyses in China*Perissin, Daniele*¹; *Wang, Zhiying*²; *Rocca, Fabio*²¹CUHK/POLIMI; ²POLIMI

In this work we will report the results of the research carried out within the framework of the Dragon 2 project by the "Topographic measurement" team, ID 5297. Since the beginning of the Dragon exchange program, our group is working on the development of InSAR processing techniques to retrieve geophysical parameters of the analyzed terrain in China. The research developed in Dragon 2 has been focused mainly on processing X-band data in different conditions and for different purposes. Here we will summarize the results we got in the following tests-sites. In Shanghai, about 35 Cosmo SkyMed images have been processed, revealing incredible details of the ground subsidence. In particular, the tracks of the new subway lines have been detected from the narrow settlement of the surface above. In Tianjin, we detected on a very wide area the subsidence due to water extraction exploiting about 40 TerraSAR-X images. The results have been compared with an L-band analysis carried out with ALOS data and with a set of measurement from optical leveling, revealing a few millimeters dispersion. In Hong Kong, we carried out an experimental validation of the movement of a set of Corner Reflectors detected by TerraSAR-X data. The Reflector height was adjusted manually by independent personnel and cross-checked with InSAR measurements retrieved blindly. The accuracy was found close to 1mm (that is, close to the precision of leveling instruments). In the Three Gorges region, 30+30 Cosmo SkyMed data acquired along ascending and descending passes were analyzed to reconstruct the 3D shape of the Three Gorges Dam and to monitor its stability. At the same time, the landslides affecting the river banks have been detected and compared from the two datasets, revealing interesting details. In this work, we will report the main results and discuss all advantages given by the high resolution as well as the technical issues that one has to deal with X-band and short revisit time.

Dragon project id

02 TERRAIN MEASUREMENT (ID. 5297)

中国境内基于X波段的多时段InSAR分析

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这里我们将汇报龙计划2期"Topographic measurement"小组 (ID5297) 最近的研究成果。本小组从龙计划交流项目开展以来一直致力利用InSAR处理技术提取中国地理特征参数的研究。在龙计划2期, 本小组主要对不同条件、不同目标的X波段SAR数据进行分析处理, 所获得的成果可总结如下: a) 上海, 通过35幅 Cosmo SkyMed影像的分析, 详细地揭示了上海地区的沉降情况, 尤其是通过地表的沉降, 我们成功地跟踪了新近修建地铁的轨迹; b) 天津, 我们通过对40幅TerraSAR-X影像的处理, 发现了一大块由于地下水采集造成的沉降区域, 并于与波段的ALOS数据和大量的光学测量结果进行了分析比较, 只有毫米级的差别; c) 香港, 在香港, 我们制作了角反射器, 并比较了人工检测结果和通过InSAR技术对TerraSAR-X进行处理所得结果, 发现基于X波段的InSAR所得结果的精度逼近1mm (即水准仪的精度); d) 三峡, 在三峡地区, 通过30幅升轨和30幅降轨 (共60幅) Cosmo SkyMed影像处理, 重建了三峡大坝的3D模型, 并监测了其稳定性。同时还检测到山体滑坡对河堤影响, 并对升轨和降轨分析结果进行了比较, 发现了许多兴趣点。本报告将汇报主要结果, 讨论高分辨率、高回访周期X波段SAR的优势及相关处理技术。

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