ESA - MOST Dragon 2 Programme

2011 DRAGON 2 SYMPOSIUM

中国科技部-欧洲空间局合作 "龙计划"二期

"龙计划"二期2011年学术研讨会

Project Summary

ID 5343: Earth Surface motion from space over Three Gorges Dam, Tibet and Jiangsu

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and the Three Gorges Dam team

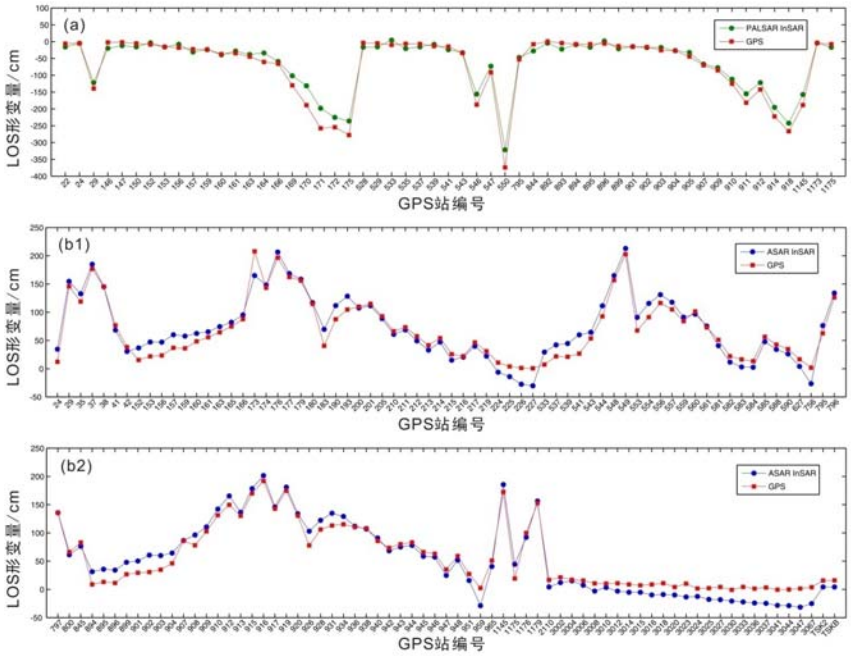
Friday, 24 June 2011

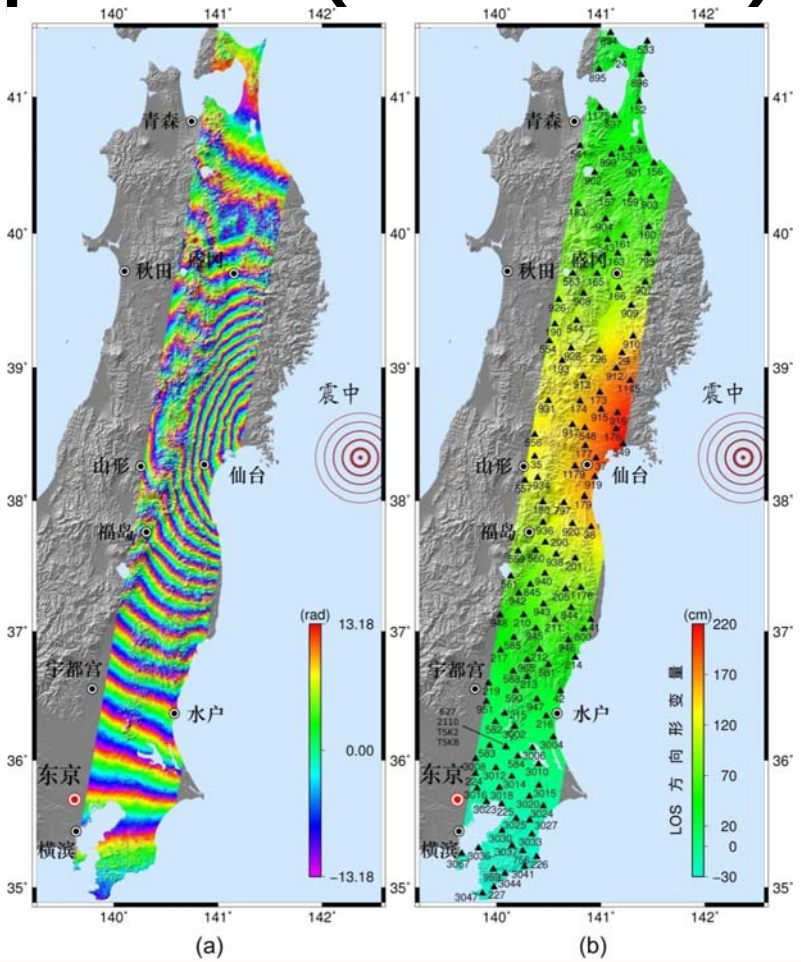
Main Results (Overview)

1. Co-seismic deformation of Japanese Earthquake measured using InSAR processing
2. Crustal displacement field of Dunxiiong Earthquake (2008) surveyed by PS InSAR and SBAS time series
3. Qinghai-Tibet railway deformation mapped using SBAS time-series technique
4. ROI-PAC plugin Software for ScanSAR & AP available
5. Assessment of spaceborne DEMs using ICESat
6. Pre-landslide slope movement of Shuping Landslides (3G) measured using SAR image correlation analysis
7. Landslide Monitoring in the Three Gorges Region by using InSAR Time-Series Techniques

Japanese Earthquake (11.3.11)

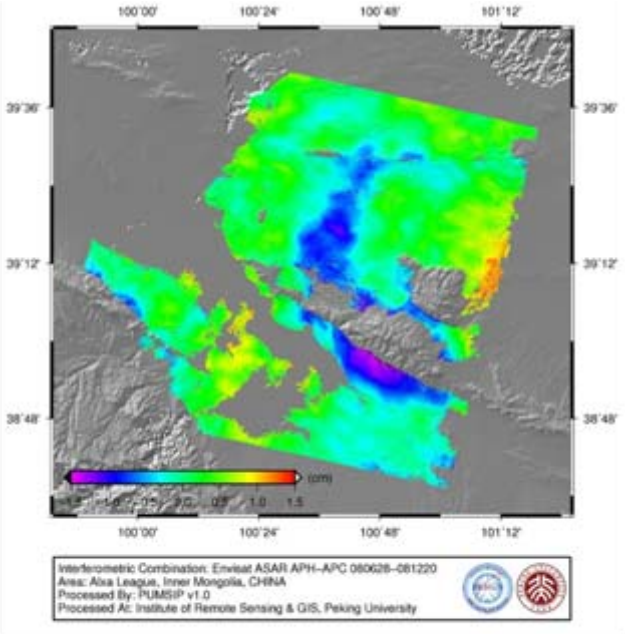
For Envisat ASAR
Mean difference: 0.31cm
STD: 16.46cm



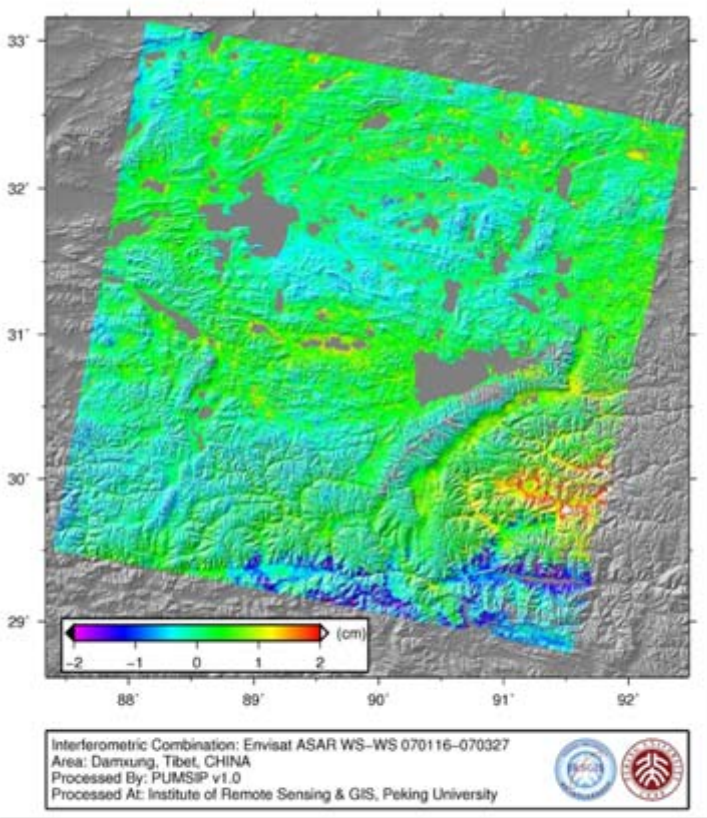


ROI-PAC plug-in for ScanSAR+AP

For Envisat ASAR for WSA & AP



Envisat_APH-APV_InnerMongolia

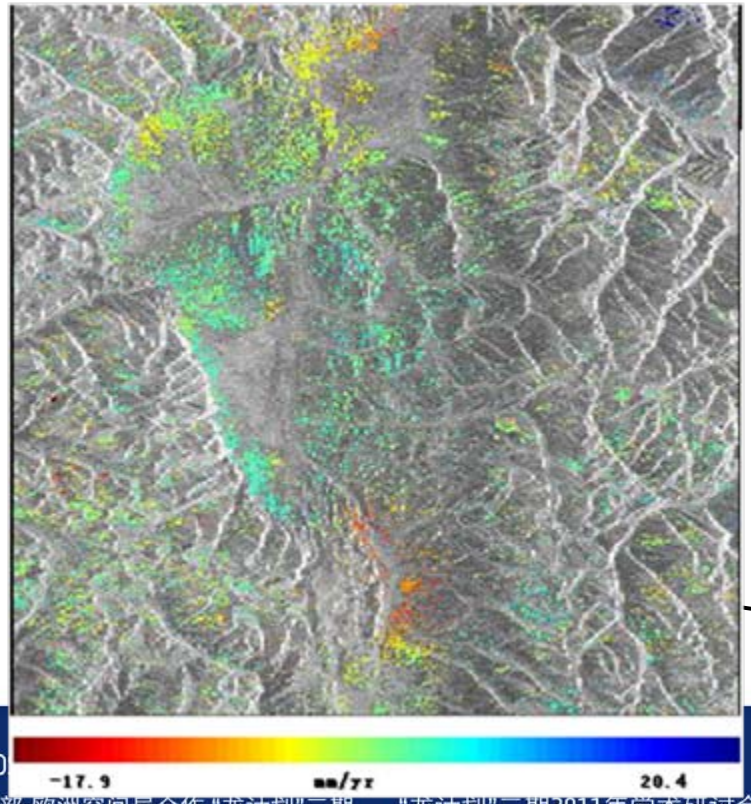


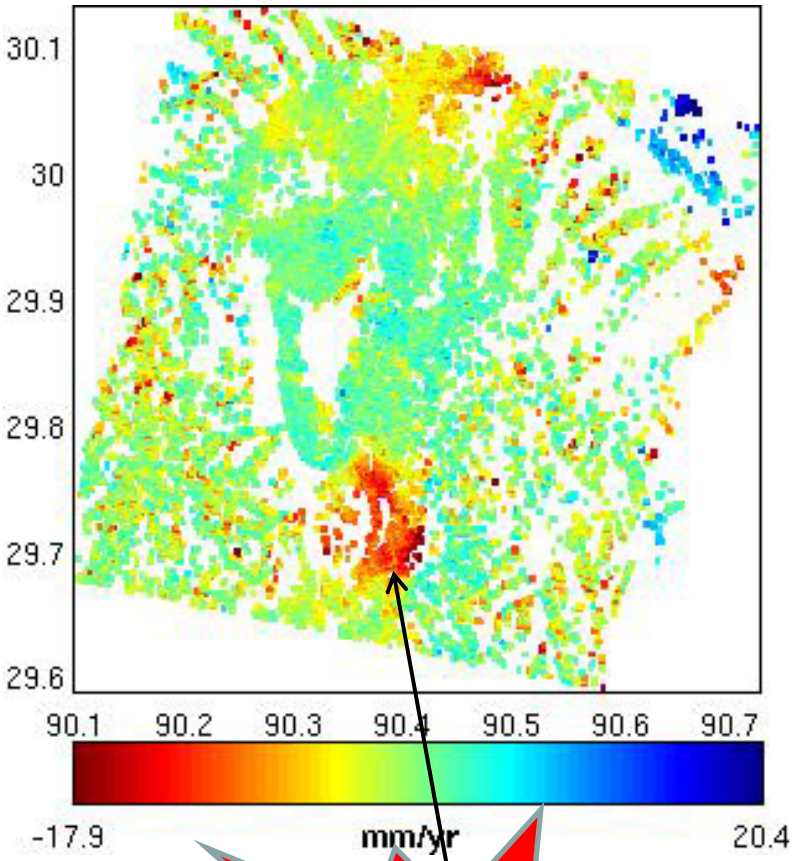
Envisat_WS-WS_Dangxiong

Damxung earthquake

Envisat ASAR, 9/08-5/2011

13 ASAR to measure pre-seismic creep

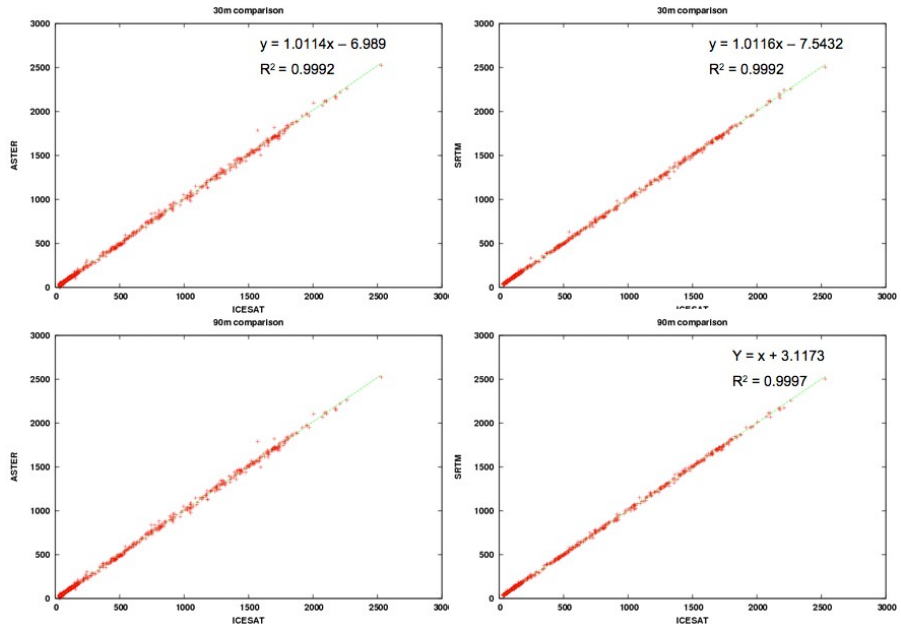


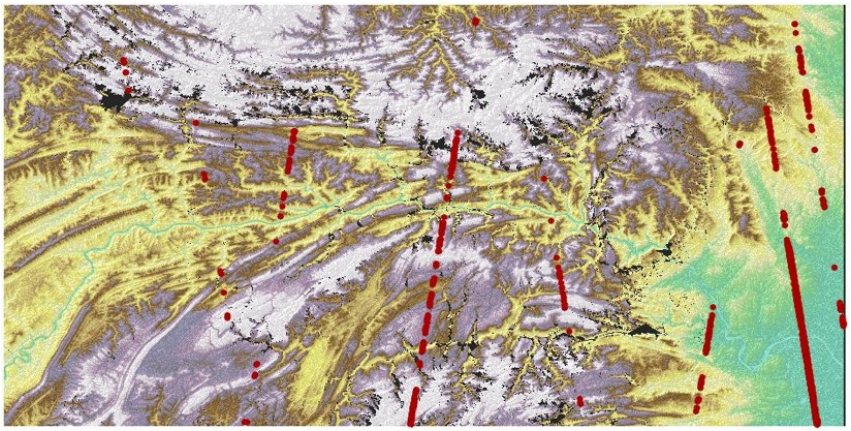


Damxung earthquake

ICESat validation of DEMs

Little appreciable difference between ASTER & SRTM

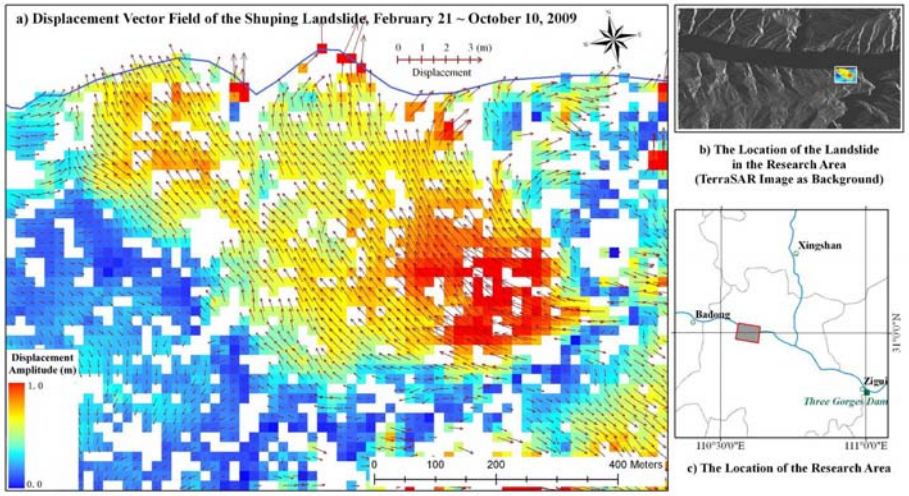




Only limited coverage from ICESat due to persistent cloudiness in the area. 70m footprint not optimum for ASTER GDEM

Landslide creep from TerraSAR-X 1m Spotlight

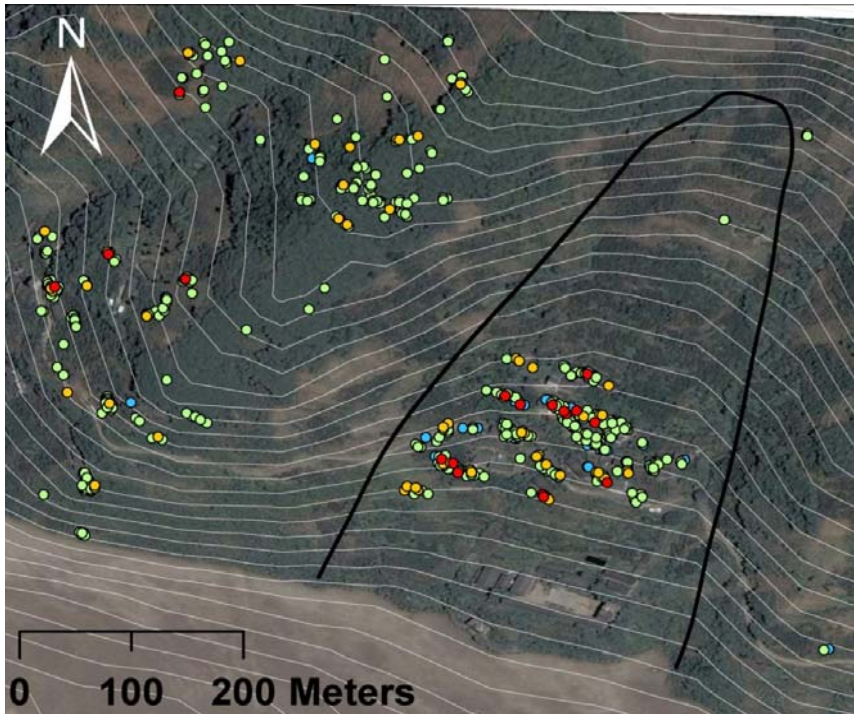
First application of phase correlation every 11 days to derive creep measurements prior to landslide for 2009

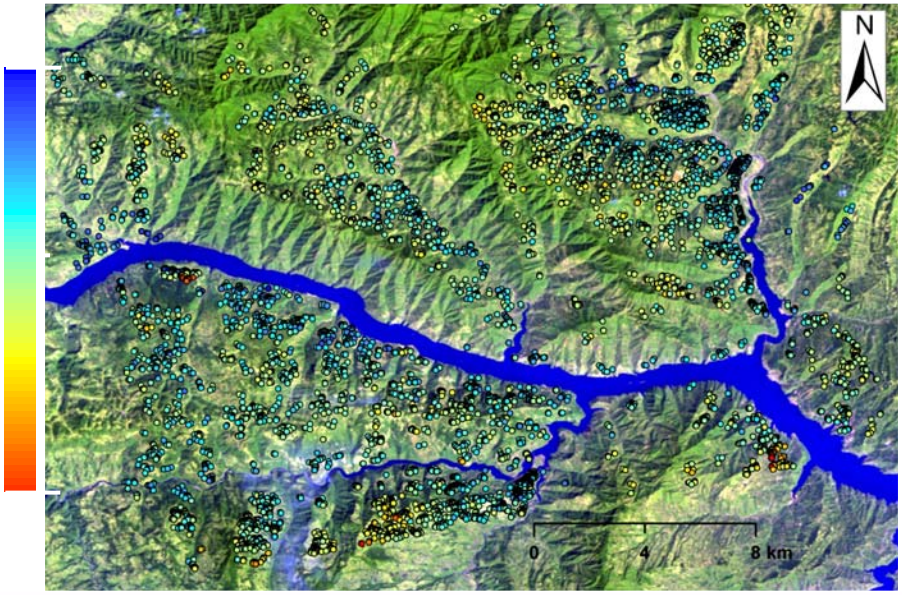


dInSAR mapping for landslides

Challenge to fuse SBAS results from ASAR and TSX as PS often in different places

Mean LOS Velocity Map from TSX Stripmap



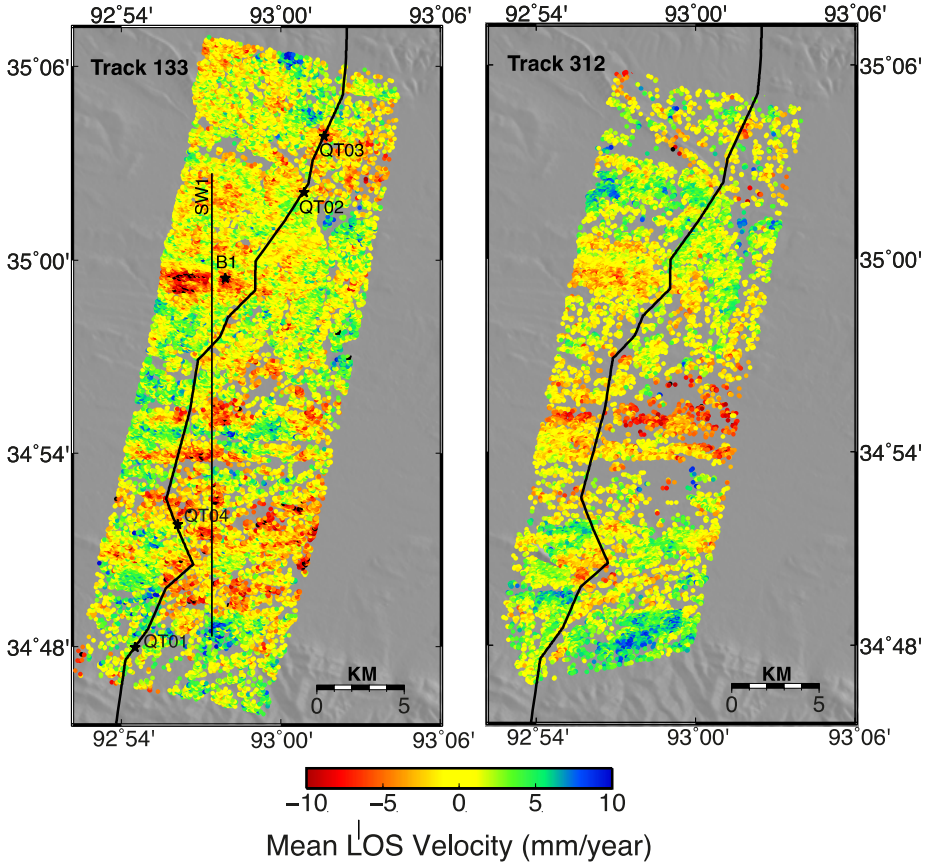


mm/yr

>60	- 40 to -10	- 10 to 10	10 to 40	> 60

Monitoring of Qinghai-Tibet railway line

Combining these SBAS dInSAR results suggests that InSAR has the potential to monitor the deformation of Qinghai-Tibet railway on areas with permafrost



Issues and Recommendations

- No further ENVISAT ASAR dInSAR and any ALOS PALSAR data, need to wait for Sentinel-1
- Best possible DEM should be derived from TanDEM-X
- Lack of access to any environmental information is driving us to use EO surrogates. Concern over lack of ground validation

List of Publications (a sample of peer review only)

1. Cunren Liang, Qiming Zeng, Jian Jiao, Xi'ai Cui, ScanSAR-Stripmap interferometry using Envisat ASAR data, *Journal of Remote Sensing*, No. 4, 2011.(in press)
2. An Liqiang, and Zhang Jingfa. Application situation and trend of remote sensing technology used in earthquake disaster survey. *Journal Of Earthquake Engineering And Engineering Vibration*, 2011, 31(2):112-118.
3. An Liqiang, Zhang Jingfa, and Zhao Fujun. Extracting secondary disaster of Wenchuan Earthquake: application of object-oriented image-classifying technology. *Journal Of Natural Disasters*, 2011, 20(2): 159-167.
4. Chen Ding, Zhang Jingfa, Zhu Lu, Jiang Wenliang, Lu Xiaocui, Liu Jianda, Li Limei, and Zhang Peng. Spatial Distribution and Activity of Xuzhou Fei-Huanghe Fault Zone. *Seismology And Geology*, 2011, 33(1):1-12.
5. Lu Xiaocui, Zhang Jingfa, Zhu Lu, Jiang Wenliang, and Chen Ding. Study on the structure in the Sulu segment of Tan-Lu Fault Zone by wavelet multi-scale decomposition. *Progress In Geophysics*, 2011, In Press.
6. Hou Anye, Zhang Jingfa, and LiuBin. The comparative study of monitoring Beijing surface subsidence based on the PS-InSAR and PS-InSAR. ADSAR 2011, April 21-23, 2011, Beijing China.
7. Liu Zhimin, Zhang Jingfa, Luo Yi, Li Yongsheng, and Liu Xiuguo. Contrast study on experiment of InSAR phase unwrapping algorithms. *Remote Sensing Information*, 2011, In Press.
8. X.-F. Li, J.-P. Muller, C. Fang, Y.-H. Zhao, Measuring displacement fields from TerraSAR-X amplitude images by sub-pixel correlation: an application to the landslides in Shuping, the Three Gorges Area., Engineering Geology in preparation(2011)
9. P. Li, C. Shi, Z. Li, J.-P. Muller, J. Drummond, X. Li|, T. Li, Y. Li, J. Liu, Evaluation of ASTER GDEM using GPS benchmarks and SRTM in China, Int. J. Rem. Sens. in press(2011)

Project Planning – 2011 and 2012

- Assess relationship between landslide creep and land-slope failure, weather (e.g. rain) and conditions of dam (e.g. height of water) using other EO data sources
- Produce best possible DEM over study area for future use with dInSAR once Sentinel-1 in operation
- Study data fusion between dInSAR and phase correlation as well as different data sources (ASAR and TerraSAR-X) for mapping landslide creep
- Planning meeting for wrap-up of DRAGON2 and DRAGON3 coupled with field visit in October 2011
- JPM to spend one month at PKU and QZ to spend one month at UCL-MSSL in 2012