DRAGON 2021 SYMPOSIUM

Dragon 4 Final Results LIs Reporting

19 to 21 July 2021

Tuesday, 20 July 2021

LANDSLIDE IDENTIFICATION, GEOHAZARDS MONITORING AND RISK ASSESSMENT USING ADVANCED, MULTI-SOURCE, EARTH OBSERVATION TECHNIQUES

summary report ID:32365

European LI: **Joaquim J. Sousa**
Chinese LI: **Jinghui Fan**

Sub-projects Id. 32365_1

Landslide and ice movement identification, monitoring near typical glacier lakes in Tibet using advanced earth observation techniques

utad

European PIs	European YS	Chinese PIs	Chinese YS
Joaquim Sousa	Pedro Aguiar	Fan Jinghui	He Peng
	Rui Song		Wan Qun
	Bruno Silva		Wu Yue

Sub-projects Id. 32365_2

Monitoring landslides movement over rugged mountain area integrated with multiband SAR and LIDAR

European PIs	European YS	Chinese PIs	Chinese YS
Zbigniew Perski	Tomasz Wojciechowski	Liu Guang	Qiuyue Feng
	Piotr Nescieruk		Jiayu Li
			Yun Zhang

Sub-projects Id. 32365_3

Spatio-temporal landslide identification and activity assessment for hazard and risk investigations in Longnan region, Northwest China

eurac research

European PIs	European YS	Chinese PIs	Chinese YS
Stefan Steger	Peter Mayrhofer	Bai Shibiao	Shijia Zhang
			Jie Shu
			Jun Wang
			Xiaoshuan Wu

Sub-projects Id. 32365_4

Collaborative Monitoring of Multiple Geohazards over Traditional Heavy Industrial Region in Northeast China with Multi-source Remote Sensing Data

European PIs	European YS	Chinese PIs	Chinese YS
Stefano Salvi		Wu Lixin	Qiuyue Feng
Christian Bignami		Wei Lianhuan	Jiayu Li
Cristiano Tolomei		Shanjun Liu	Yun Zhang
		Yachun Mao	

EO data delivery

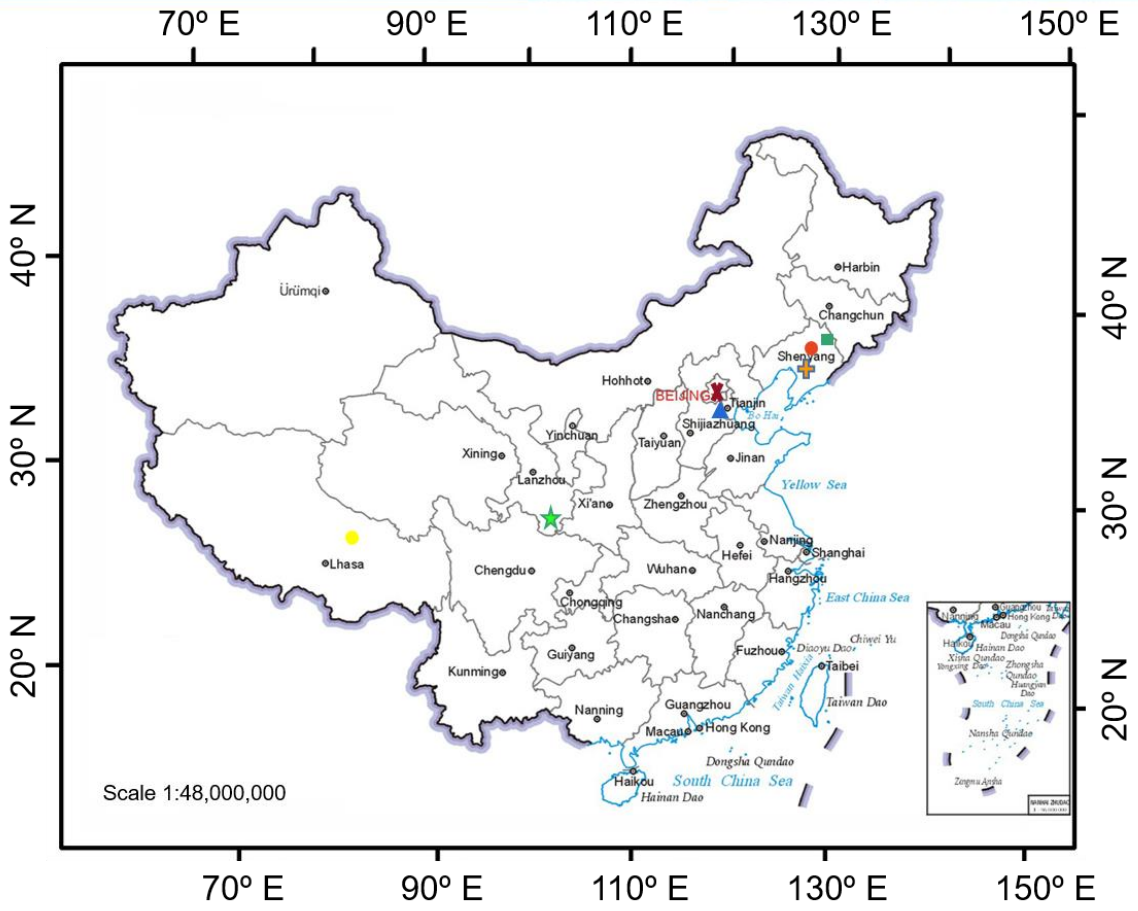
Data access (list all missions and issues if any). NB. in the tables please insert cumulative figures (since June 2016 to June 2020) for no. of scenes of high bit rate data (e.g. S1 100 scenes). If data delivery is low bit rate by ftp, insert "ftp"

ESA Third Party Missions	No. Scenes
1. Cosmo-Skymed	745
2. TerraSAR-X	68
3. ALOS	48
4. PlanetScope	2
5.	
6.	
Total:	863
Issues: nothing to report	

ESA, Explorers & Sentinels data	No. Scenes
1. Sentinel 1-A/B	1740
2.Sentinel 2-A/B MSI	1657
3. ERS	255
4. Envisat	510
5.	
6.	
Total:	4162
Issues: nothing to report	

Chinese EO data	No. Scenes
1. GF-1 & GF-3	
2. ZY-3	
3. Jiling-1 (2015-2019)	
4. Beijing-2 (2015-2019)	
5. CBERS-4 (2014-2019)	
6. HJ-1 A/B/C (2008-2019)	
Total:	349
Issues: nothing to report	

Results summary id. 32365



- Yiga Glacier
- Longnan
- Beijing South_Tianjin West
- Beijing
- Anshan
- Shenyang
- Fushun

Location of the areas of AOI used in the Dragon-4 32365 project

Results summary id. 32365_1

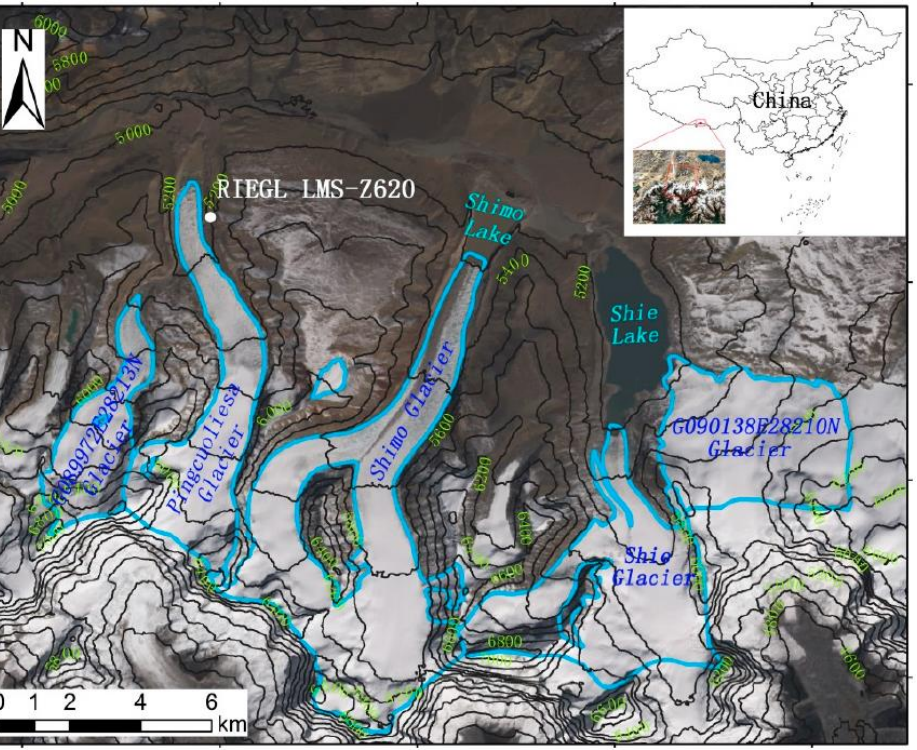
Landslide and ice movement identification, monitoring near typical glacier lakes in Tibet using advanced earth observation techniques

Glaciers…

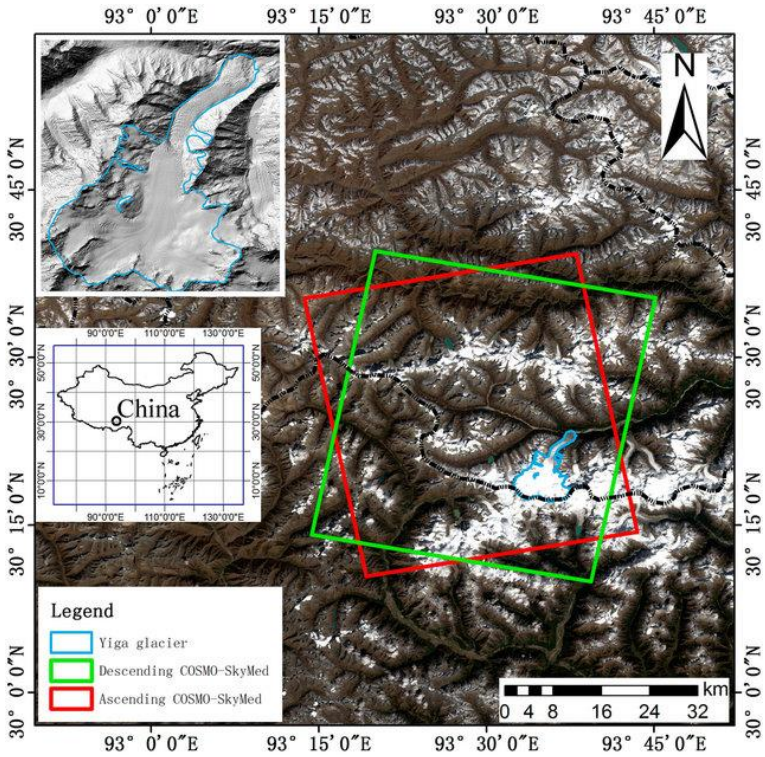
1. Are often regarded as sensitive recorders and indicators of global climate change;

2. Whose movements can cause serious natural disasters, such as debris flow and glacial lake outburst floods, that threaten human production and life.

Results summary id. 32365_1



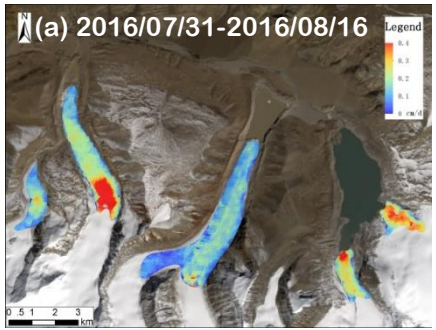
(a)

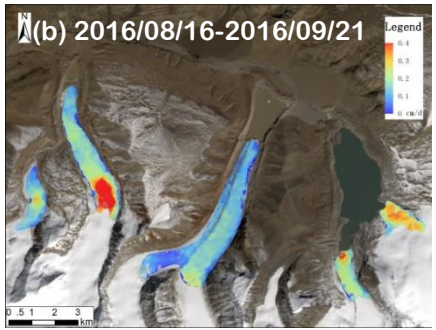


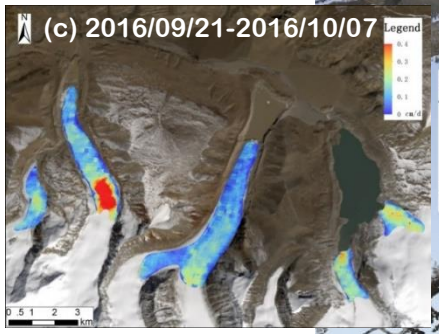
(b)

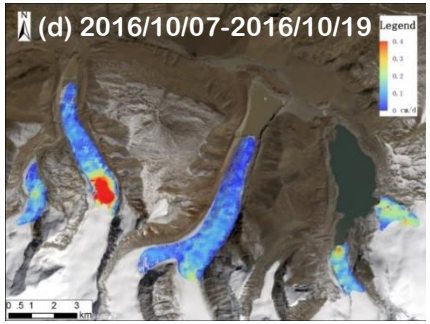
Glaciers studied in the scope of the Dragon-4 project

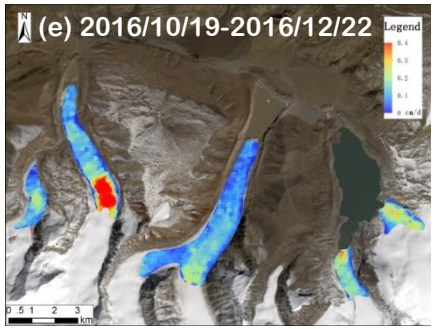
Results summary id. 32365_1



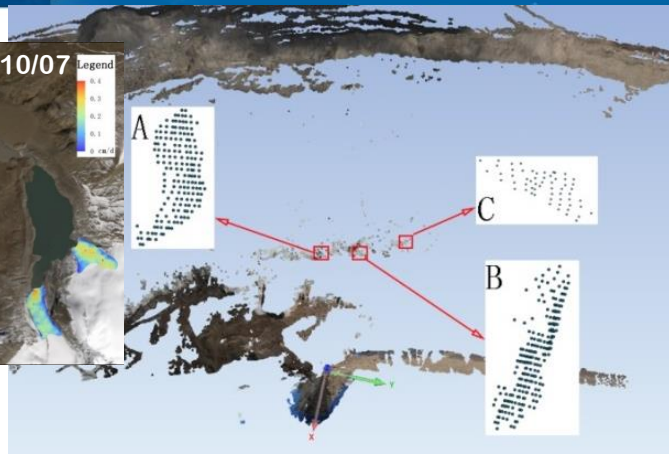






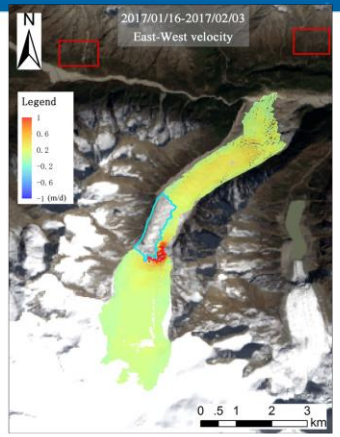


Glacial surface velocities based on offset tracking techniques across five periods (a-e);

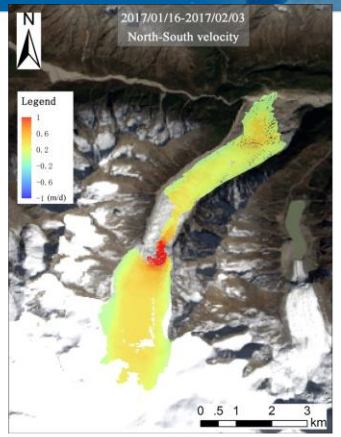


TLS Point Cloud Data on Glacial Surfaces

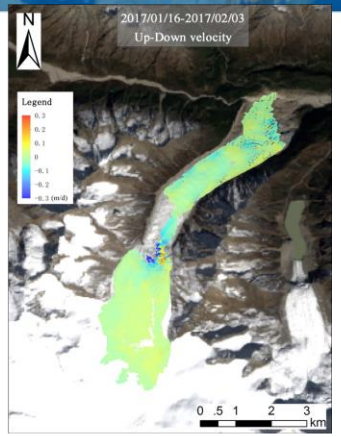
Results summary id. 32365_1



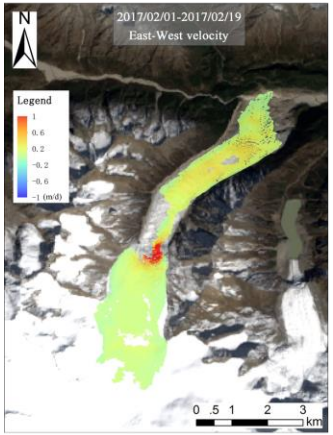
20170116-20170203
East-West velocity



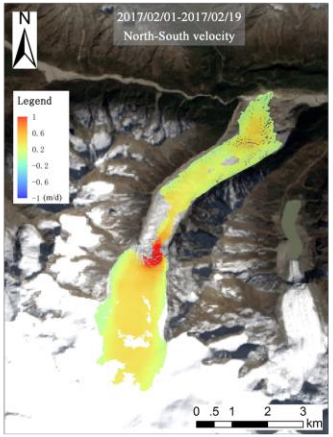
20170116-20170203
North-South velocity



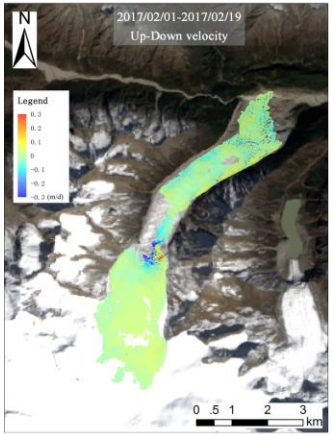
20170116-20170203
Up-Down velocity



20170201-20170219



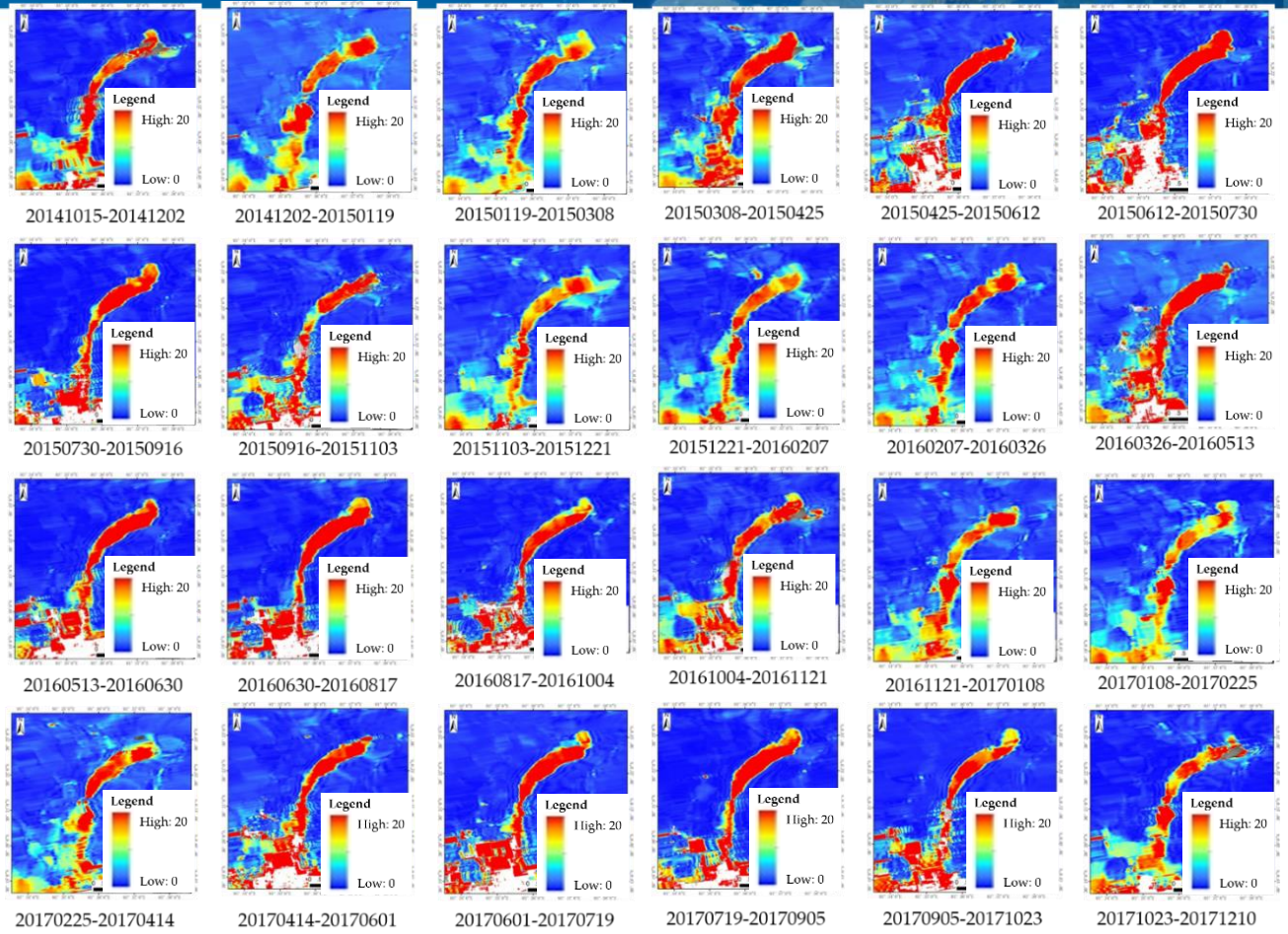
20170201-20170219



20170201-20170219

The 3D velocity components in the east-west, north-south and up-down directions during the two periods of 16 January to 3 February 2017 ((a), (b) and (c)) and 1 February to 19 February 2017 ((d), (e) and (f)).

Results summary id. 32365_1



Velocity distribution of the Yiga Glacier between October 15, 2014 and December 10, 2017

Results summary id. 32365_2

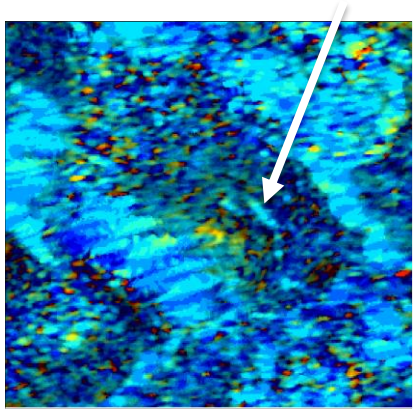
Landslides movement and subsidence monitoring

1. Beijing Fangshan Landslide
2. Beijing and Huabei subsidence

Results summary id. 32365_2

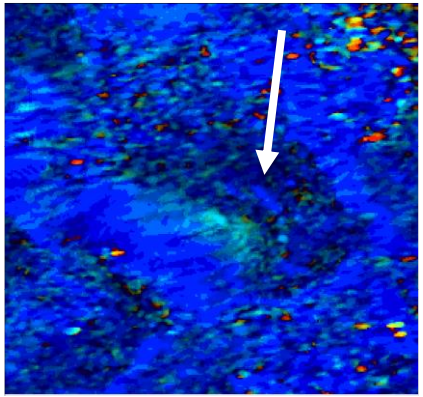
Beijing Fangshan Landslide

ALOS PALSAR2 InSAR



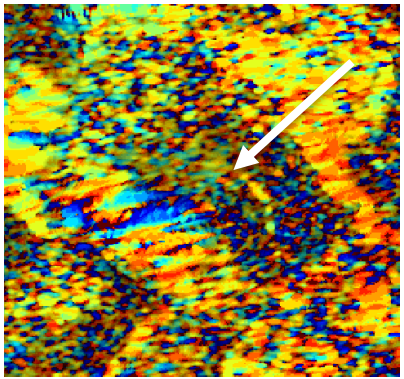
2016/07-2016/12

Bperp=98m



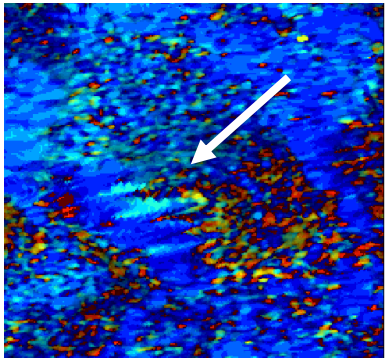
2016/12-2017/11

Bperp=50m



2017/11-2018/07

Bperp=242m

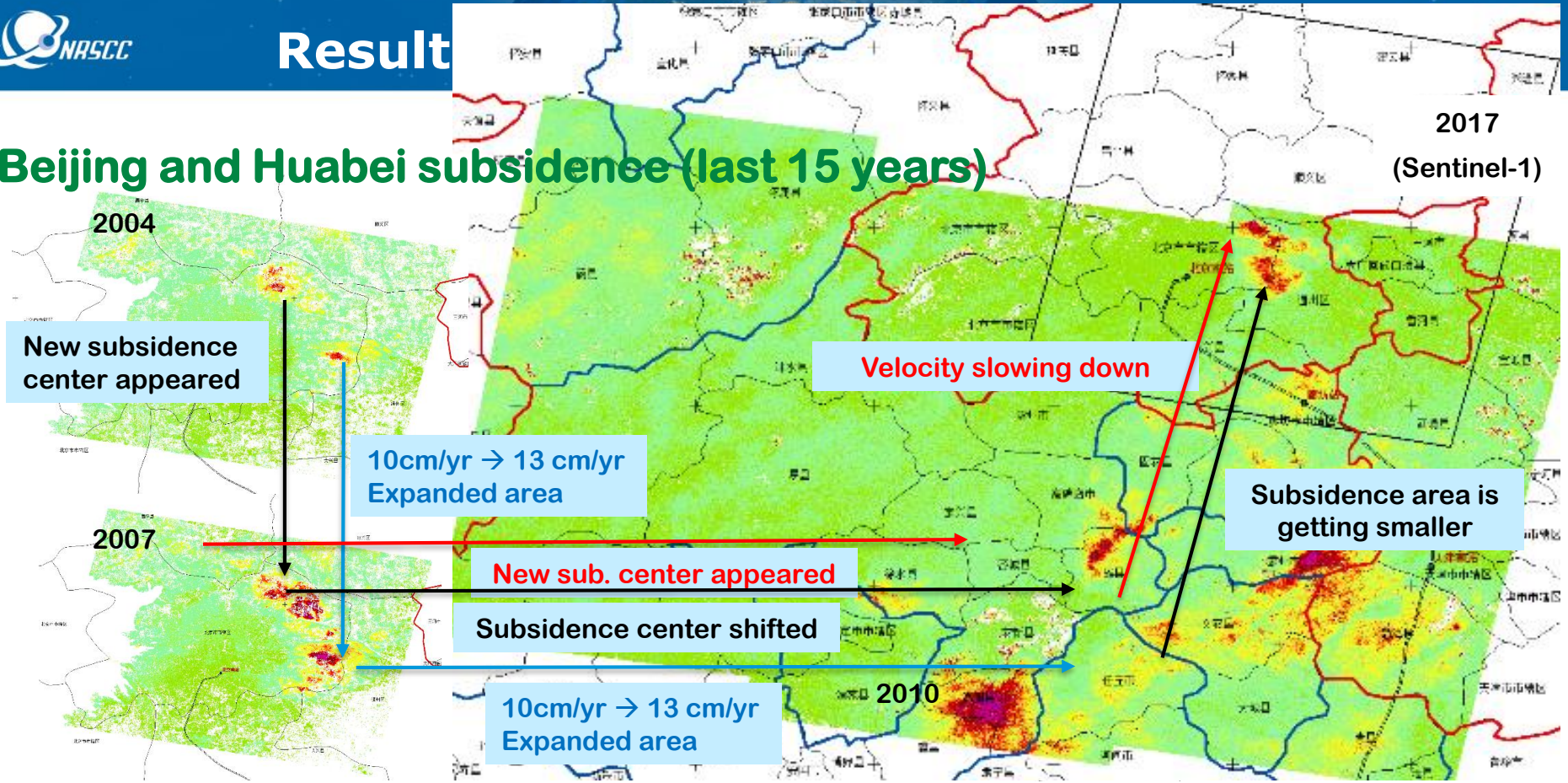


2018/07-2018/09

Bperp=112m

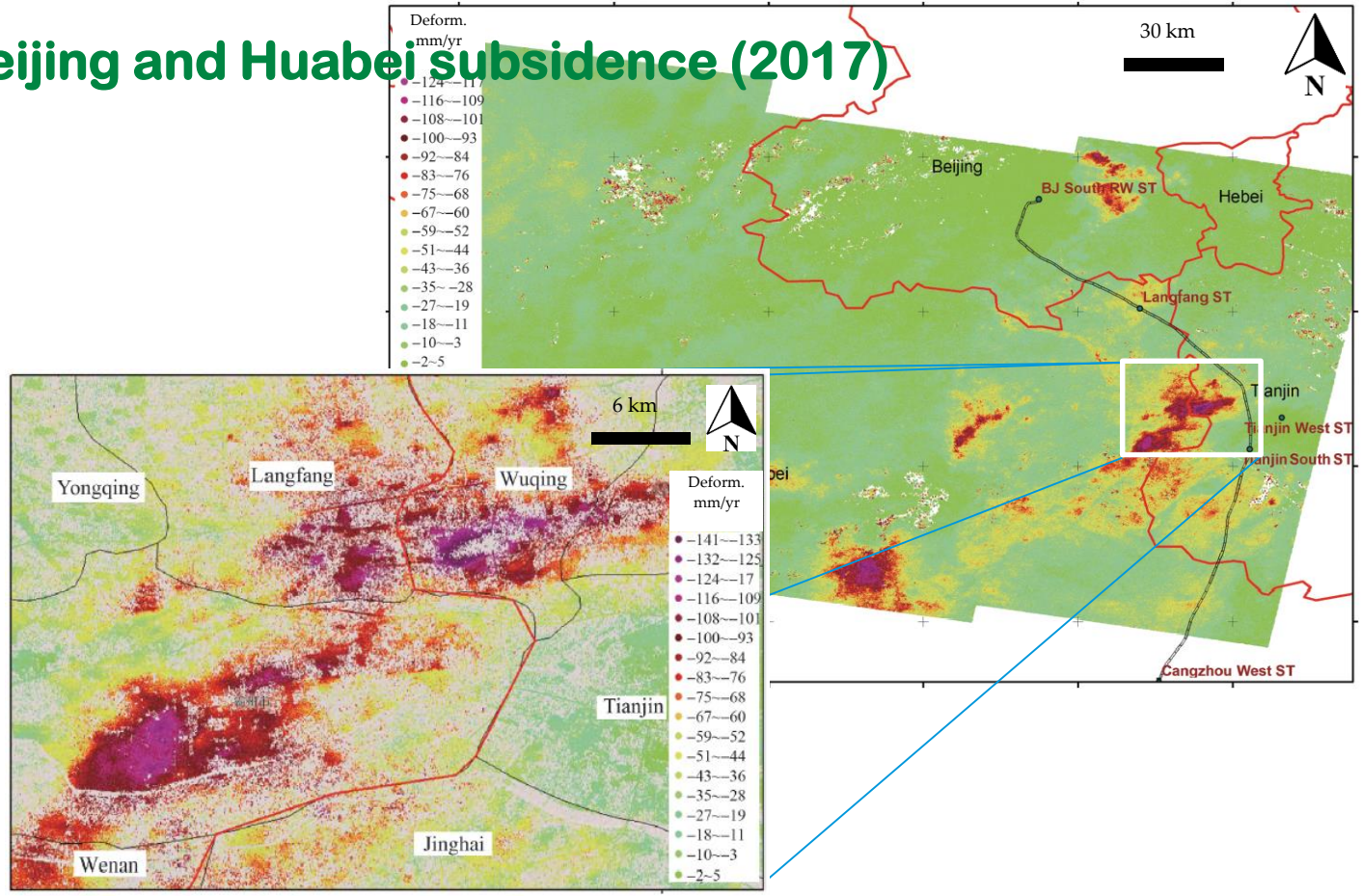
Result

Beijing and Huabei subsidence (last 15 years)



Results summary id. 32365_2

Beijing and Huabei subsidence (2017)

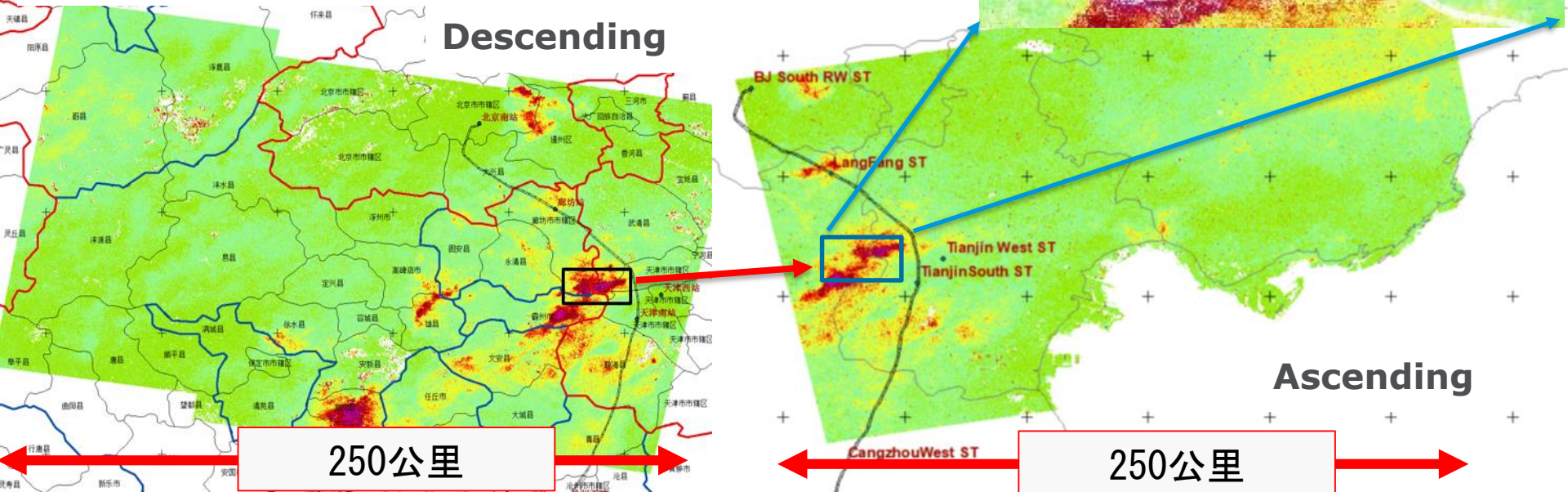


Sentinel 1 TOPS IW mod SBAS subsidence map of Beijing South, with an enlarge subsidence map around Tianjin West

Results summary id. 323

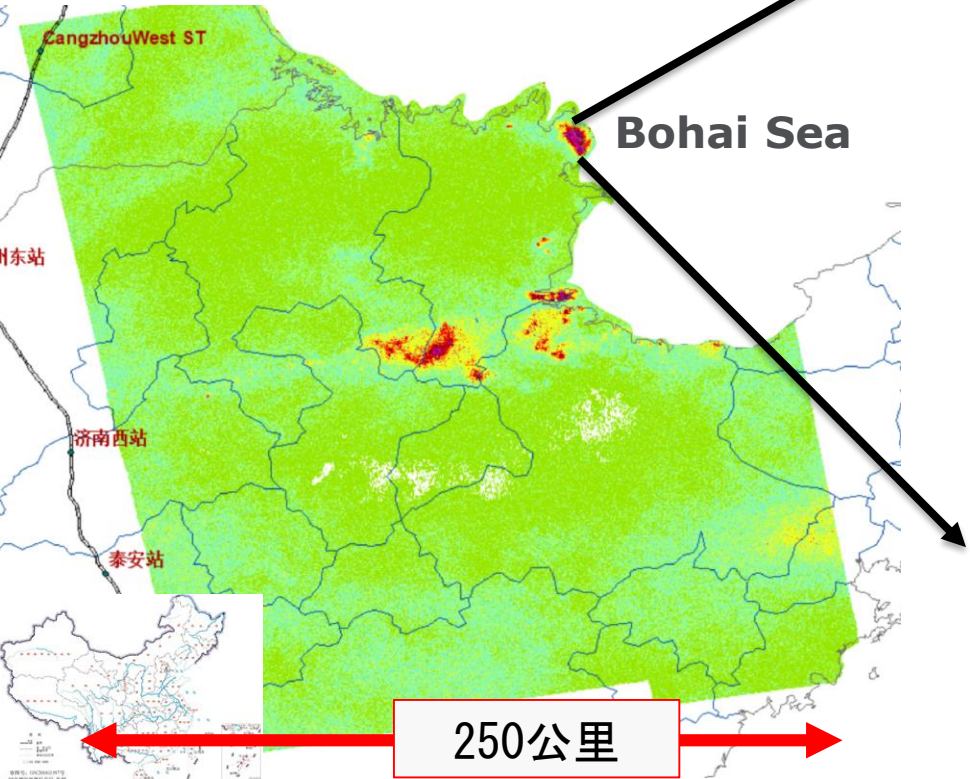
Beijing and Huabei subsidence (2017)

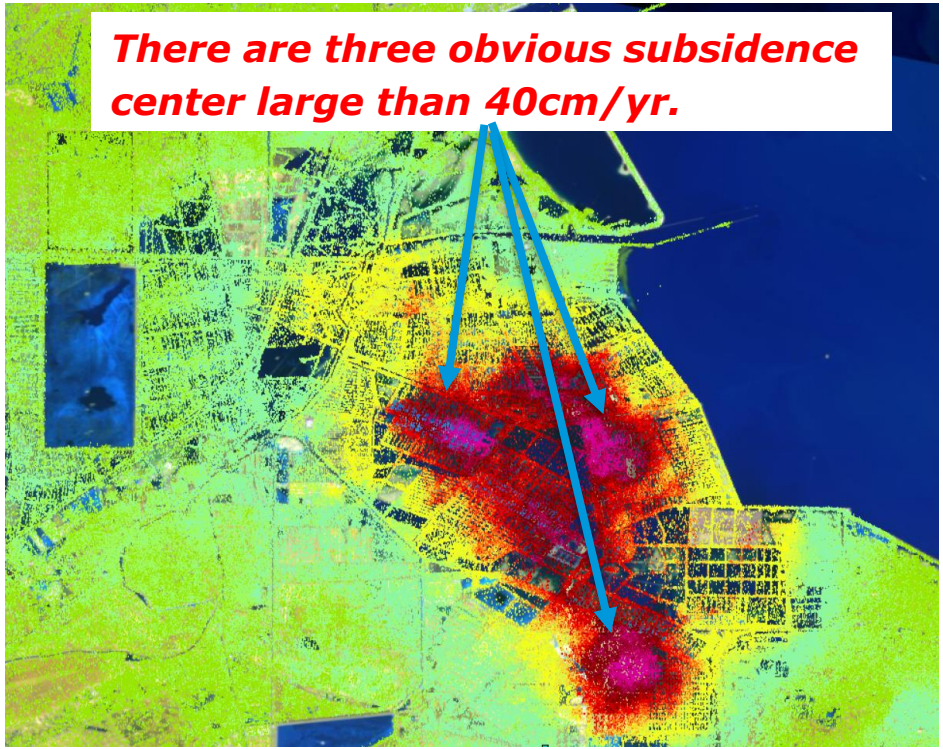
More details is obtained and clear subsidence pattern could be observed.



Results summary id. 32365_2

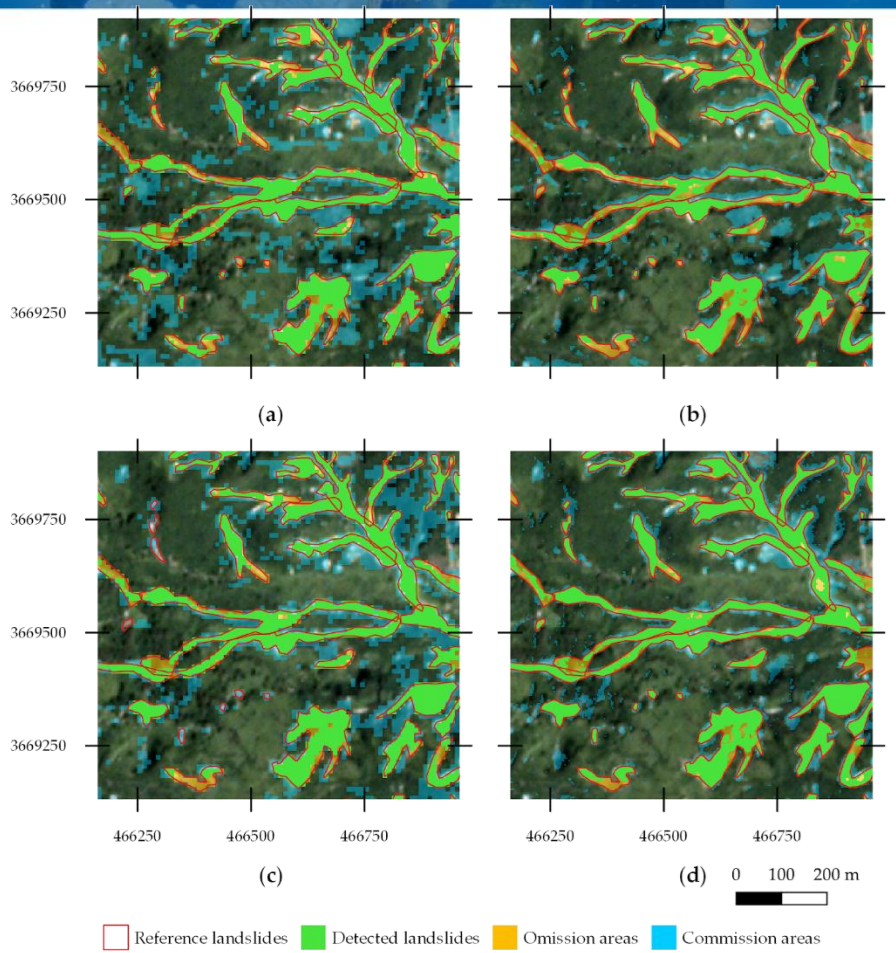
North coastal around Bohai subsidence (2017)





Results summary id. 32365_3

Spatio-temporal landslide identification and activity assessment for hazard and risk investigations in Longnan region, Northwest China

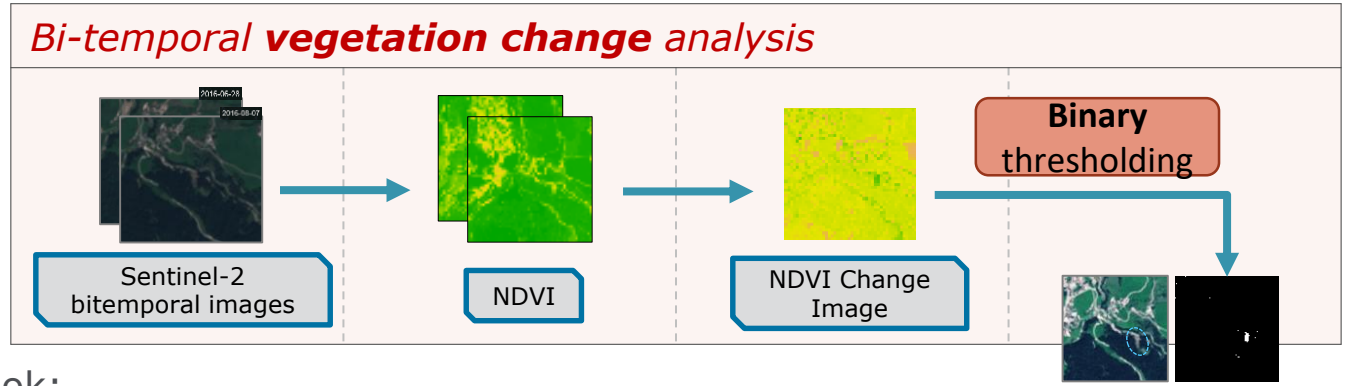


Results of the change detection: (a) EM with Sentinel-2 imagery, (b) EM with PlanetScope imagery, (c) GAM with Sentinel-2 imagery, and (d) GAM with PlanetScope imagery colorized as explained in legend.

Results summary id. 32365_3

We are working on…

- Testing of land cover disturbance indices derived from Sentinel-2 image data
- Developing an approach for the automated multi-temporal detection of landslides

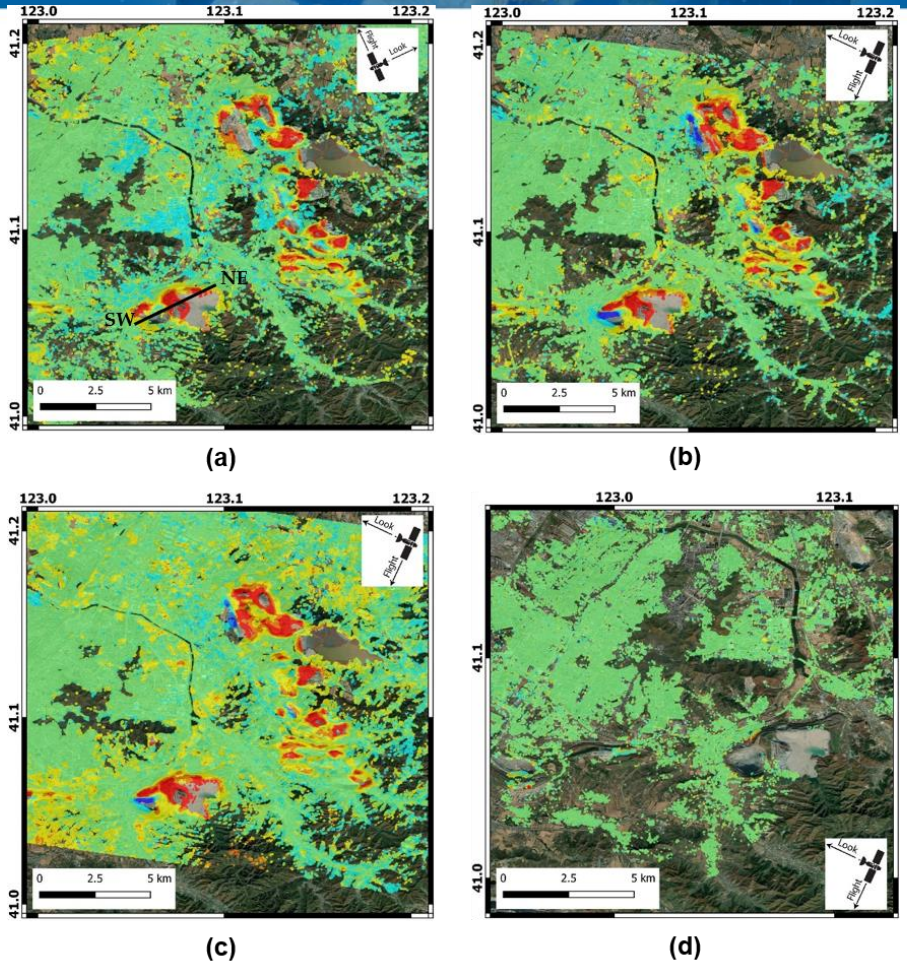


Our Outlook:

Algorithm development for multi-temporal landslide inventory maps	Spatio-temporal **landslide activity assessment** in the study areas	Dragon4 Project Group **exchange** and **joint research activity**	Potential **testing of SAR Interferometry** (Sentinel-1) for validation and examination of pre-failure movement

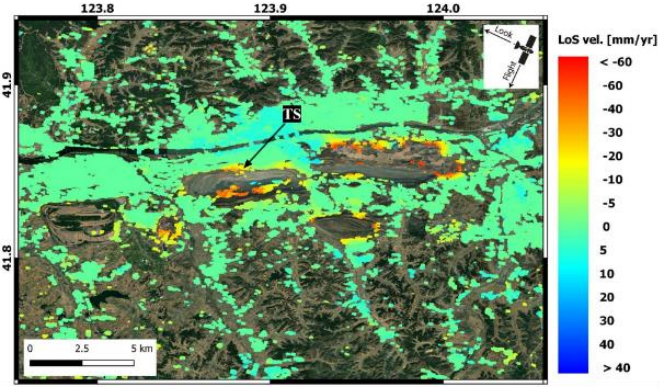
Results summary id. 32365_4

Collaborative Monitoring of Multiple Geohazards over Traditional Heavy Industrial Region in Northeast China with Multi-source Remote Sensing Data

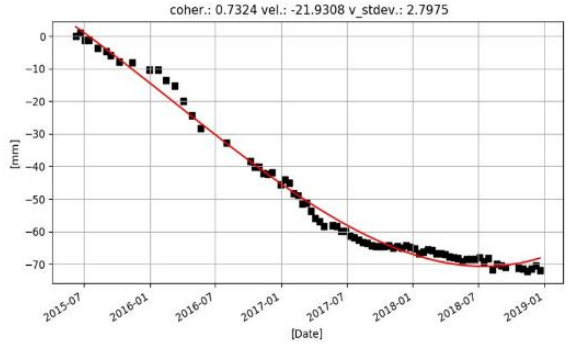


Ground velocity maps for the Anshan pit mine area

Results summary id. 32365_4

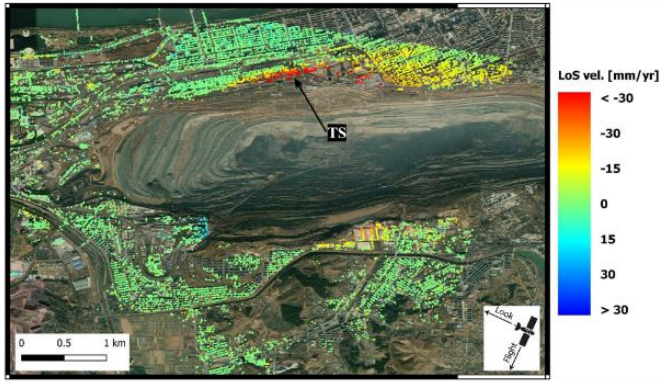


(a)

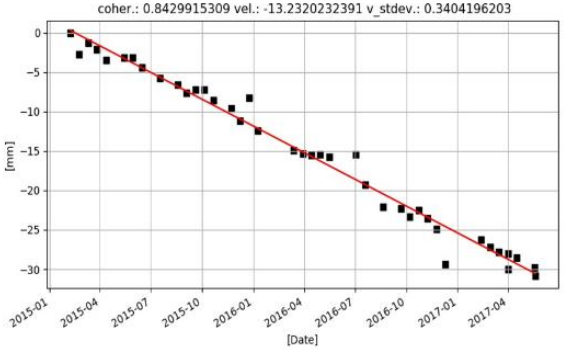


(b)

Ground velocity maps for the Fushun pit mine area



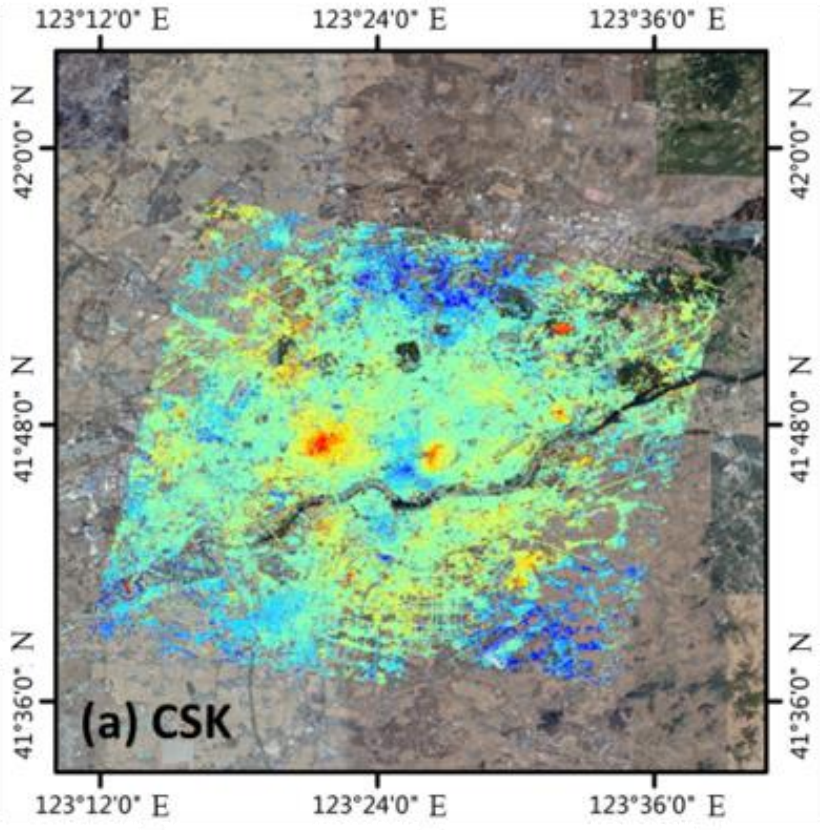
(c)

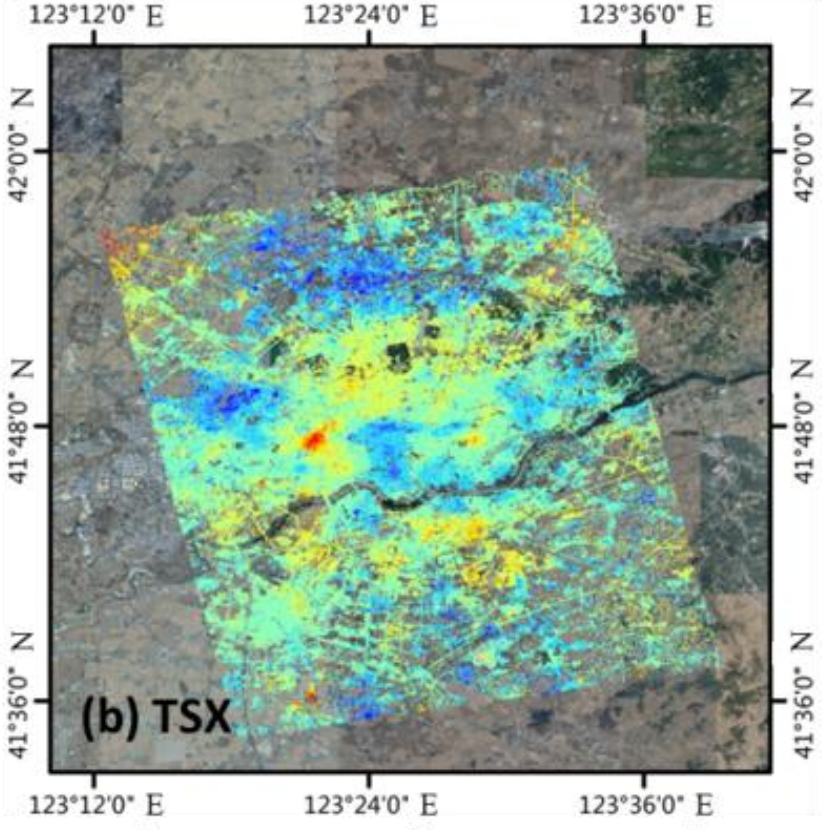


(d)

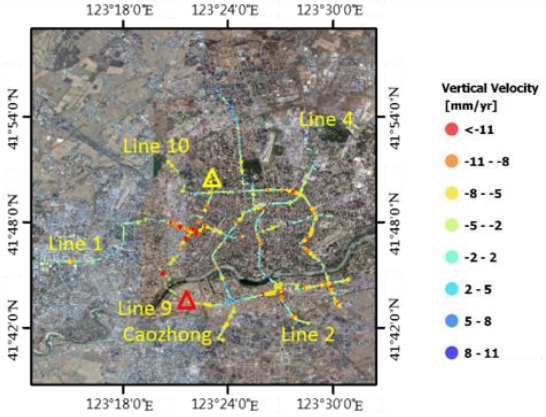
Results summary id. 32365_4

Mean ground velocity maps over Shenyang: (a) CSK data and; (b) TSX data.

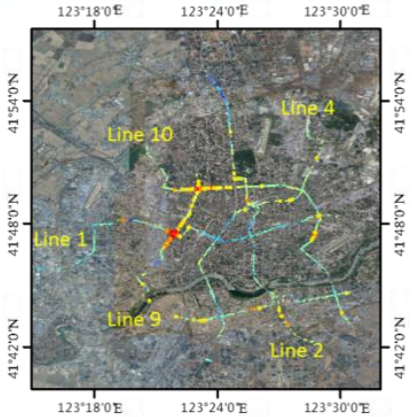




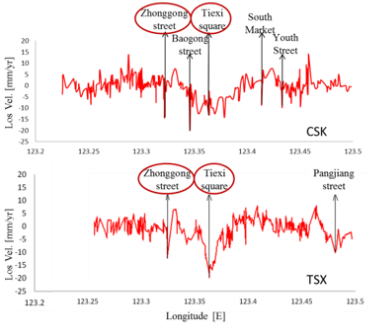
Results summary id. 32365_4



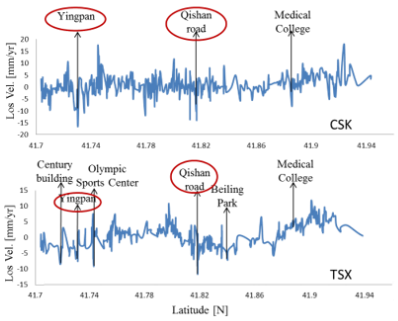
(a)



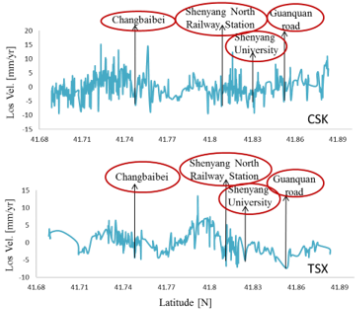
(b)



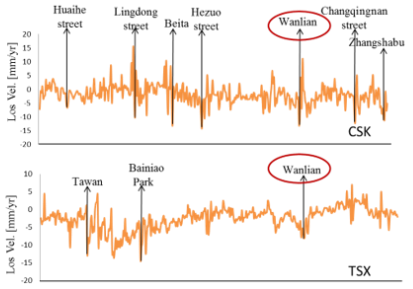
(c)



(d)



(e)

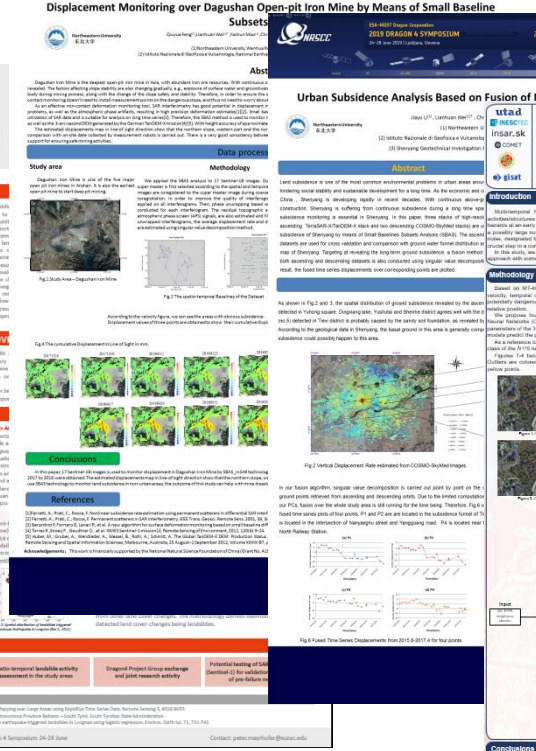


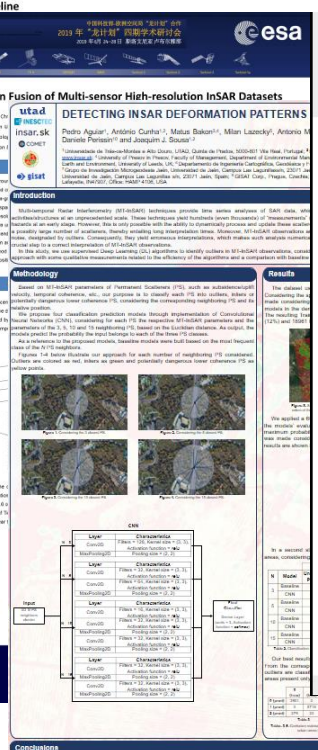
(f)

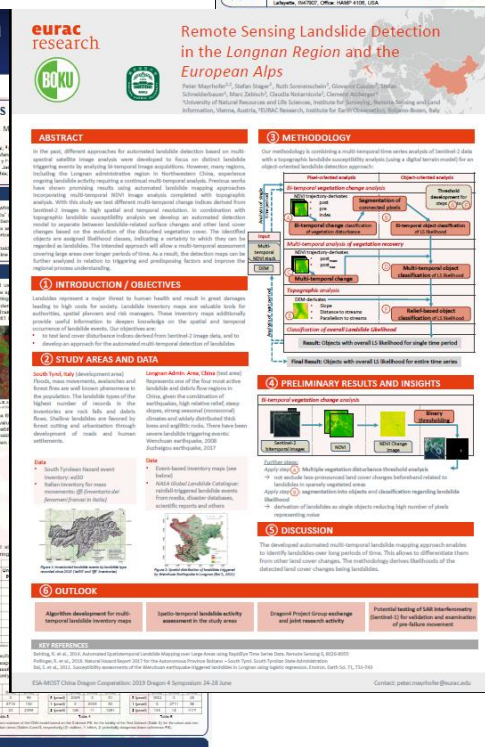
Comparison of displacement velocity profiles from (a) CSK and (b) TSK, and analysis with respect to subway tunnels: profile along line (c) 1; (d) 2; (e) 4 and; (f) 10.

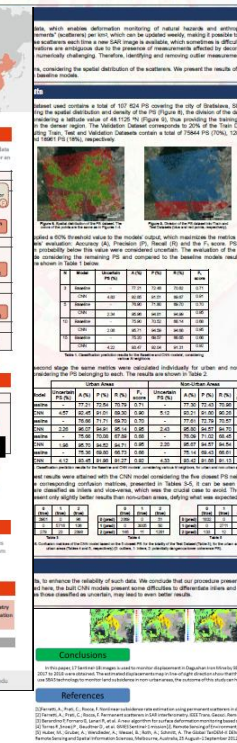
European Young scientists contributions in Dragon 4

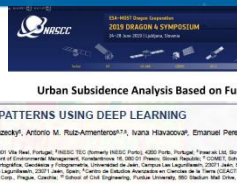
More than 50 YS contributions during D4 program











Academic joint publications

Nonlinear Model for InSAR Baseline Error, IEEE Transactions on Geoscience and Remote Sensing, 54(9), p5341-5351

Filtering SAR interferometric phase noise using a split-window model, Remote Sensing Letters, 7(8), 800-809

Policy factors impact analysis based on remote sensing data and the CLUE-S model in the Lijiang River Basin, China, Catena, (158) , pp286-297

Minimum Redundancy Array - A Baseline Optimization Strategy for SAR Tomography (under review for IEEE GRSL)

Monitoring and Analyzing Mountain Glacier Surface Movement Using SAR Data and a Terrestrial Laser Scanner: A Case Study of the Himalayas North Slope Glacier Area. Jinghui Fan, Qun Wang, Guang Liu, Lu Zhang, Zhaocheng Guo, Liqiang Tong, Junhuan Peng, Weilin Yuan, Wei Zhou, Jin Yan, Zbigniew Perski, Joaquim João Sousa. Remote Sensing: 2019, 11(6)

Monitoring the Motion of YiGa Glacier Using GF-3 Images. WANG Qun, ZHANG Yunling, FAN Jinghui, FU Yuhao. Geomatics and Information Science of Wuhan University（accepted）

Application of Machine Learning for Classifications of InSAR Deformation Patterns. ESA Living Planet Symposium, Milan 13-17 May, 2019

Academic exchanges

- Team Member Meetings
  - 2017: EUG General Assembly 2017, Vienna
  - 2017: D4 Symposium, Copenhagen
  - 2018: D4 Mid-term Symposium, Xi'an
  - 2019: D4 Symposium, Ljubljana
  - 2020/21: remotly
- Exchange of Young Scientists
  - Chinese PhD Candidates visiting European Institutions
  - European Young scientists visiting China
- Frequent email exchange regarding executive details