



ESA-MOST Dragon Cooperation

中国科技部-欧洲空间局“龙计划”合作

2017 DRAGON 4 SYMPOSIUM

2017年“龙计划”四期学术研讨会

26-30 June 2017 | Copenhagen, Denmark

2017年6月26-30日, 丹麦 哥本哈根

FRI. 30 JUNE 2017 DRAGON 4 ID. 32388 PROJECT SUMMARY

List Lis: Hui Lin, Andrew Hooper

List Pis: Jiang Liming, Andrew Hooper, Lan Cuo, Meng
Liquu

Sub-projects and themes:

Id. 32388_1

Monitoring Decadal Glacier and Frozen Ground Dynamic over High Mountain Asia

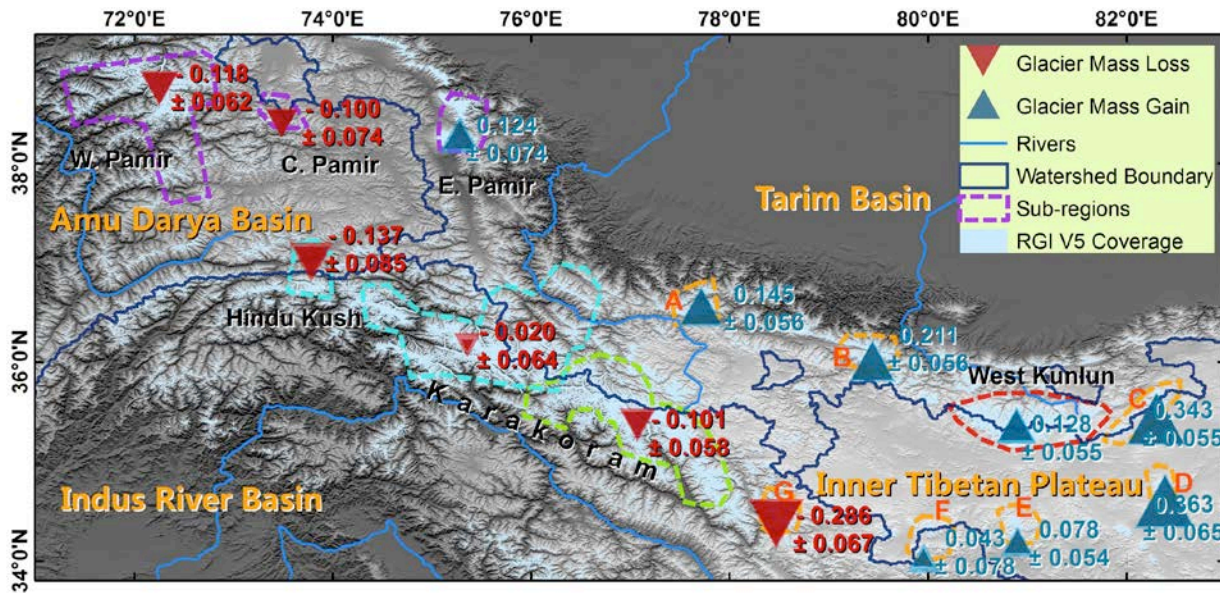
Id. 388_2

Impacts of Cryospheric Component Changes on Hydrological Process in Typical

Summary EO data exploitation – cumulative stats all subprojects

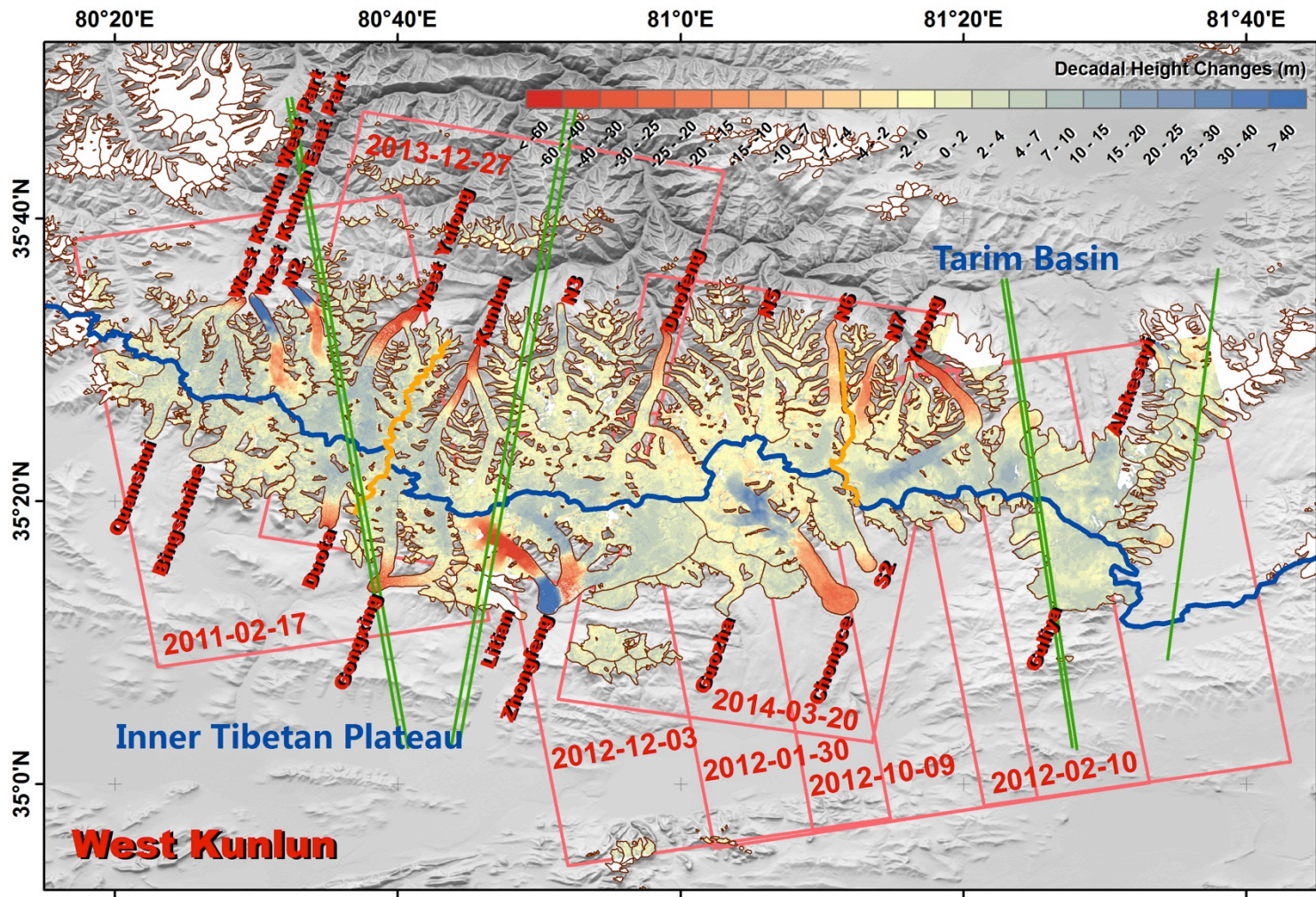
ESA & ESA TPM DATA	Nos. scenes or inform if by FTP	SENTINELS 1, 2 & 3 DATA	Nos. scenes	CHINESE EO DATA	Nos. scenes
ERS SAR	~100	Sentinel 1-A/B SAR	~180	HJ-A/B	30
ASAR	~200	Sentinel 2-A/B MSI	~50	GF-1	0
MERIS	nan	Sentinel 3-A OLCI	nan	GF-2	nan
AATSR	nan	Sentinel 3-A SLSTR	nan	HY-A	nan
SMOS	nan	Sentinel 3-A SLAR	nan	FY-1	nan
TSX	~80	Etc.	nan	HJ & CBERS.	80
TOTAL	~380	TOTAL	~230	TOTAL	~130

Results summary id. 32388_1



Glacier mass balance rate in unit of m w.e. a^{-1} at Karakoram-Pamir-WestKunlun during 2000-2014.

The glaciers in West Kunlun, Eastern Pamir and the northern part of Karakoram experienced a clear mass gain of $0.043 \pm 0.078 \sim 0.363 \pm 0.065$ m w.e. yr^{-1} . The Karakoram showed a near-stable mass balance in its western part (-0.020 ± 0.064 m w.e. yr^{-1}), while the Eastern Karakoram showed mass loss (-0.101 ± 0.058 m w.e. yr^{-1}). Significant positive glacier mass balances are noted along the edge of the Upper Tarim Basin and indicate a decreasing gradient from northeast to southwest.



Surge Type,
West Kunlun,
N2, N7, Zhongfeng.

Stagnant,
West Yulong, Duota,
Gongxing, Zhongfeng
2-4, Chongce.

Yulong is the only one
not detected by
feature tracking

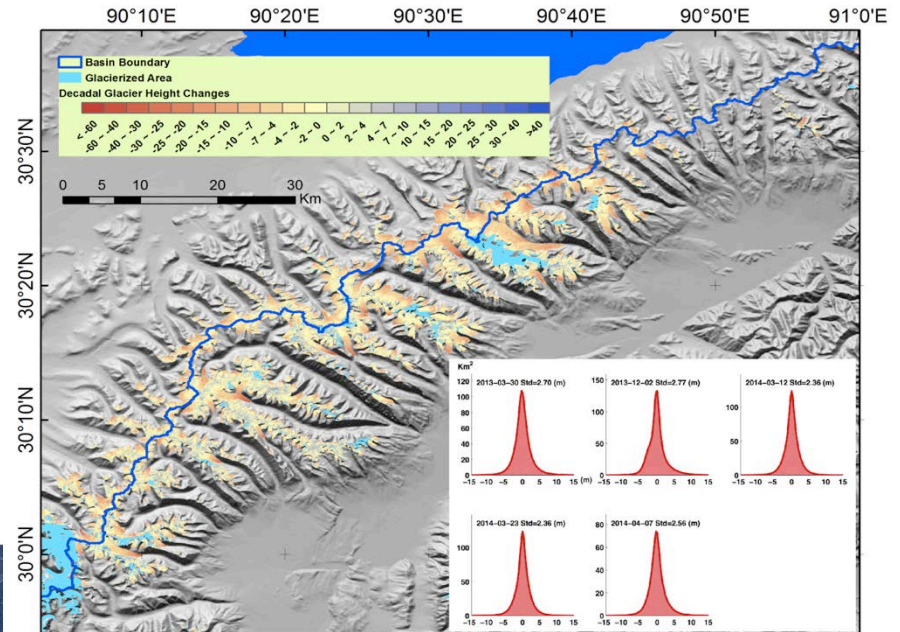
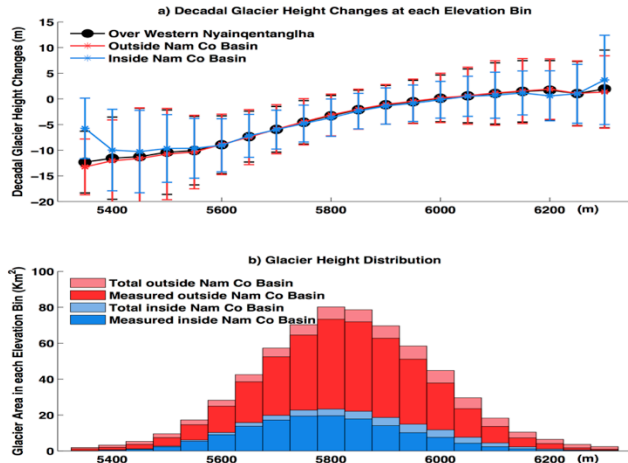
More positive glacier
mass balance are
found at its east and
west end than central
West Kunlun.

划” 四期学术研讨会
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Results summary id. 32388_2

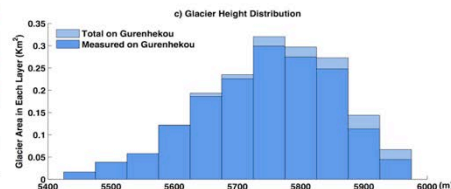
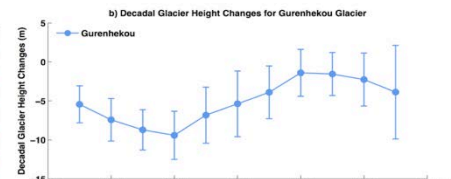
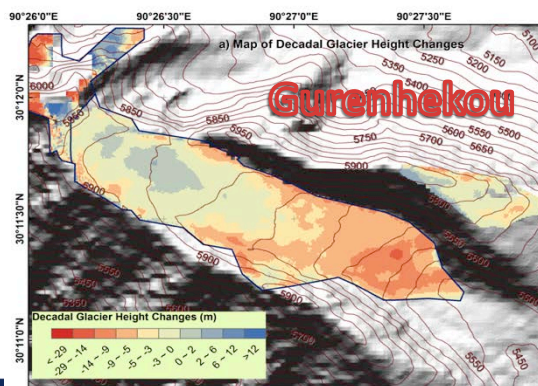
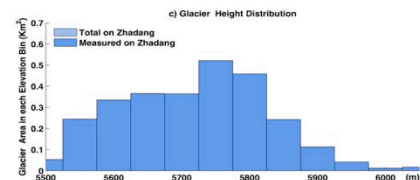
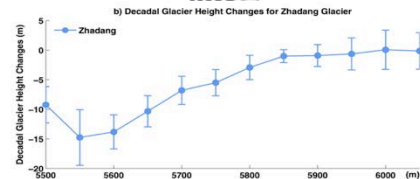
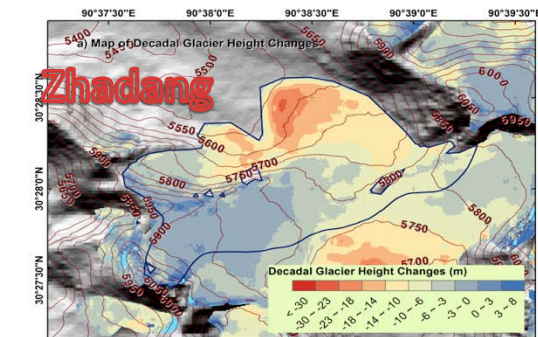
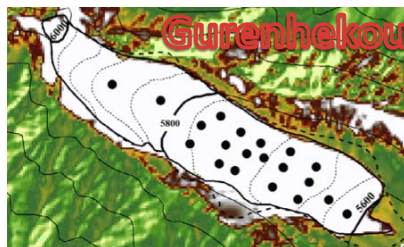
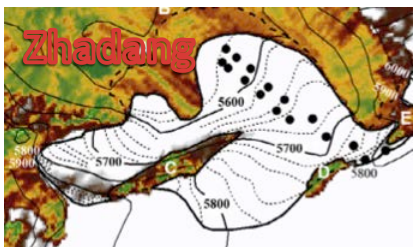
Area	Glacier Height Changes in 14 Years (m)	Glacier Mass balance rate (w.e. m yr ⁻¹)
Western NyQ Mt	- 3.822 ± 0.552	- 0.235 ± 0.127
In Nam Co Basin	- 4.408 ± 0.562	- 0.268 ± 0.129
Out Nam Co Basin	- 3.610 ± 0.551	- 0.219 ± 0.126

Glacier mass balance in the first decade of the 21st century was -0.235 ± 0.127 m w.e. yr⁻¹ for the Western Nyainqentanglha Mountains glaciers. If glacier melt was assumed to flow into the Nam Co Lake without any evaporation, it contributed 10.50 ± 9.00 % to the Nam Co Lake volume increase.



Validation to in-situ observation

Name	ZMIN/Z MED/Z MAX (a.s.l m)	Area (km ²)	in-situ mass balance (m w.e. yr ⁻¹)	mass balance (m w.e. yr ⁻¹)
Zhadang	5512/57 51/6079	2.912	- 0.59	- 0.501± 0.166
Gurenhekou	5489/57 79/5979	1.574	- 0.31	-0.267 ± 0.248



Young scientists contributions

European YS

Chinese YS

Li Gang (Ph.D., CUHK), and Liu Lin (Ph.D. ITPCAS) performed data analysis to glacier mass balance to multi study sites at High Mountains Asia.

Shi Guoqiang, Liu Yuzhou made contribution to algorithms for Sentinel 1A/B interferometry.

Academic exchanges & joint publications

Academic exchanges & cooperation

- CUHK and DLR Jointly Host International Workshop on InSAR Technologies for Urban Infrastructural Health Diagnosis. (2017/01/17-19)
- The 2nd international conference of Digital Belt and Road (DBAR 2017) & The 3rd international conference on remote sensing applications in tropical and subtropical areas (RSATSA 2017). (2017/12/06-08)

Joint publications

Li, G., Lin, H*. (2017) Recent decadal glacier mass balances over the Western Nyainqentanglha Mountains and the increase in their melting contribution to nam co lake measured by differential bistatic SAR interferometry. Global and Planetary Change, 149, 177-190.

Lin, H., Li, G*, Lan, C., Hooper, A., Ye, Q. (2017) A decreasing glacier mass balance gradient from the edge of the Upper Tarim Basin to the Karakoram during 2000-2014. Scientific Reports. In press.

Liu, L., Jiang, L*, et al., (2016) Glacier elevation changes (2012–2016) of the Puruogangri Ice Field on the Tibetan Plateau derived from bi-temporal TanDEM-X InSAR data. International Journal of Remote Sensing. 37, 24.

Summary on progress and collaboration

Chinese LI, Lin Hui, and European PI Ming Liquiu, designed study frame work and European LI, Andrew Hooper, supervised to SAR interferometry and other post data analysis in deriving glacier mass balances.

Chinese PI, Lan Cuo made meteorological analysis to explain derived glacier mass balance, she also contribute to analyze glacier melting impacts on Upper Indus.

Chinese PI, Jiang Liming, contribute to SAR interferometry and feature-tracking strategies to derive glacier height changes and glacier flow rate.

Plans for the next 2 years

Explore potentials (both feature tracking and interferometry) of applying S1A/B, S2A/B satellite to derive glacier surface feature, glacier flow velocity time series.

Evaluate C/X band penetration depth among HMA and explorer its correlation to circulation.

Use FNL data and numerical models to interpolate meteorological to high resolutions, explain the observed glacier mass balance pattern in HMA.

Select typical catchment of upper stream and study melting impact to its runoffs.

Young Scientists from both side will apply for funding for exchanging.