

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

**Multi – source hydrological data products to monitor
High Asian River Basins and regional water security
(MUSYCADHARB)**

32439

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. 32439 PROJECT

SUMMARY

LI-s: Massimo MENENTI (TU Delft, NL), Xin LI (CAREERI)
PI-s: List Li JIA (RADI), Francesca PELLICCIOTTI (NU, UK), Kun
YANG (ITP); Marco MANCINI (POLIMI, IT), Jancheng SHI
(RADI), Maria Jose ESCORIHUELA (Isardsat, ES)

Id. 32439_1 Satellite data products on each component of the terrestrial water cycle at the land – atmosphere interface (SADTALE)

Theme: Hydrology and cryosphere

Id. 32439_2 Observation and modeling of high elevation hydrological processes, including accumulation and ablation in glaciers

Theme: Hydrology and cryosphere

Id. 32439_3 Forcing, calibration, validation and data assimilation in basin scale hydrological models using satellite data products

Theme: Hydrology and cryosphere

Id. 32439_4 Monitoring Water resources in Red River Basin using Microwave Remote Sensing

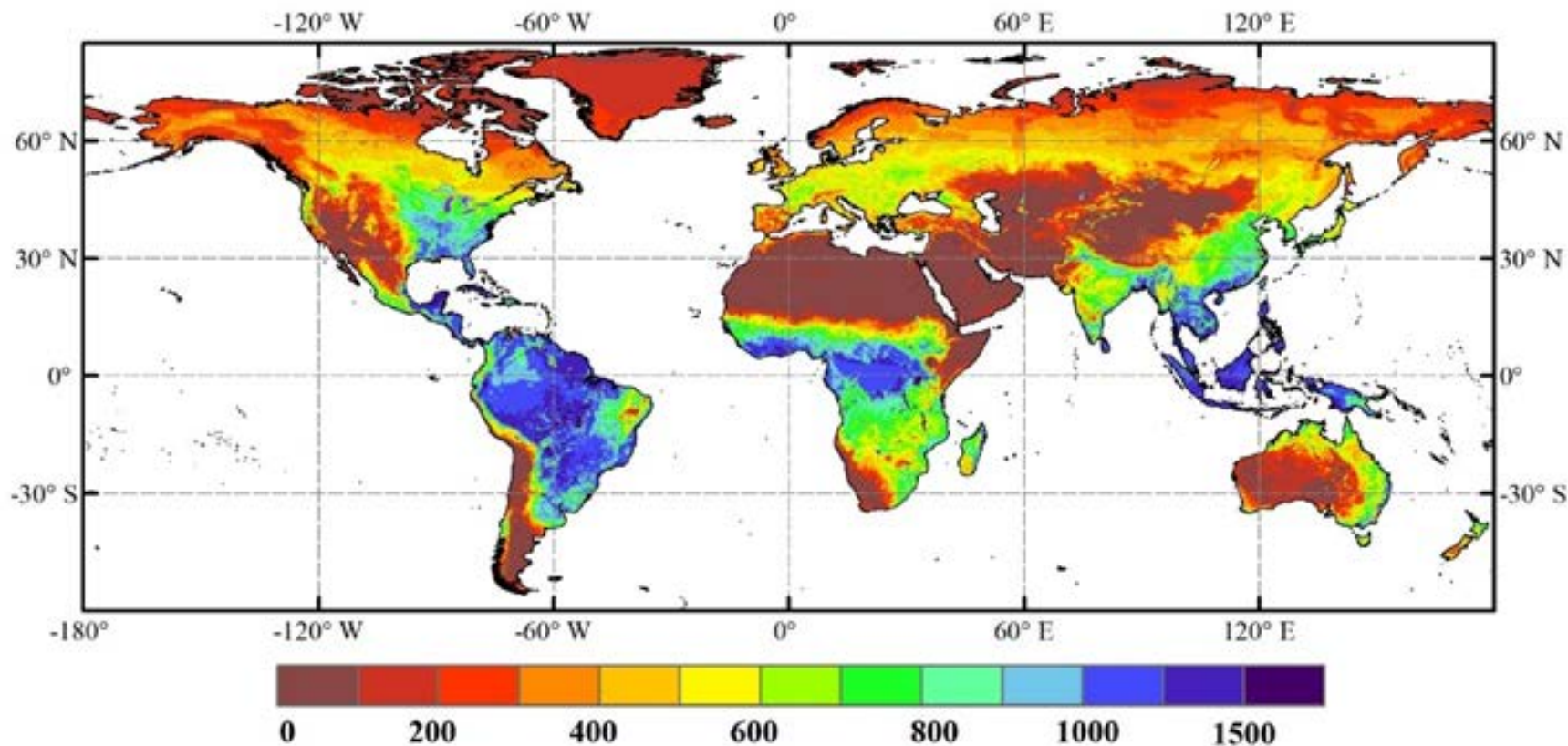
Themes: Hydrology and cryosphere

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	21	Sentinel 1-A/B SAR	121	HJ-A/B	30
ASAR	404	Sentinel 2-A/B MSI	29	GF-1	50
MERIS		Sentinel 3-A OLCI		GF-2	50
AATSR		Sentinel 3-A SLSTR		HY-A	10
SMOS	725	Sentinel 3-A SLAR		FY-1	300
TSX/CSK	20 / 20	Etc.		GF-3/SAR	10
ASCAT and ESA CCI Soil Moisture	7665 scenes	TOTAL		TOTAL	
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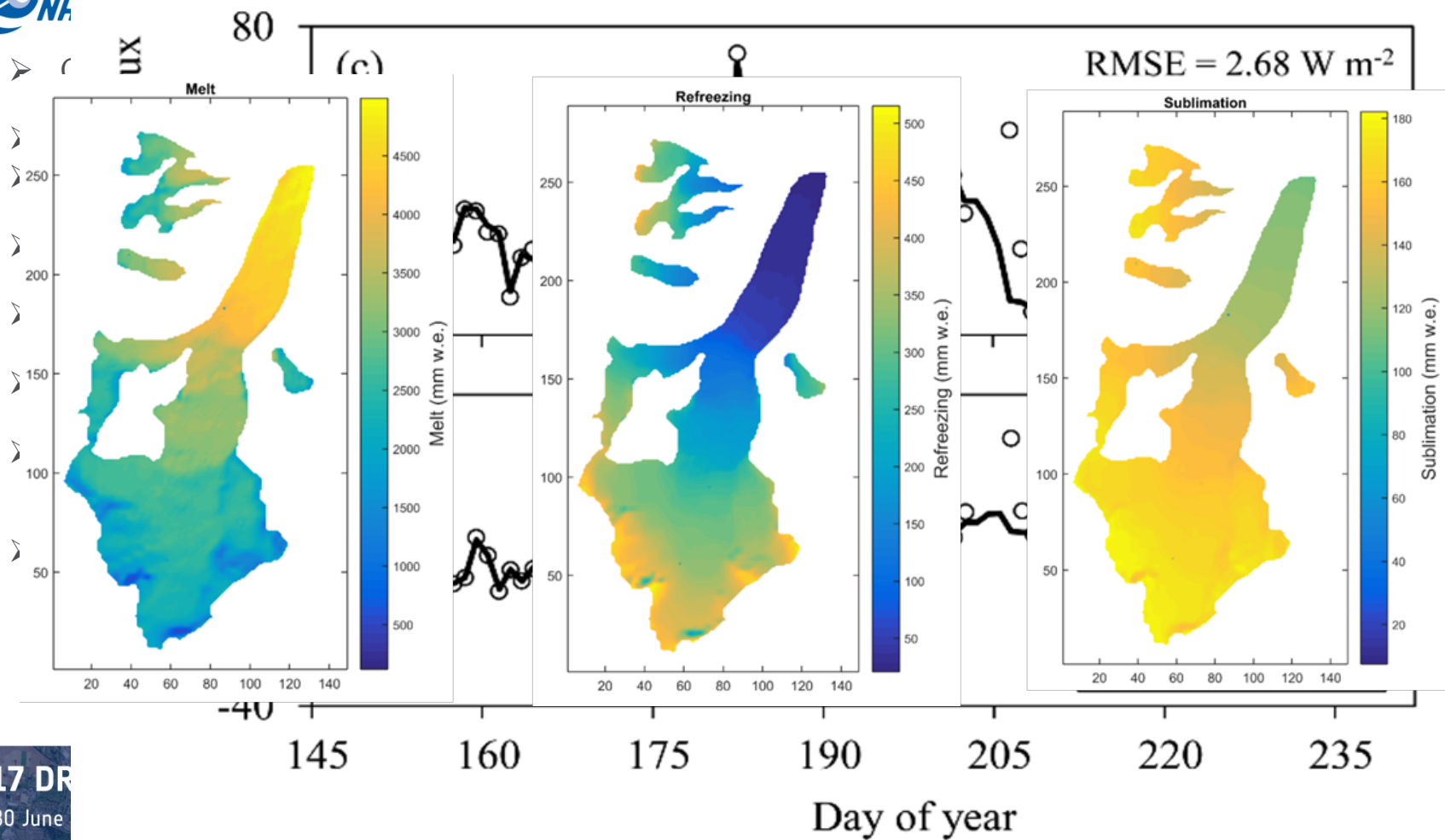


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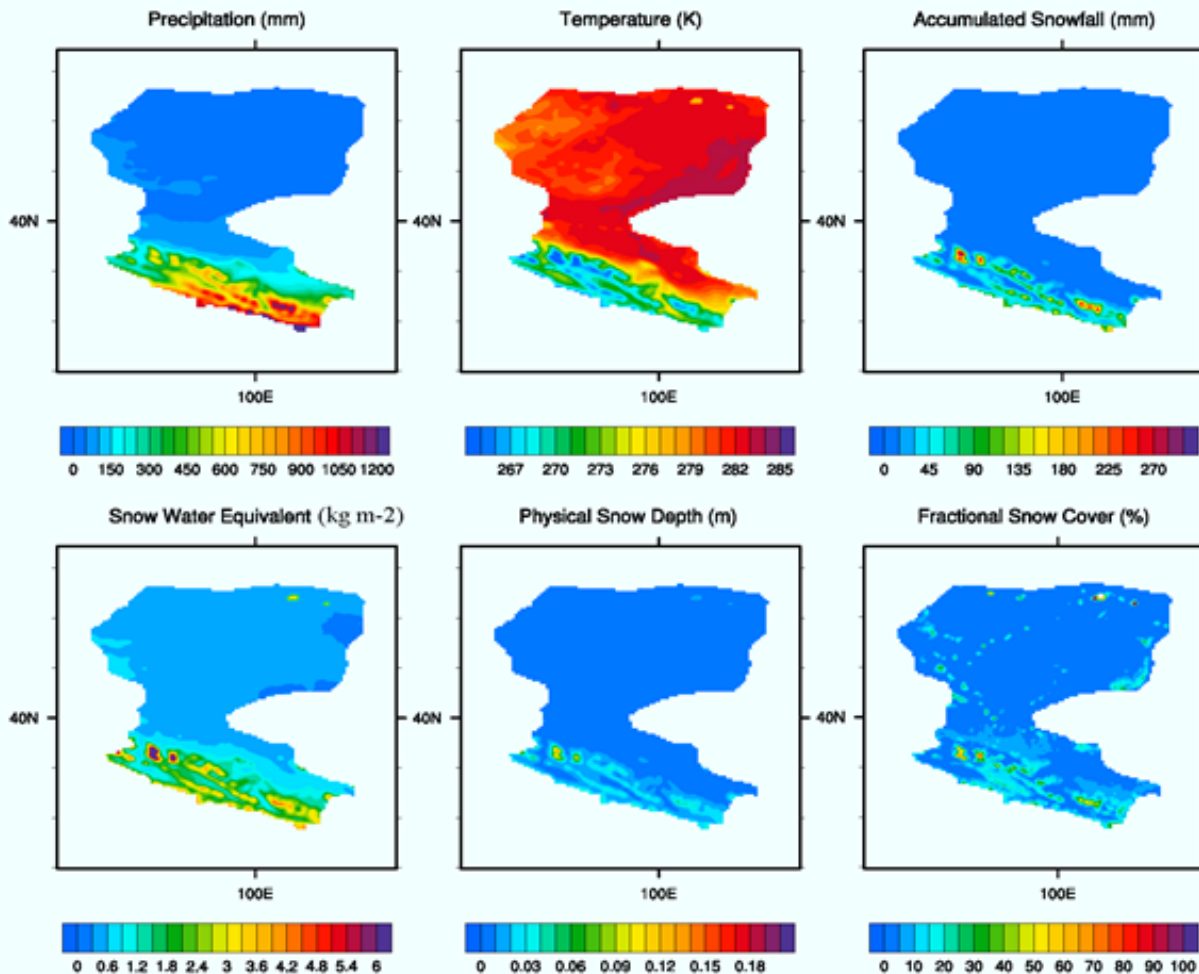
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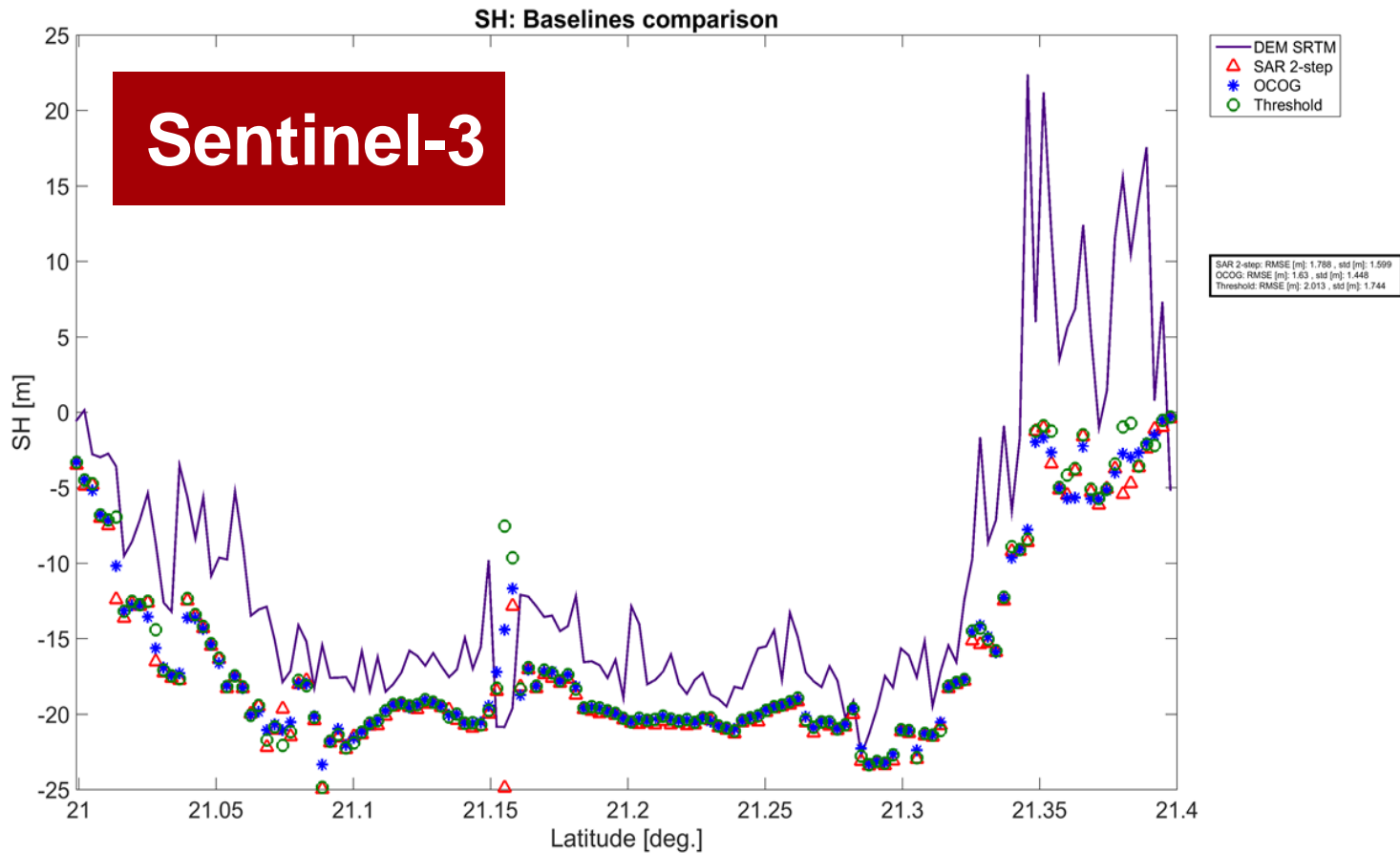
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Young scientists contributions

European YS

Dr. Mattijn van HOEK: PhD CAS 5/2017

Qi GAO PhD student at IsardSAT –
Satellite altimetry water levels.

Dr. Chiara CORBARI (POLIMI) EO data
driven hydrological modelling

Dr. Tom Shaw (PhD student at NU, now
a postdoc): energy balance modelling
setup, data analysis, mass balance

Dr. Alvaro Ayala (PhD student at ETH
Zurich, now a postdoc): energy and
mass balance model development

Chinese YS

Junchao SHI: PhD TU Delft 16/5/2017

Yerong WU: PhD TU Delft 10/2017 (expected)

Haolu SHANG: PhD TU Delft + RAD1 10/2017
(expected)

Dr. Jie ZHOU PhD CAS + TU Delft 5/2017 Time
series analysis for drought early warning

Dr. Chaolei ZHENG ET data products (ETMonitor)

Dr. Baohong Ding (ITP): Development of glacier
melting model with physical basis ().

Dr. Wei YANG (ITP): Comparison of surface
meteorology and energy balance between debris-
free and debris-covered Glaciers in southeast
Tibetan Plateau.

Dr. Rui LI (RAD1) combination of hydrological
model simulation and microwave products.

Dr. Tianjie ZHAO (RAD1) working on soil moisture
study by SMOS

Young scientists contributions

Chinese YS

Dr. Chaolei Zheng (RADI): ET algorithms and datasets

Dr. Guangcheng Hu (RADI): ET algorithms

Dr. Ning Wang (RADI): snow sublimation

Academic exchanges & joint publications

Academic exchanges & cooperation

Provide update & outcomes on

- Meetings

DBAR: Science Plan Review; Beijing, 6-7 December 2016;

DBAR: Kick Off High Mountain and Cold Regions (HiMAC) Task Force; Beijing 3-4, March 2017;

EOBAR International Conference, 16 – 18 May 2016

- Visiting scientists

Massimo MENENTI: PRC 1000 Talent at RADIS – CAS (2016 – 2019) EO Hydrology and Cryosphere;

- Workshops organised

Field visit to HeiHe River Basin + meeting with end – users; 19 – 20 May 2016

- Joint supervision of MSc and PhD students

Tianjin HUANG RADIS 22May 2017 Glacier thickness changes by GLAS

Joint publications

HU, G., L. JIA and M. MENENTI, 2015. Comparison of MOD16 and LSA-SAF MSG evapotranspiration products over Europe for 2011, Rem. Sens. Env. Vol. 156: 510–526

<http://dx.doi.org/10.1016/j.rse.2014.10.017>

SHANG, H.L., L. JIA and M. MENENTI, 2015. Analyzing the inundation pattern of the Poyang Lake flood plain by passive microwave data. J. Hydrometeor. Vol. 16 (2): 652 – 667 DOI: 10.1175/JHM-D-14-0022.1

CHEN, Q., L. JIA, R. HUTJES and M. MENENTI, 2015. Estimation of Aerodynamic Roughness Length over Oasis in the Heihe River Basin by Utilizing Remote Sensing and Ground Data. Remote Sens. Vol. 7: 3690-3709; doi: 10.3390/rs70403690

ZHOU, J., L. JIA and M. MENENTI, 2015. Reconstruction of Global MODIS Vegetation Index Time Series: Performance of Harmonic ANALYSIS of Time Series (HANTS). Rem. Sens. Env. Vol. 04/2015 (163): 217–228 DOI: 10.1016/j.rse.2015.03.018

ROUPIOZ, L., J. COLIN, L. JIA, F. NERRY, and M. MENENTI, 2015. Quantifying the impact of cloud cover on ground radiation flux measurements using hemispherical images. Int. J. Rem. Sens, vol. 36 (19-20) : 5087–5104 <http://dx.doi.org/10.1080/01431161.2015.1084440>

Academic cooperation

- Joint proposal on the Arctic Monitoring and Assessment Society, titled "Understanding changes in the Arctic environment: monitoring and modelling". Applicant: Dr. Frank
- Joint investigation on the Tibetan Plateau. Joint study on the Parlung No.4 Glacier in 2017, using a digital elevation model. Our project goes beyond the results about the combination of meteorological and hydrological models.
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Joint publications

MENENTI M and L.JIA, 2016. Observing the response of terrestrial vegetation to climate variability by time series analysis of satellite observations. J. Rem. Sens. Vol. 20 (5): 946 – 957

FAIVRE, R., J. COLIN and M. MENENTI, 2017. Evaluation of Methods for Aerodynamic Roughness Length Retrieval from Very High-Resolution Imaging LIDAR Observations over the Heihe Basin in China. Remote Sens. Vol. 9(1): 63; doi: 10.3390/rs9010063

PHAN, V.H., R.C.LINDENBERGH and M.MENENTI, 2017. Assessing Orographic Variability in Glacial Thickness Changes at the Tibetan Plateau Using ICESat Laser Altimetry. Remote Sens., Vol. 9(2): 160 ; doi:10.3390/rs9020160

LI,N., L.JIA, J.LU, J.ZHOU and M.MENENTI, 2017. Regional surface soil heat flux estimate from multiple remote sensing data in a temperate and semiarid basin. J. Applied Remote Sens. Vol.11(1): 16 - 28 DOI: 10.1117/1.JRS.11.016028

MENENTI, M., L. JIA, G. HU, Q. LIU, X. XIN, L. ROUPIOZ, C. ZHENG, J. ZHOU, Z. LI, R. FAIVRE, H. GHAFARIAN, V.H. PHAN, R. LINDENBERGH, J. LI, J. WEN, L. LI, J. ZHAO and B. DOU., 2016. Terrestrial Water Cycle in South and East Asia: Hydrospheric and Cryospheric Data Products. IGARSS 2016 - 2016 IEEE DOI: 10.1109/IGARSS.2016.7729989

MENENTI M, H.R. GHAFARIAN MALAMIRI, H.SHANG, S.M. ALFIERI, C. MAFFEI and L.JIA, 2016. Observing the response of terrestrial vegetation to climate variability across a range of time scales by time series analysis of land surface temperature. Chapter 14 In: Y. Bang (Ed.) Multitemporal Remote Sensing: Methods and Applications. Springer Verlag, Heidelberg: 277 – 315 DOI 10.1007/978-3-319-47037-5_14

Corbari, C., Mancini, M., Li, J., Su, Z., (2015), Can satellite land surface temperature data be used similarly to ground discharge measurements for distributed hydrological model calibration?, Hydrological Sciences J. vol. 60 (1-2), 202-217

Joint publications

MENENTI M and L.JIA, 2016. Observing the response of terrestrial vegetation to climate variability by time series analysis of satellite observations. J. Rem. Sens. Vol. 20 (5): 946 – 957

Ji D., SHI J., XIONG C., WANG T., ZHANG Y., 2017. total precipitable water retrieval method over land using the combination of passive microwave and optical remote sensing. Remote Sensing of Environment, 191, 313-327.

Zheng C., Jia L., Hu G., et al. 2016. Global evapotranspiration derived by ETMonitor model based on earth observations. 2016 IEEE International Geoscience and Remote Sensing Symposium, 222-225.

Zhao T., Shi J., Wang T., et al. 2016. GLOBAL MAPPING OF LANDSCAPE FREEZE/THAW STATE FROM THE WATER CYCLE OBSERVATION MISSION (WCOM). 2016 IEEE International Geoscience and Remote Sensing Symposium, 3442-3444.

Wang N., Jia L., Zheng C., M. Menenti M. 2017. Estimated sub-pixel snow sublimation from satellite-based observations. Journal of Applied Remote Sensing, in review.

van Hoek M., Jia L., Zhou J., Zheng C., Massimo Menenti. 2016. Early Drought Detection by Spectral Analysis of Satellite Time Series of Precipitation and Normalized Difference Vegetation Index (NDVI). Remote Sensing, 8(5), 422.

Zhou J., Jia L., Menenti M., Gorte B. 2016. On the performance of remote sensing time series reconstruction methods – A spatial comparison. Remote Sensing of Environment, 187, 367-384.

Zheng C., Jia L., Hu G., et al. 2016. Global evapotranspiration derived by ETMonitor model based on earth observations. 2016 IEEE International Geoscience and Remote Sensing Symposium, 222-225.

Zhao T., Shi J., Wang T., et al. 2016. GLOBAL MAPPING OF LANDSCAPE FREEZE/THAW STATE FROM THE WATER CYCLE OBSERVATION MISSION (WCOM). 2016 IEEE International Geoscience and Remote Sensing Symposium, 3442-3444.

Wang N., Jia L., Zheng C., M. Menenti M. 2017. Estimated sub-pixel snow sublimation from satellite-based observations. Journal of Applied Remote Sensing, in review.

Shi, JianCheng; Xiong, Chuan; Jiang, LingMei. Review of snow water equivalent microwave remote sensing. Science China-Earth Sciences. 2016, 4(59): 731-745

Li, Rui; Wang, Jing'ai; Zhao, Tianjie; Shi, Jiancheng. Index-based evaluation of vegetation response to meteorological drought in Northern China. Natural Hazards. 2016, 3(84): 2179-2193

Summary on progress and collaboration

- European and Chinese members have complementary skills and expertise for our common topic in term of water resource management.
- Fruitful collaboration with the group of Prof Kun Yang and Wei Yang and postdoc Dr Bahohng Ding in particular. Combination of ground data collected by the Chinese partners with the distributed, physically-based energy balance model developed by PI Pellicciotti's group allowed some of the first estimates of glacier scale energy and mass fluxes
- Collaboration with the group at RAD1 has been initiated to improve albedo estimates from satellite data.
- Basin scale remote sensing products of precipitation, evapotranspiration, soil moisture, snow cover area, snow water equivalent, runoff, and groundwater storage have been further produced and evaluated.
- The framework of data assimilation system has been established, and has been proven to be effective for both at basin and global scales.
- The remote sensing products will be assimilated into the hydrological models to improve the predicting ability of hydrological models.
- Multiple processes have been integrated into a physically-based energy and mass balance model of glaciers.
- Global and regional water loss products ET were obtained based on ETMonitor, and multiple satellite observation datasets were adopted including European satellite based soil moisture dataset.
- New algorithms to retrieve the key water cycle process related variables, including the snow sublimation estimation, total precipitable water, and surface freeze and thaw condition, were developed and validated, which will further be applied with Chinese and European satellite data.
- Combining best MW precipitation product, best MW soil moisture product and best altimetry data with evapotranspiration, we will calculate water balance of red river in 2018-2019 .



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26-30 June

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