



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

Key Eco-Hydrological Parameters Retrieval and Land Data Assimilation System Development in a Typical Inland River Basin of China's Arid Region

Project Summary

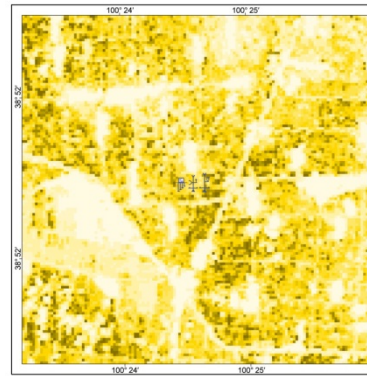
id. 5322 Hydrology

Friday, June 24th 2011

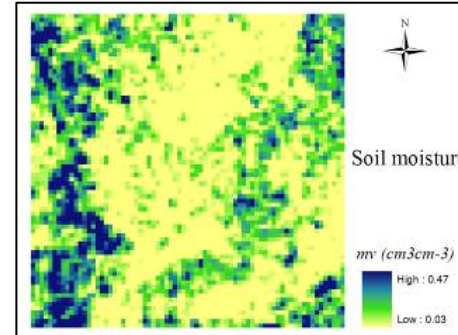
Progress on key eco-hydrological parameters retrieval



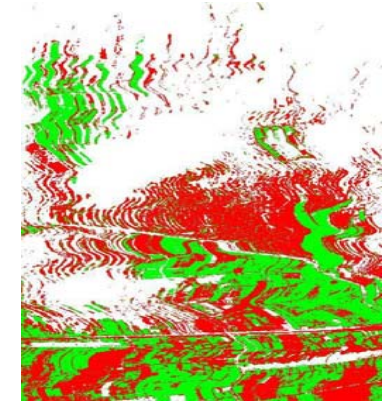
LAI derived from CHRIS/PROBA image



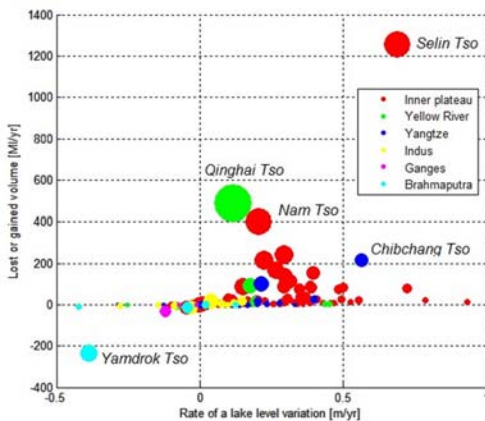
ET estimation using Landsat TM images



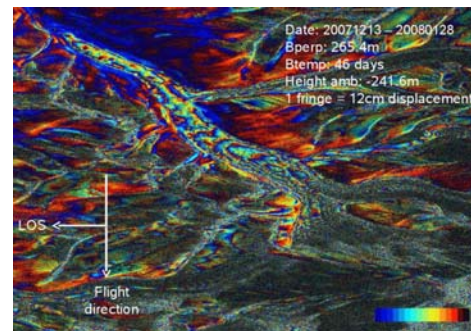
Estimation of surface soil moisture and roughness from multi-angular ASAR images



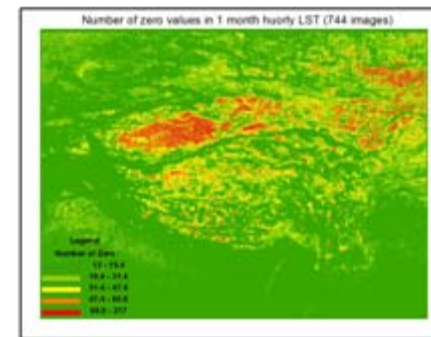
Mapping C3 and C4 plant functional types using airborne hyperspectral image



ICESAT / GLAS measurements of lake levels and mass balance



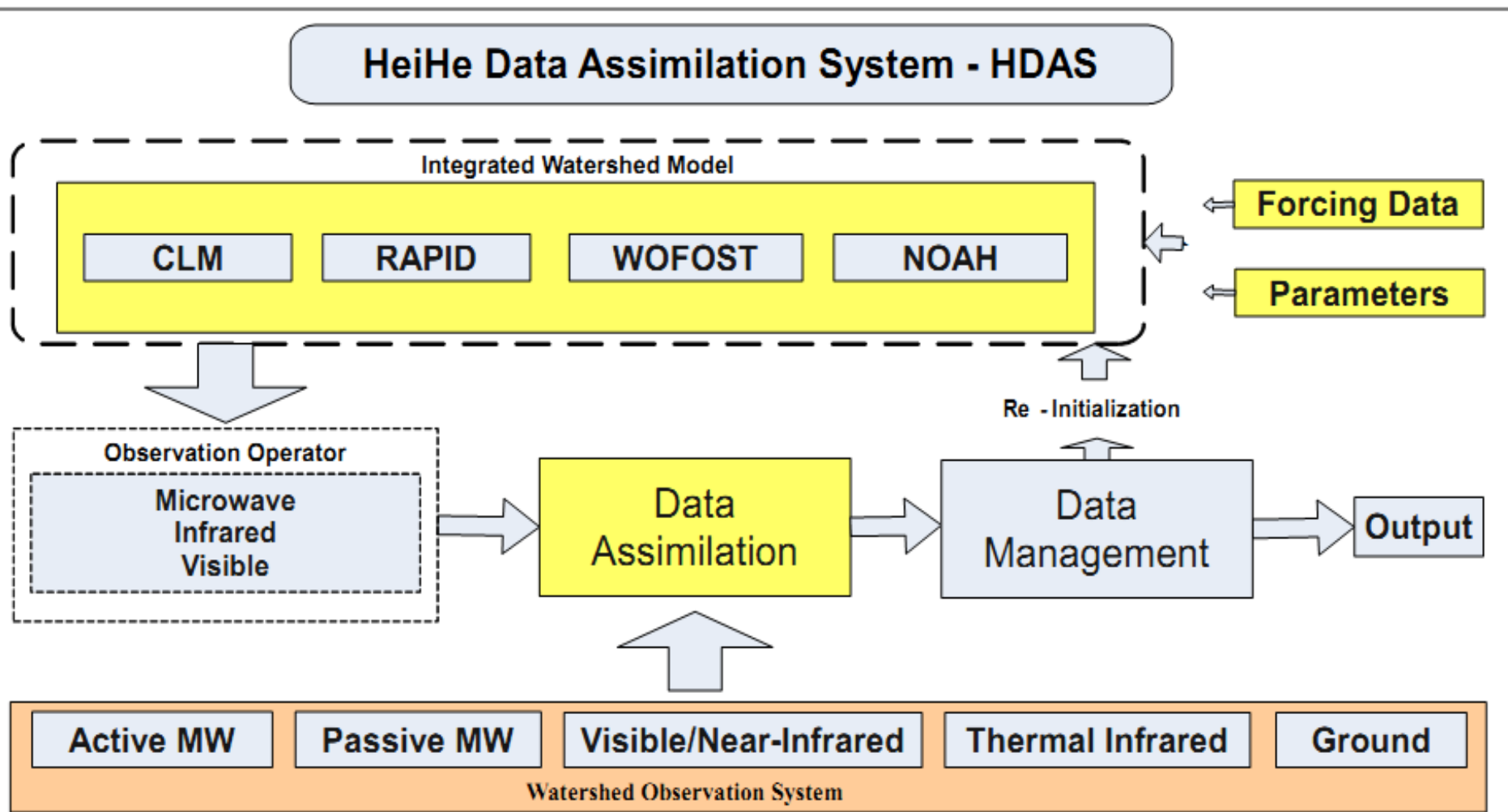
High resolution DTM to estimate glaciers mass balance using ALOS/PRISM records: FY 2



Time series analysis and gap filling LST

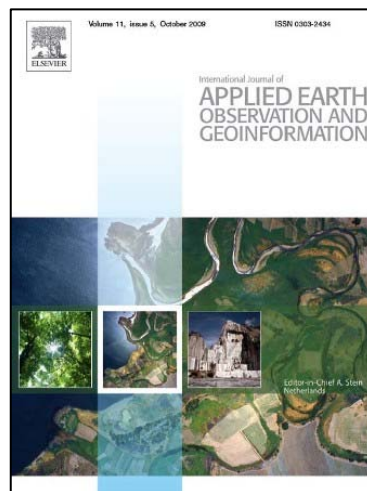
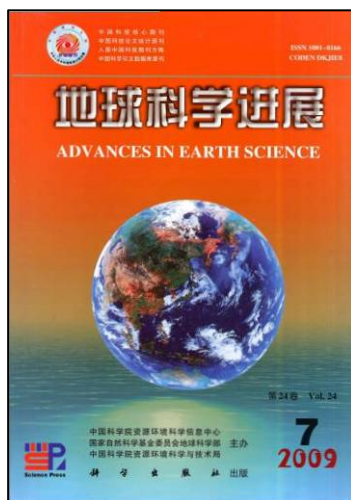
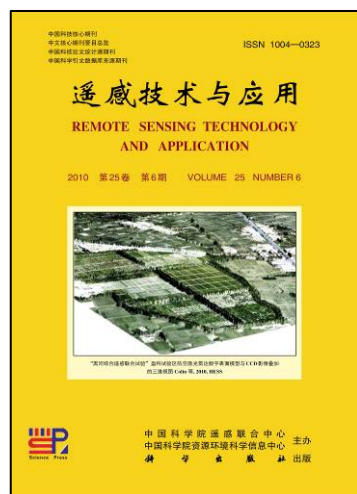
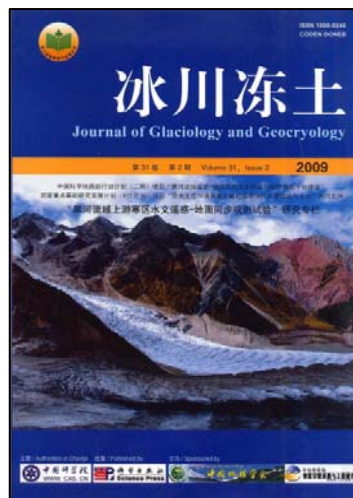
Snow depth
NPP/GPP
Roughness/z0
Vegetation and soil temperatures
... ..

Progress on Heihe data assimilation system (HDAS)



- Retrieval of hydrological and ecological variables/parameters were performed by using airborne and satellite-borne remote sensing data (most from Dragon II project) obtained during WATER.
- Ground truth collected in WATER field campaigns are tested to be useful in validation of the models/algorithms for retrieval of hydrological and ecological parameters.
- Multi-source remote sensing data assimilation system is established and obtained preliminary results, further efforts need to be made in the next step.
- SAR interferometry has been used to map glacier flow
- Trends in water level for about 200 lakes in the Qinghai – Tibet Plateau have been determined with ICESAT/GLAS data
- Airborne LIDAR data have been used to map the aerodynamic roughness in an agricultural landscape using a novel method based on Computational Fluid Dynamics (CFD)
- AATSR data have been used to parameterize sensible heat fluxes with a single- and a dual-source scheme
- New Surface Energy Balance Framework developed compatible with multiple data sources and algorithms

- J. Colin and R. Faivre. Aerodynamic roughness length estimation from very high-resolution imaging LIDAR observations over the Heihe basin in China. *Hydrol. Earth Syst. Sci.*, 14, 2661-2669, 2010.
- Jia, L. and M. Menenti, 2010. Thermal infrared observations of heterogeneous soil-vegetation systems. Chapter 10 in: *Remote Sensing Optical Observations of Vegetation Properties*. Research Signpost, Kerala, India : 227-274.
- Jia, L., H. Shang, G. Hu, and M. Menenti, 2011, Phenological response of vegetation to upstream river flow in the Heihe River basin by time series analysis of MODIS data, *Hydrology and Earth System Sciences*, 15, 1047–1064, 2011. Ouyang, X., L. Jia, G. Hu, and M. Menenti, 2011, Retrieval of land surface temperature by cross-calibrated thermal infrared data of SVISSR onboard China geostationary satellite with MODIS, *International Journal of Applied Earth Observation and Geoinformation*, in review.
- Bai, J., L. Jia, S.M. Liu, and Z.W. Xu, 2011, Characterizing the footprint of eddy-covariance and scintillometer measurements for validation of land surface heat flux estimate from satellite observations, manuscript to be submitted to HESS.
- Jia, L. and M. Menenti, Multiple variables retrievals from multi-spectral radiance measurements by spaceborne sensors with dual-view angle capability, *ESA-SEN4SCI Workshop*, 22-23 March 2011, Frascati, Italy.
- S. G. Wang, et al. Estimation of surface soil moisture and roughness from multi-angular ASAR imagery in the Watershed Allied Telemetry Experimental Research (WATER), *Hydrol. Earth Syst. Sci.*, 15, 1415-1426, 2011.
- Junlei Tan, et al. Retrieval of Leaf Area Index, Leaf Chlorophyll Content Based on SLC Model and CHRIS Data. *Proceedings of IITA-GRS 2010*, pp:551-5548, 2010.
- Xin Li, et al. Watershed Allied Telemetry Experimental Research. *Journal of Geophysical Research*, 114(D22103): 1-19, doi:10.1029/2008JD011590, 2009.
- Yi Song, et al. A biophysics-based surface resistance model for estimating latent heat flux from remotely sensed data. *JAG*, in revision.
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HESS - Special Issue

Observing and modeling the catchment-scale water cycle
Editor(s): Xin Li, Xiaowen Li, K. Roth, M. Menenti, and W. Wagner

- Parameterization of a coupled CO₂ and H₂O gas exchange model at the leaf scale of *Populus euphratica*** 05 Mar 2010
G. F. Zhu, X. Li, Y. H. Su, and C. L. Huang
Hydrol. Earth Syst. Sci., 14, 419-431, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 1679 KB) ⇒ [Discussion Paper](#) (HESSD)
- The Two-layer Surface Energy Balance Parameterization Scheme (TSEBPS) for estimation of land surface heat fluxes** 12 Mar 2010
X. Xin and Q. Liu
Hydrol. Earth Syst. Sci., 14, 491-504, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 515 KB) ⇒ [Discussion Paper](#) (HESSD)
- Frozen soil parameterization in a distributed biosphere hydrological model** 23 Mar 2010
L. Wang, T. Koike, K. Yang, R. Jin, and H. Li
Hydrol. Earth Syst. Sci., 14, 557-571, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 1269 KB) ⇒ [Discussion Paper](#) (HESSD)
- Estimation of evapotranspiration in the Mu Us Sandland of China** 24 Mar 2010
S. Liu, J. Bai, Z. Jia, L. Jia, H. Zhou, and L. Lu
Hydrol. Earth Syst. Sci., 14, 573-584, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 1897 KB) ⇒ [Discussion Paper](#) (HESSD)
- Groundwater response to leakage of surface water through a thick vadose zone in the middle reaches area of Heihe River Basin, in China** 07 Apr 2010
X.-S. Wang, M.-G. Ma, X. Li, J. Zhao, P. Dong, and J. Zhou
Hydrol. Earth Syst. Sci., 14, 639-650, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 1116 KB) ⇒ [Discussion Paper](#) (HESSD)
- Evaluation of Penman-Monteith model applied to a maize field in the arid area of northwest China** 29 Jul 2010
W.-Z. Zhao, X.-B. Ji, E.-S. Kang, Z.-H. Zhang, and B.-W. Jin
Hydrol. Earth Syst. Sci., 14, 1353-1364, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 505 KB) ⇒ [Discussion Paper](#) (HESSD)
- Accurate LAI retrieval method based on PROBA/CHRIS data** 10 Aug 2010
W. J. Fan, X. R. Xu, X. C. Liu, B. Y. Yan, and Y. K. Cui
Hydrol. Earth Syst. Sci., 14, 1499-1507, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 2935 KB) ⇒ [Discussion Paper](#) (HESSD)
- The benefits of gravimeter observations for modelling water storage changes at the field scale** 01 Sep 2010
B. Creutzfeldt, A. Guntner, S. Vorogushyn, and B. Merz
Hydrol. Earth Syst. Sci., 14, 1715-1730, 2010
⇒ [Abstract](#) ⇒ [Final Revised Paper](#) (PDF, 2184 KB) ⇒ [Discussion Paper](#) (HESSD)
- Responses of snowmelt runoff to climatic change in an inland river basin, Northwestern China, over the past 50 years** 19 Oct 2010

Improve and validate the HDAS

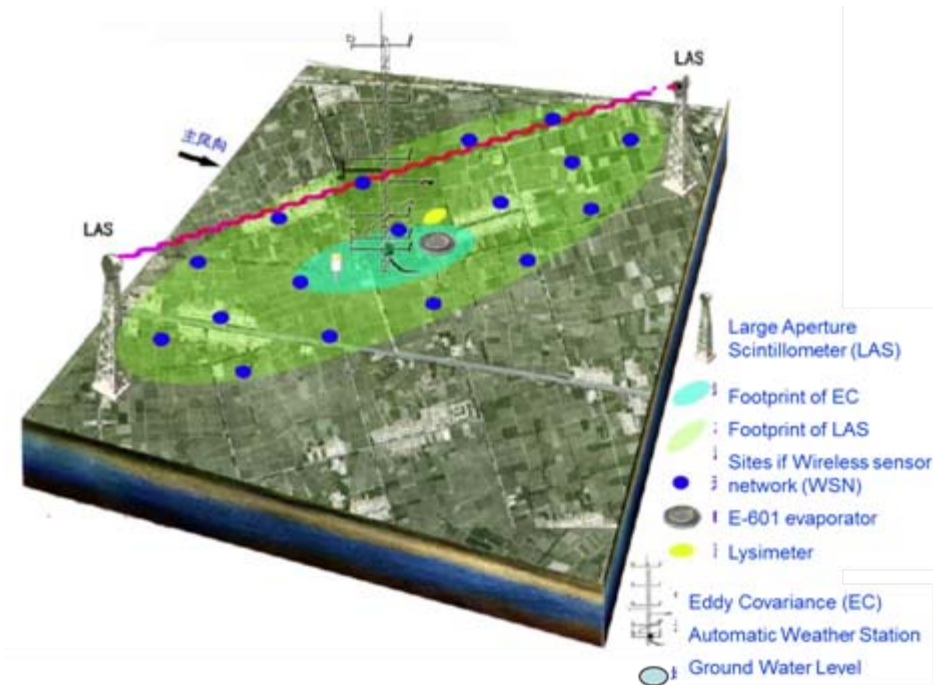
Generate time series of hydrological data products for the Heihe watershed

Extend new parameterization of aerodynamic roughness and of heat and water exchanges to larger watersheds

Link observed changes in lake levels with water balance and conveyance on Qinghai – Tibet Plateau

Comparing and combining deformation products derived from ICESat laser altimetry and InSAR radar data over glaciers on Greenland, Antarctica and Tibet

Heihe Watershed Allied Telemetry Experimental Research



Intensive observation period (IOP): 2012-2014

<http://water.westgis.ac.cn>

To provide and validate the remote sensing products

Remote sensing product	Spatial resolution	Internal satellite/sensors	International satellite/sensors
LAI	30-1000 m	HJ-1, FY-3	MODIS, MISR, VEGETATION, POLDER, MERIS, MSG
Chlorophyll content	30-1000 m	HJ-1	MERIS
Precipitation	5-25 km	FY-3	TRMM, AMSR-E, GMS
Soil moisture	1-25 km	FY-3	SMOS, EnviSat, SMAP, AMSR-E
Snow Water Equipment	1-25 km	FY-3	CoReH2O, SLCP, AMSR-E
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Thank you !

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