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"Inland Water Storage and Runoff: Modeling, In Situ Data and Remote Sensing"
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Fusion of Satellite and Drone Remote Sensing with In-situ Data and VIP process-based model to Retrieve Hydrological Regime for China basins

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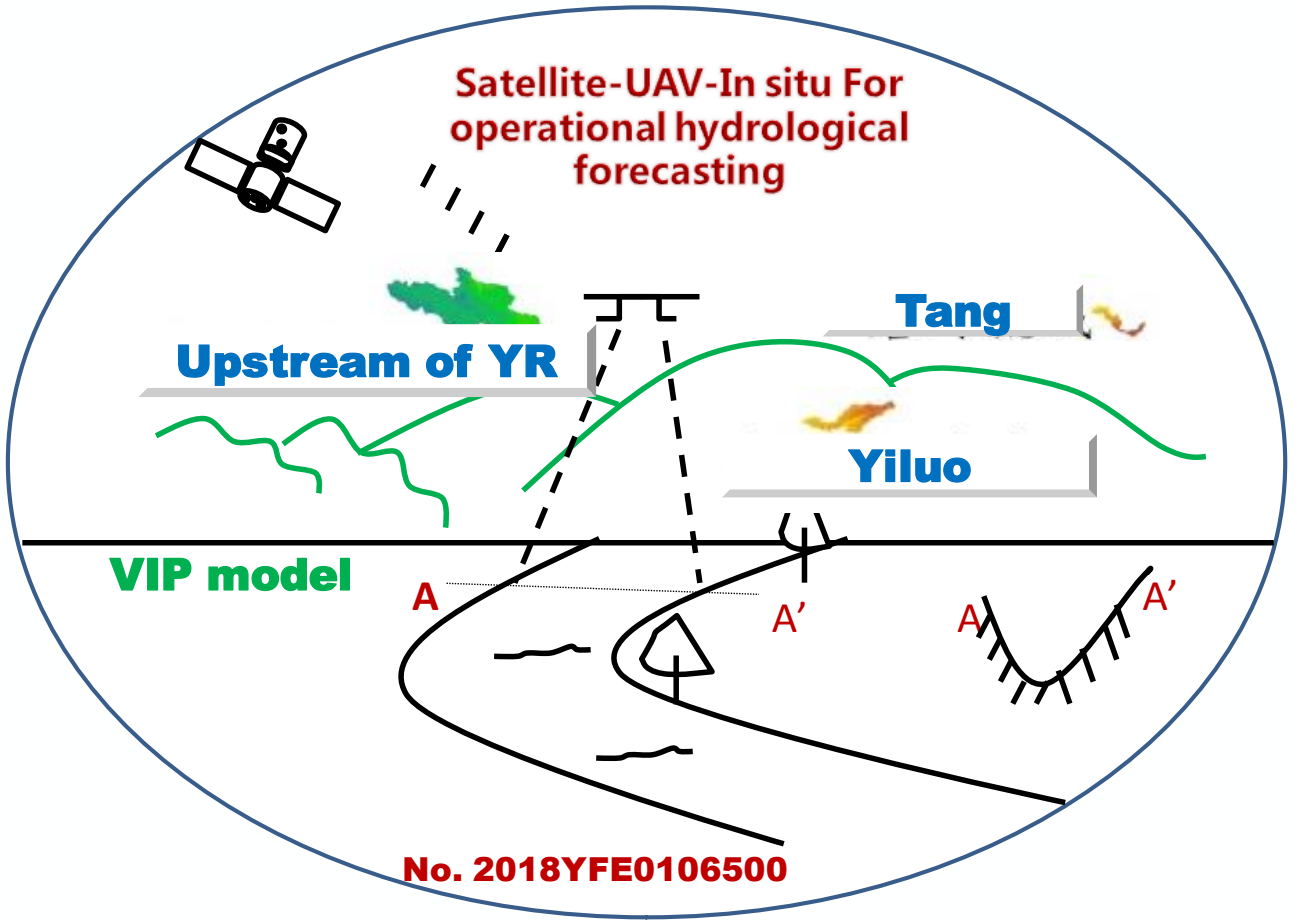
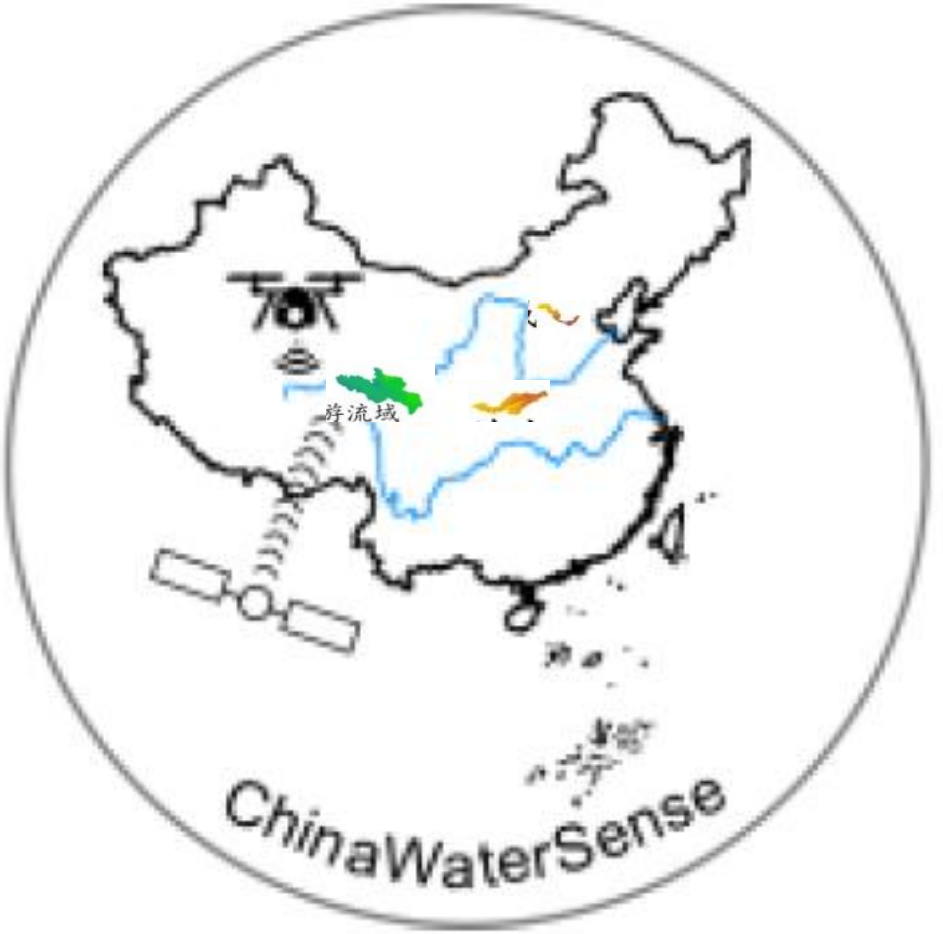
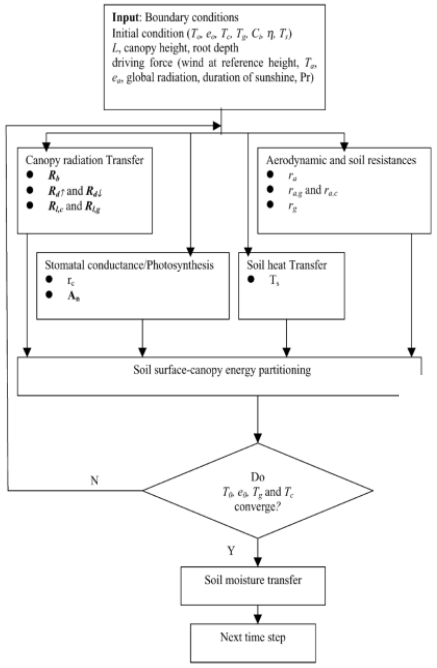
http://www.igsnrr.cas.cn/topic/yfjh/

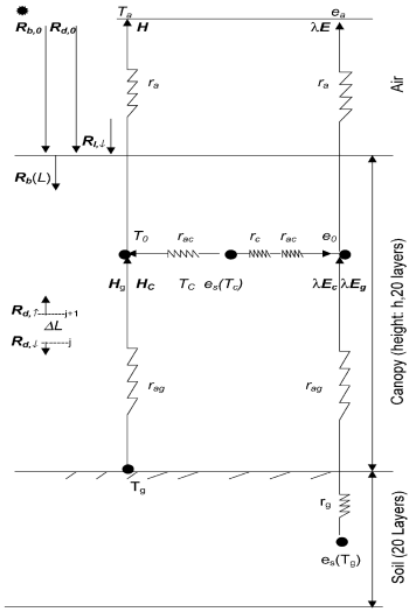
https://chinawatersense.dtu.dk/

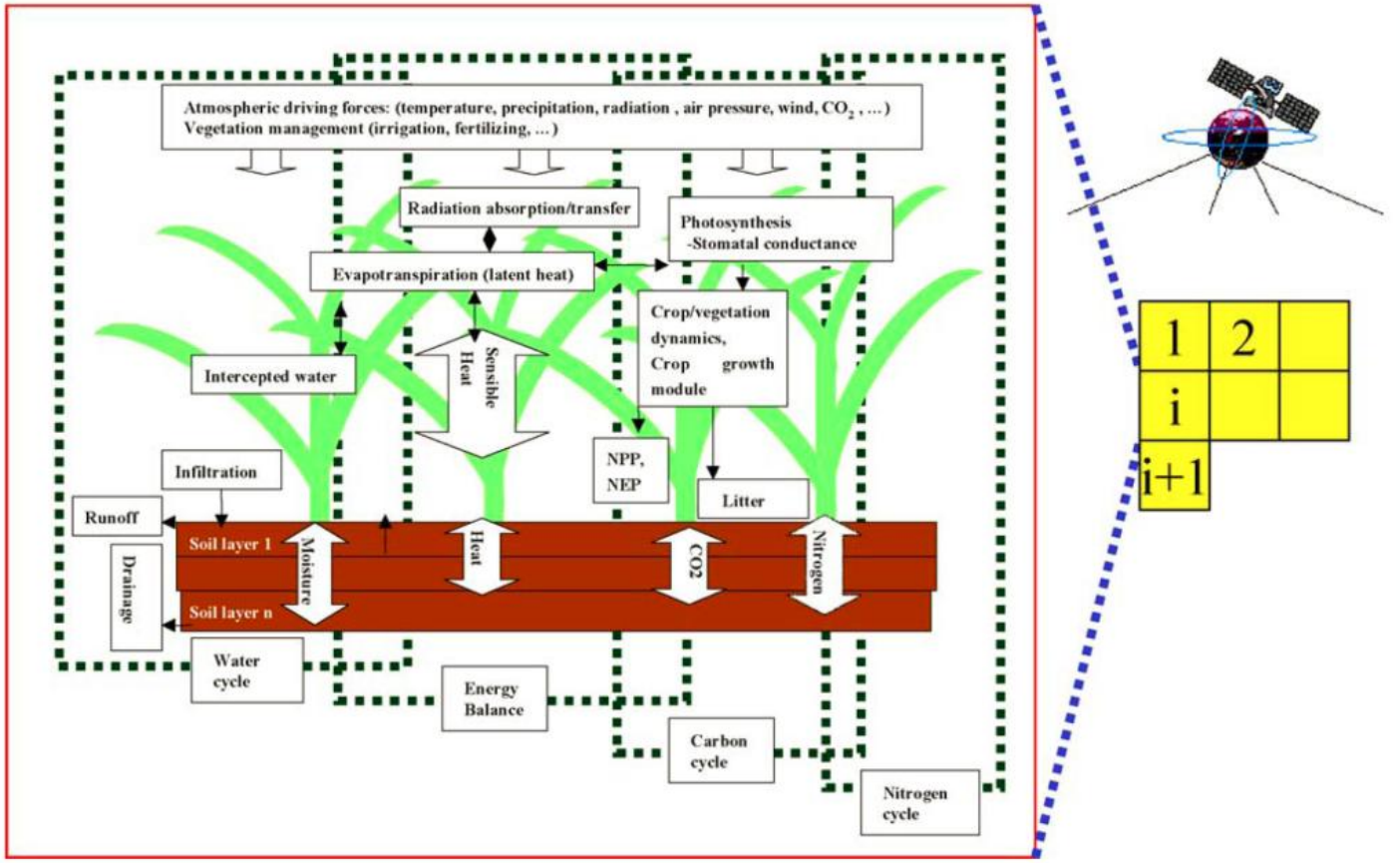




VIP (Vegetation Interface Processes) distributed eco-hydrological dynamic model







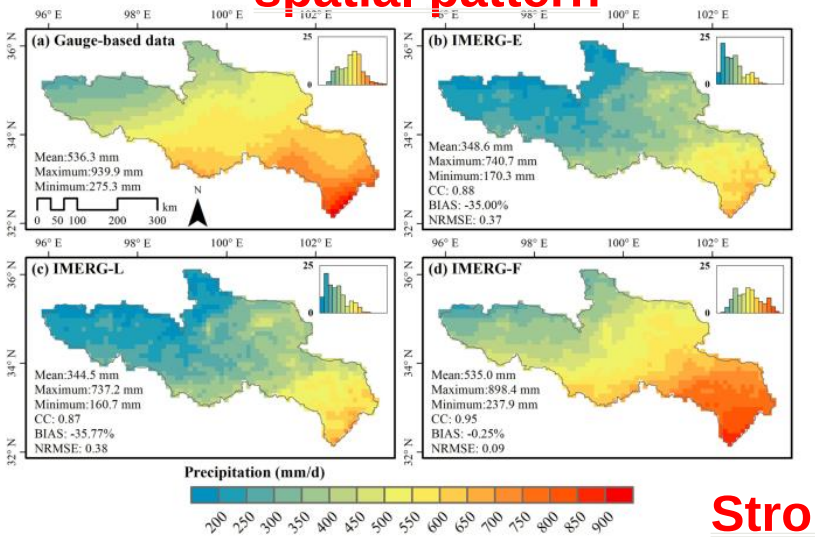
Mo and Liu , AFM, 2001;Mo et al., JH, 2004; Mo et al., EM, 2005; Mo et al., 2017； Liu et al., JH,2021

Outlines

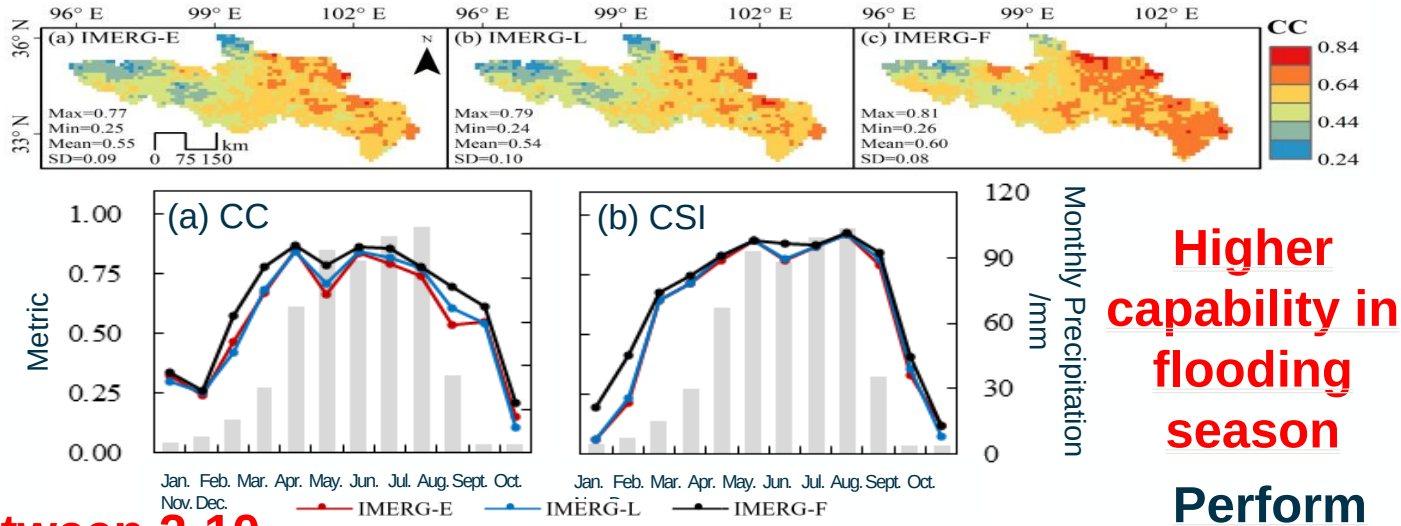
1. Evaluation of IMERG products in the Yellow River Basin Upper Tangnaihai
2. Deriving human-induce evapotranspiration based on GRACE and the VIP model
3. Retrieval of Surface Water Elevation to inform a hydrodynamic model for the Yiluo River

Extensive evaluation of three IMERG precipitation products for both liquid and solid in Yellow River source region (2014-2018, 0.1 degree, daily)

NRT Underestimated with matched spatial pattern

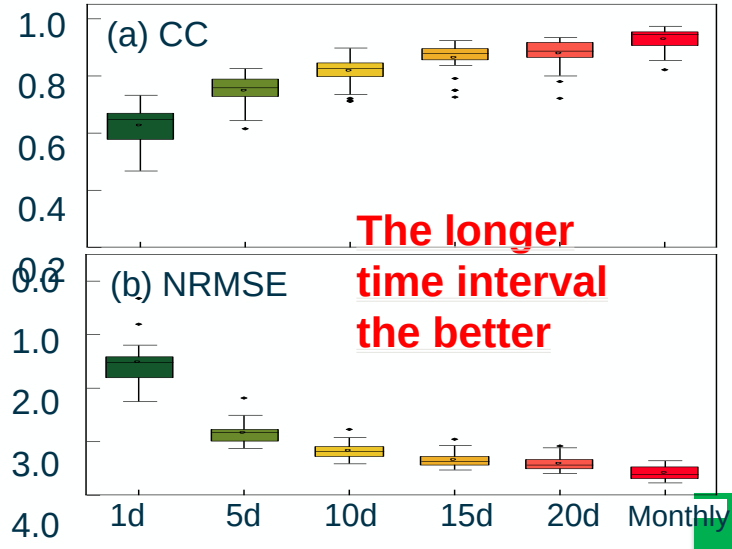


Better performance in humid area

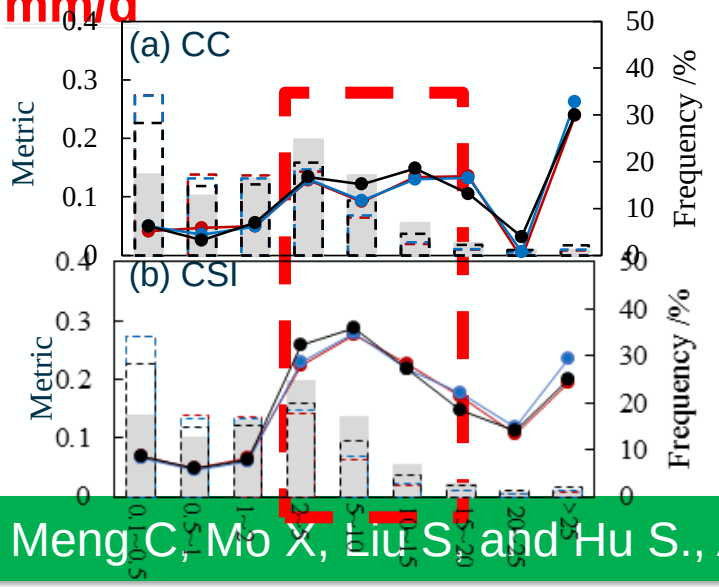


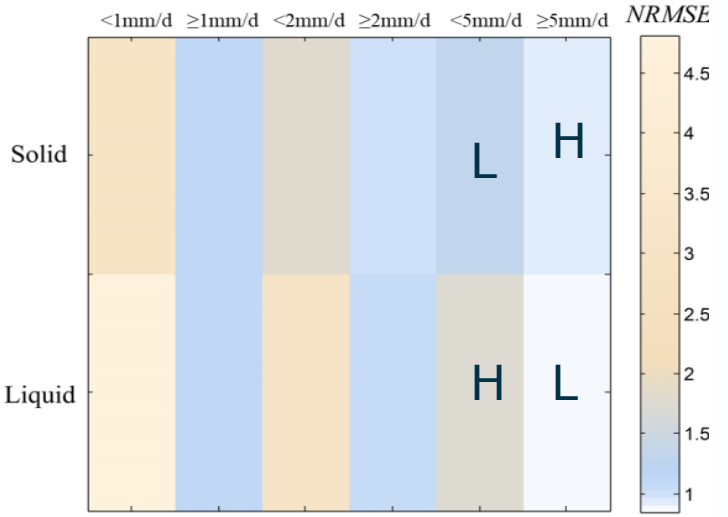
Higher capability in flooding season

Strong for P between 2-10 mm/d



The longer time interval the better

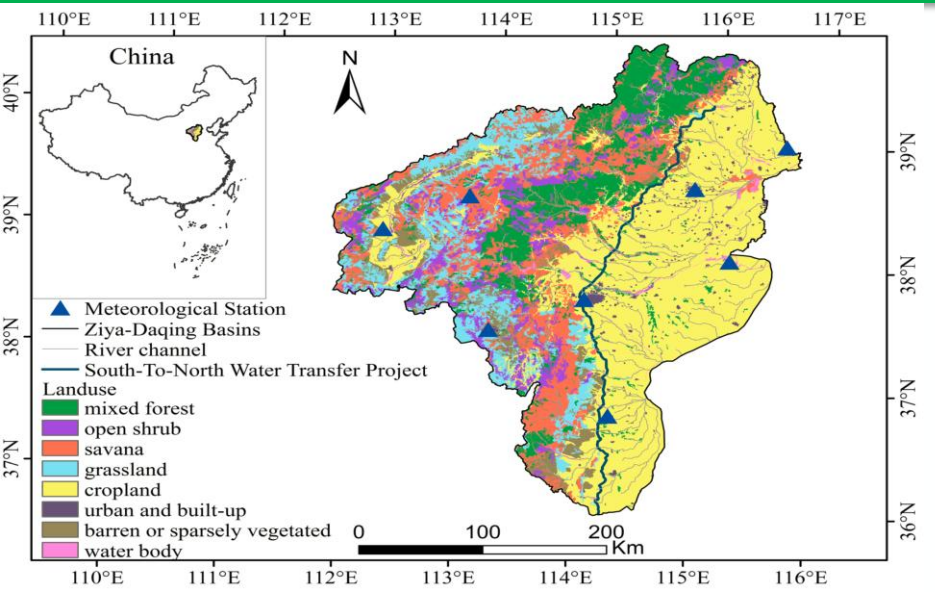


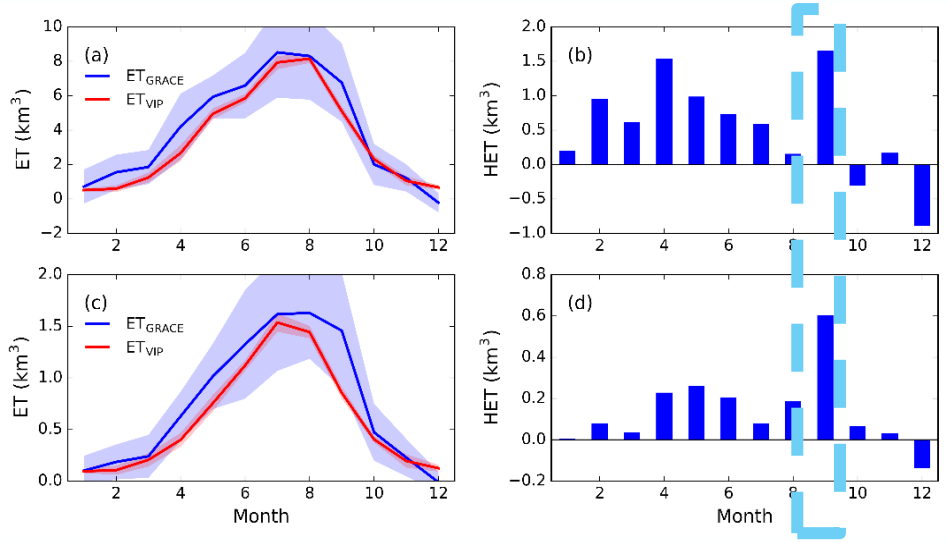


Perform better for liquid than for solid when P>5mm/d, but opposite when P is smaller

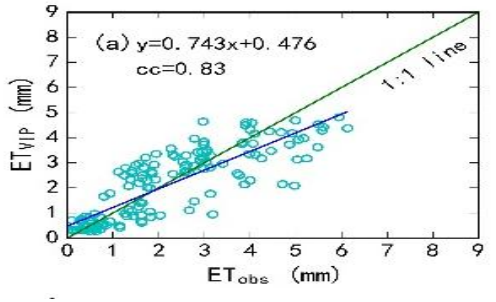
Meng C, Mo X, Liu S, and Hu S., Atmospheric Research, 2021, 256: 105576.

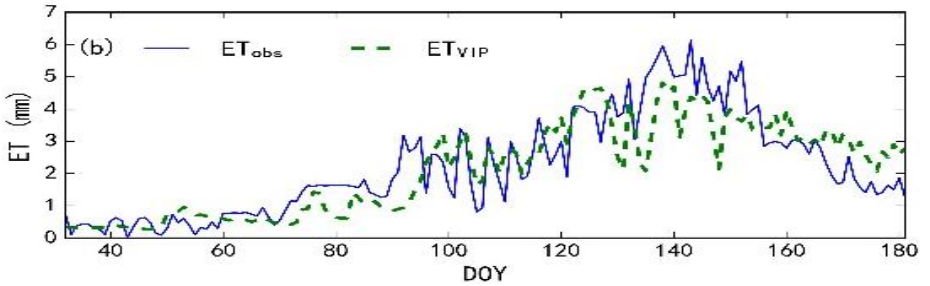
Deriving monthly 1km resolution human-induced evapotranspiration with GRACE satellites and the VIP model in the Ziya-Daqing Basins, China from 2006 to 2015





Bias of ET < 2mm, RMSE < 1.18 mm





Independent variable	CC	PC	Indirect path coefficient							
			GDP	SR	GR	PR	IR	IW	DW	Sum
GDP	0.69	1.33	–	−1.23	0.76	0.03	−0.69	−0.11	0.59	−0.64
SR	0.15	−2.61	0.63	–	2.03	0.08	−0.27	0.07	0.23	2.76
GR	0.30	2.23	0.45	−2.37	–	0.08	−0.25	0.04	0.13	−1.93
PR	0.22	0.09	0.52	−2.24	2.00	–	−0.28	−0.05	0.16	0.13
IR	−0.77	0.71	−1.28	1.00	−0.77	−0.03	–	0.15	−0.56	−1.49
IW	−0.24	0.34	−0.42	−0.58	0.25	−0.01	0.33	–	−0.15	−0.58
DW	0.67	0.61	1.29	−0.98	0.47	0.02	−0.66	−0.08	–	0.06

GDP, domestical water use and groundwater pumping are the driving forces

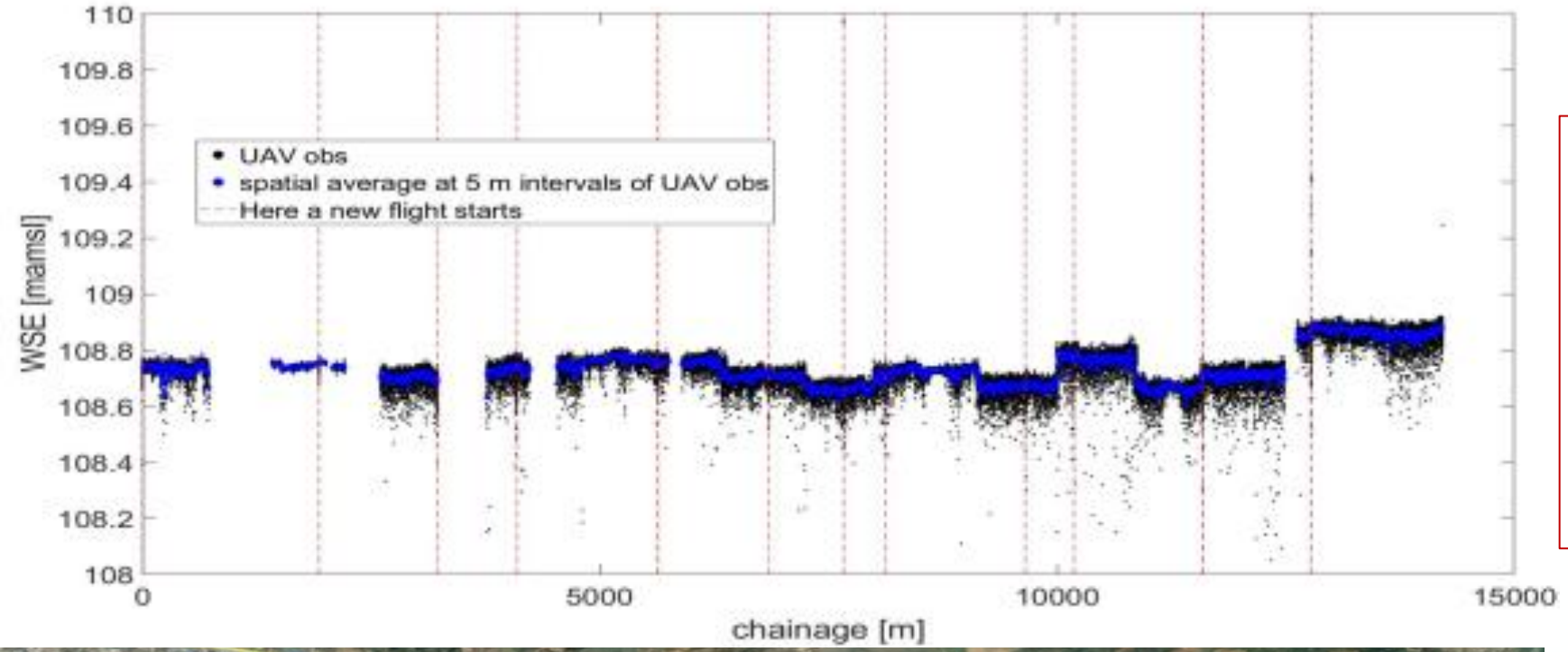
The ratio of HET to ET is from 13.5% to 18.5% with high values in September.

ET_Grace = P – R –dS/dt
- GRACE

ET_VIP = f(.)
- VIP

HET

Yi Liu , Xingguo Mo , Shi Hu , Xuejuan Chen & Suxia Liu (2020): Hydrological Sciences Journal.



- **Water surface elevation sensed by Dj M600 pro UAV flight with Radar payload developed by Technical University of Denmark over Yiluo River for 20 km**

F. Bandini,…,P.Bauer-Gottwein, Unmanned Aerial System (UAS) observations of water surface elevation in a **small stream**: Comparison of radar altimetry, LIDAR and photogrammetry techniques,Remote Sensing of Environment, 2020, 111487, lowest standard deviation (σ) and RMSE on WSE estimates, ca. 1.5 cm and ca. 3 cm

Conclusions

1. The IMERG precipitation products can basically depict spatial pattern with NRT underestimation.
2. Fusion of GRACE and the VIP model helped identify human-induced evapotranspiration
3. There is a high potential of multi-source remote sensing data to help calibrating hydrodynamical model

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