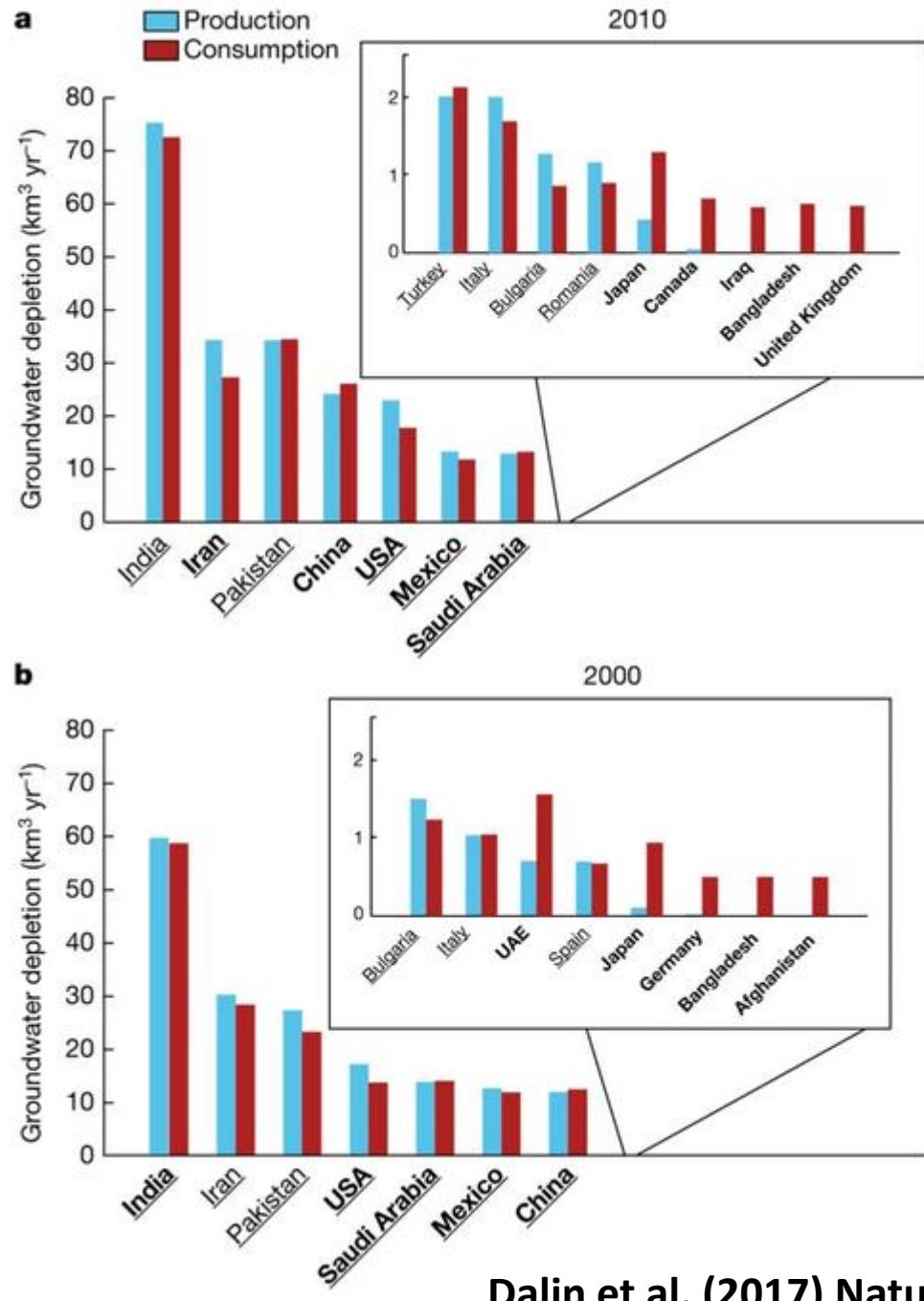


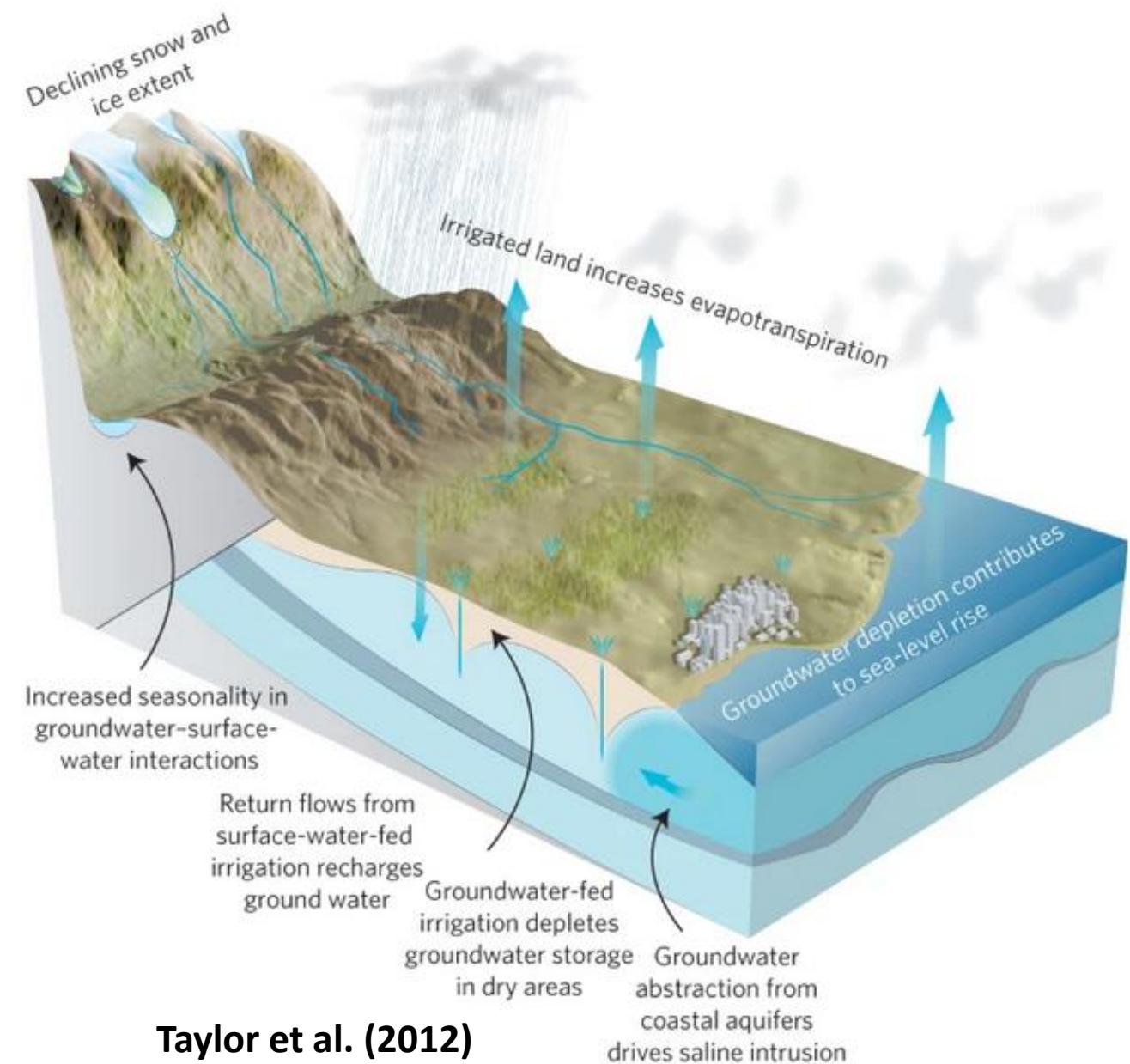
IMPROVING ACCURACY OF GROUNDWATER STORAGE IN THAILAND USING GRACE DATA ASSIMILATION TECHNIQUE

Natthachet Tangdamrongsub

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Hydrological Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, Maryland, USA*



Dalin et al. (2017) Nature



Taylor et al. (2012)
Nat. Clim. Change



แสดง :  ป้องกันภัย

ปอร์ชาชการ

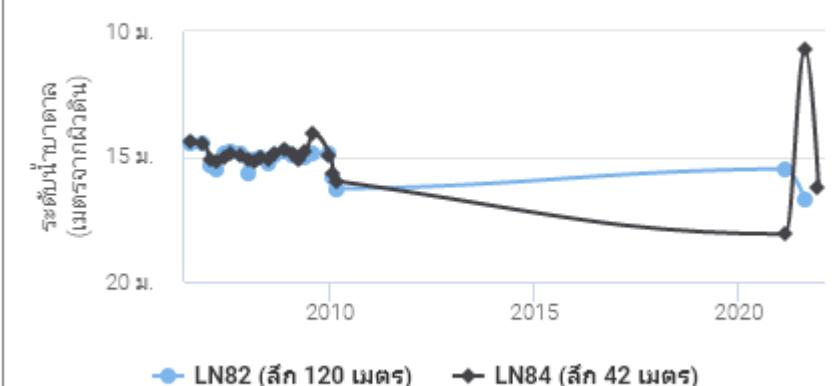
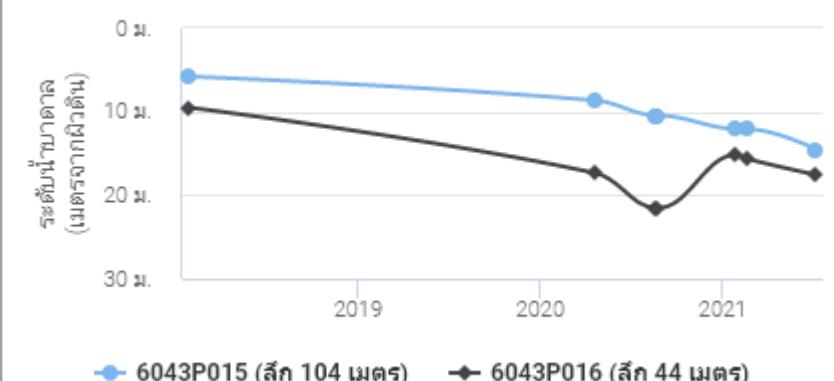
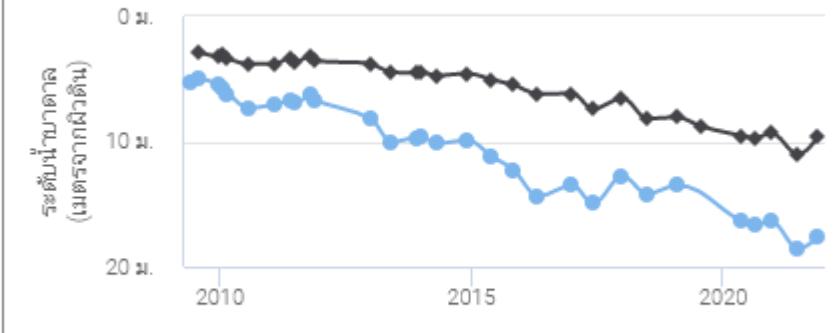
ป้อเอกชน-ป้อน้ำตีน

ระบบค่าคืนห*

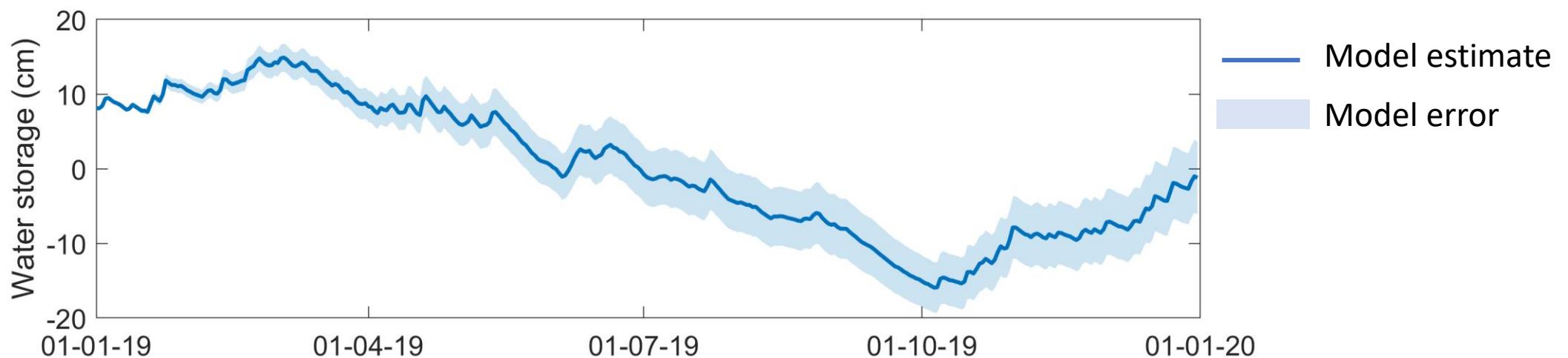
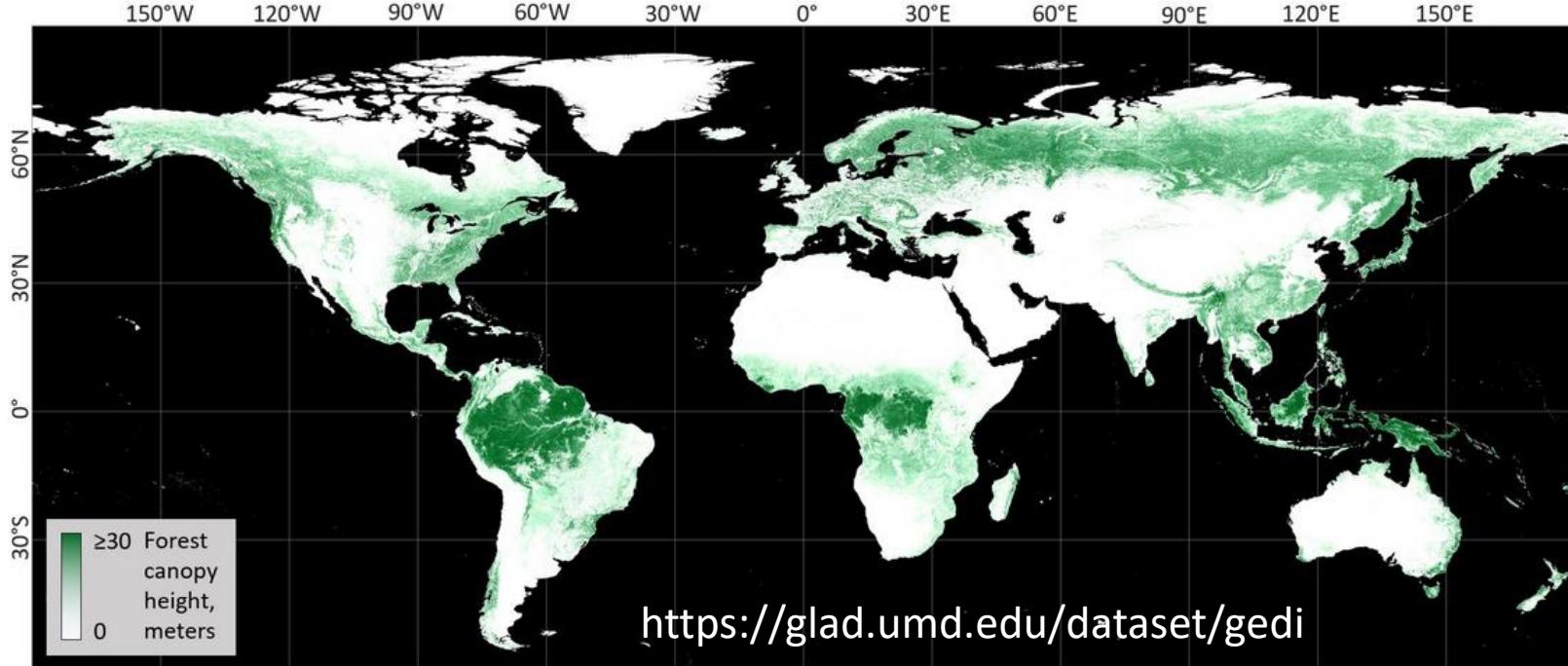


The figure is a map of Thailand and parts of surrounding countries, including Laos and Myanmar. It features a dense distribution of green circular markers scattered across the entire area, indicating numerous locations of interest. Major urban centers are highlighted with blue location pins. The map also displays a network of roads, with some major routes labeled with numbers such as AH1, 4, 10, 13, 56, 59, 62, 55, and 7. Political boundaries are shown as black lines, and river systems are depicted in blue. Labels for various cities and regions are present in both Thai and English. In the bottom right corner, there is a legend with three icons: a yellow person icon, a black plus sign icon for zooming in, and a black minus sign icon for zooming out.

Groundwater level

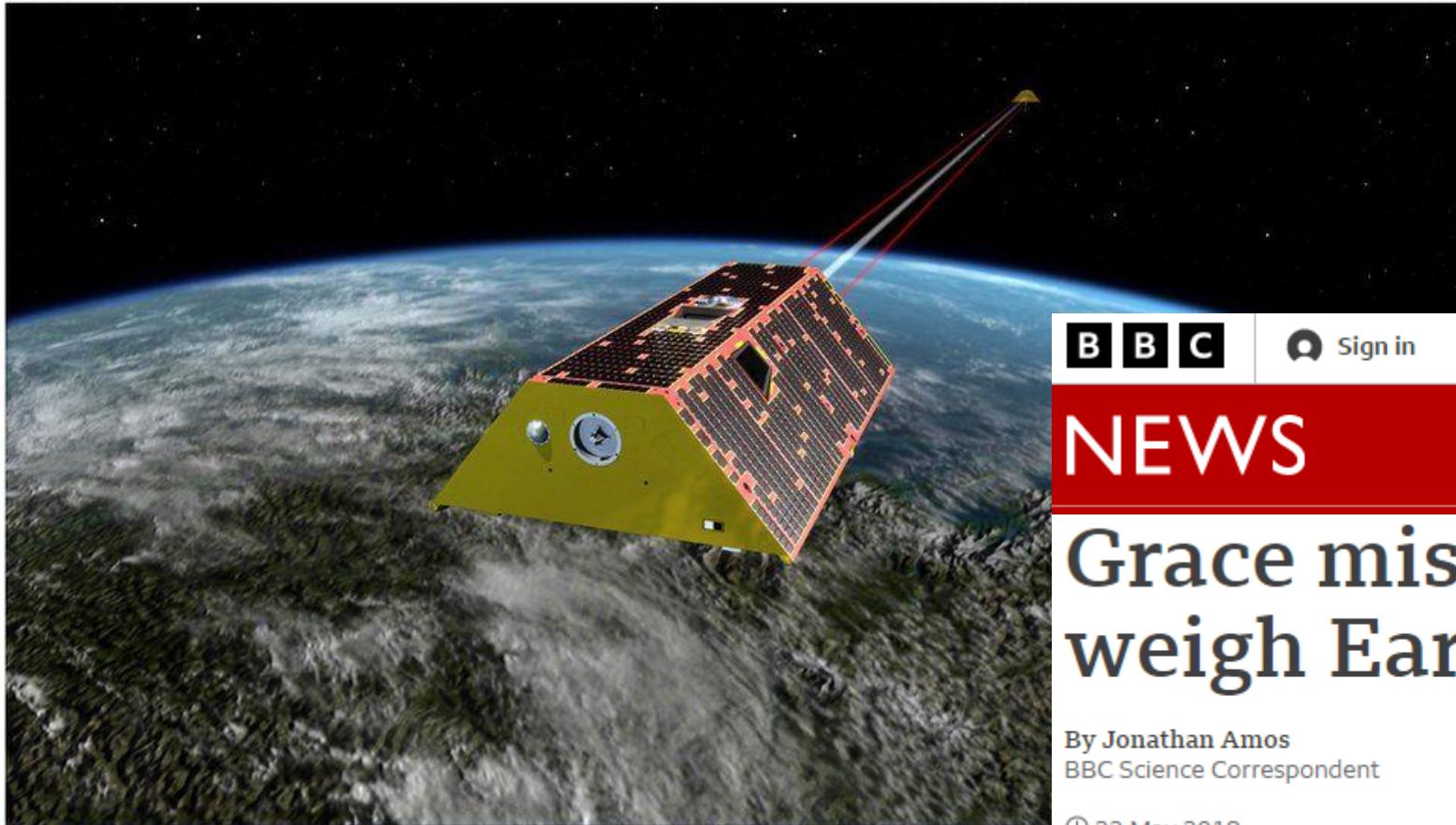


Model simulation



GRACE: Gravity Recovery And Climate Experiment

GRACE Follow-On



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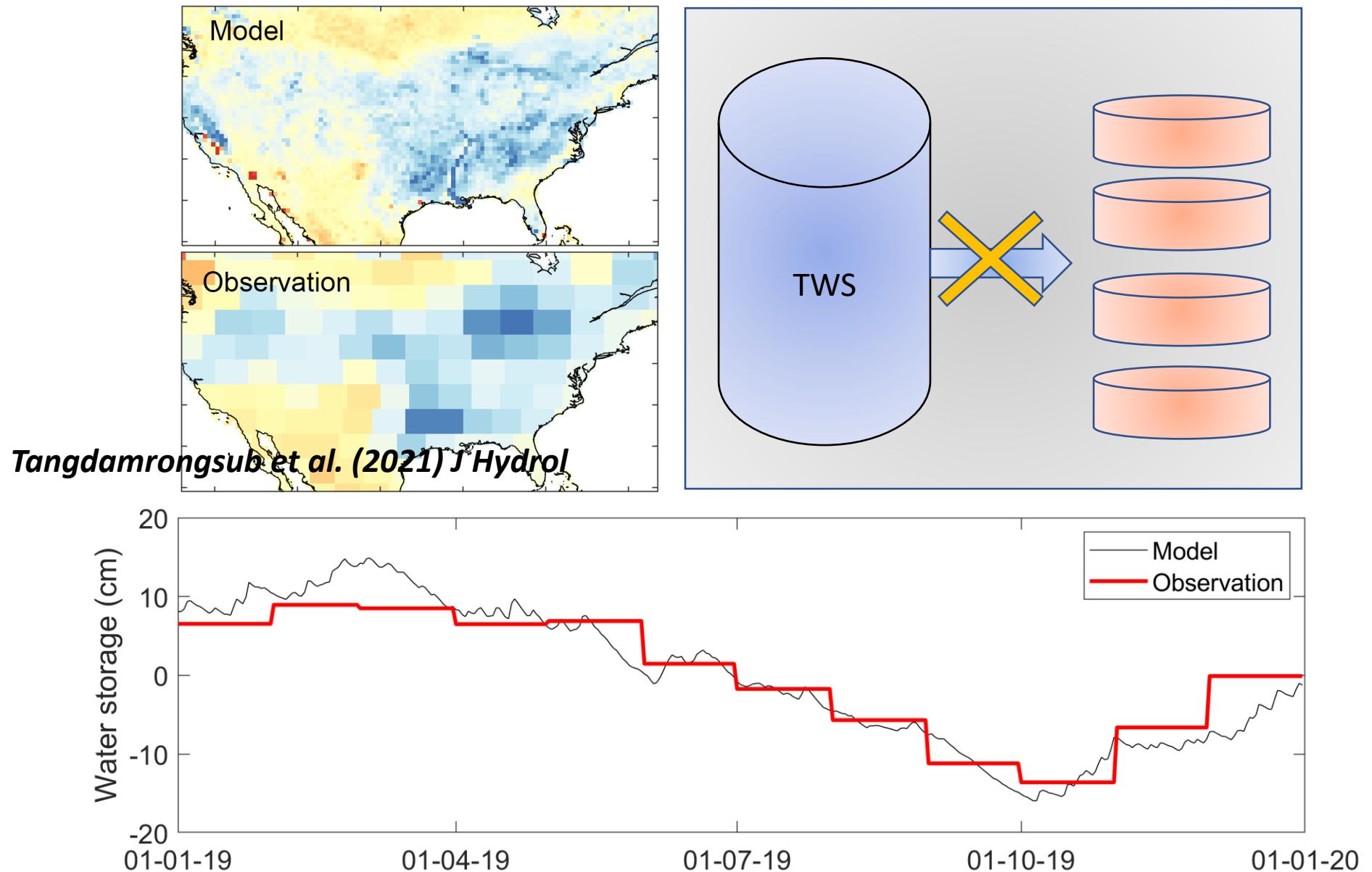
NEWS

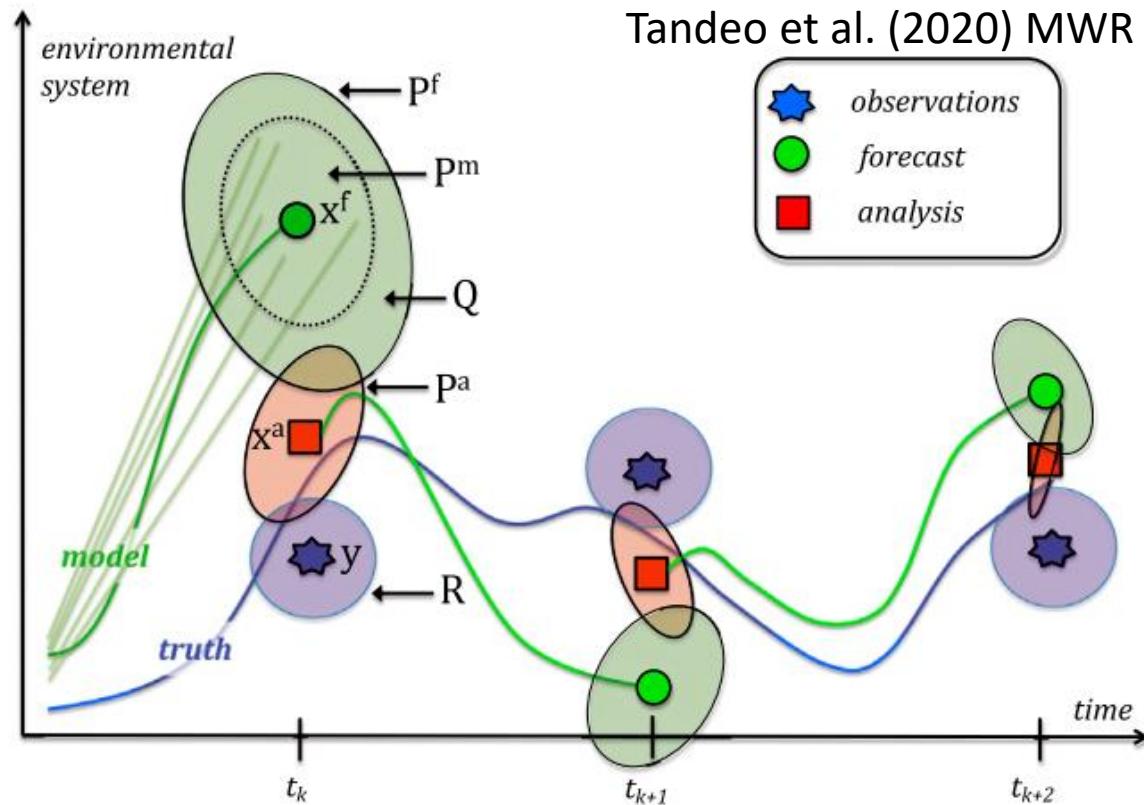
Grace mission launches to weigh Earth's water

By Jonathan Amos
BBC Science Correspondent

22 May 2018

<https://www.bbc.com/news/science-environment-44216431>





$$\mathbf{x}^a = \mathbf{x}^f + \mathbf{K} (\mathbf{y} - \mathbf{Hx}^f)$$

Update Forecast Weight Observation

Hydrol. Earth Syst. Sci., 25, 4185–4208, 2021
<https://doi.org/10.5194/hess-25-4185-2021>
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Development and evaluation of 0.05° terrestrial water storage estimates using Community Atmosphere Biosphere Land Exchange (CABLE) land surface model and assimilation of GRACE data

Natthachet Tangdamrongsub^{1,2}, Michael F. Jasinski², and Peter J. Shellito³

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Multivariate data assimilation of GRACE, SMOS, SMAP measurements for improved regional soil moisture and groundwater storage estimates

Natthachet Tangdamrongsub^{a,b,*}, Shin-Chan Han^c, In-Young Yeo^c, Jianzhi Dong^d, Susan C. Steele-Dunne^e, Garry Willgoose^c, Jeffrey P. Walker^f

remote sensing



Article

Evaluation of Groundwater Storage Variations Estimated from GRACE Data Assimilation and State-of-the-Art Land Surface Models in Australia and the North China Plain

Natthachet Tangdamrongsub^{1,*}, Shin-Chan Han¹, Siyuan Tian^{2,3},
Hannes Müller Schmied^{4,5}, Edwin H. Sutanudjaja⁶, Jiangjun Ran⁷ and Wei Feng⁷

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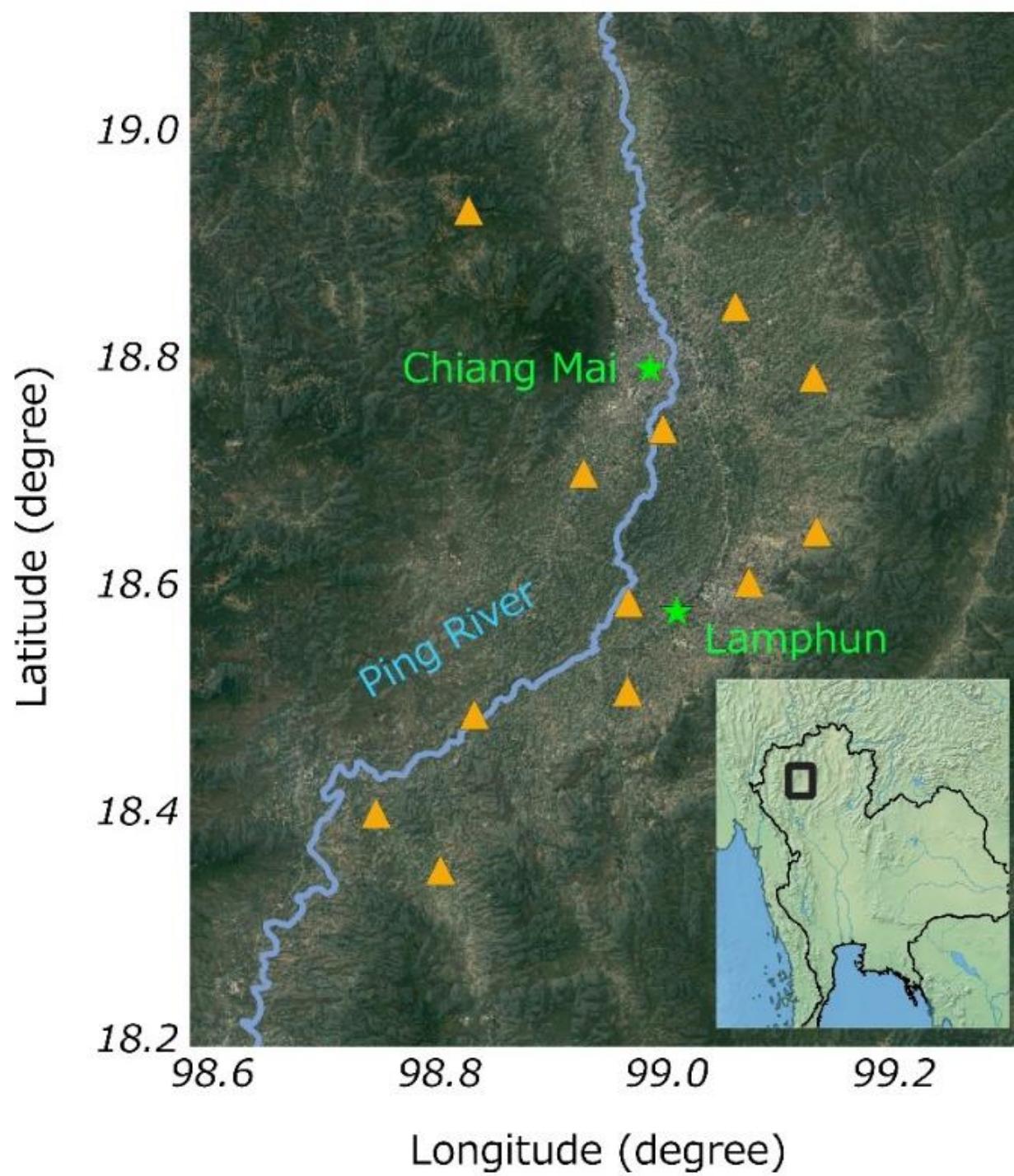


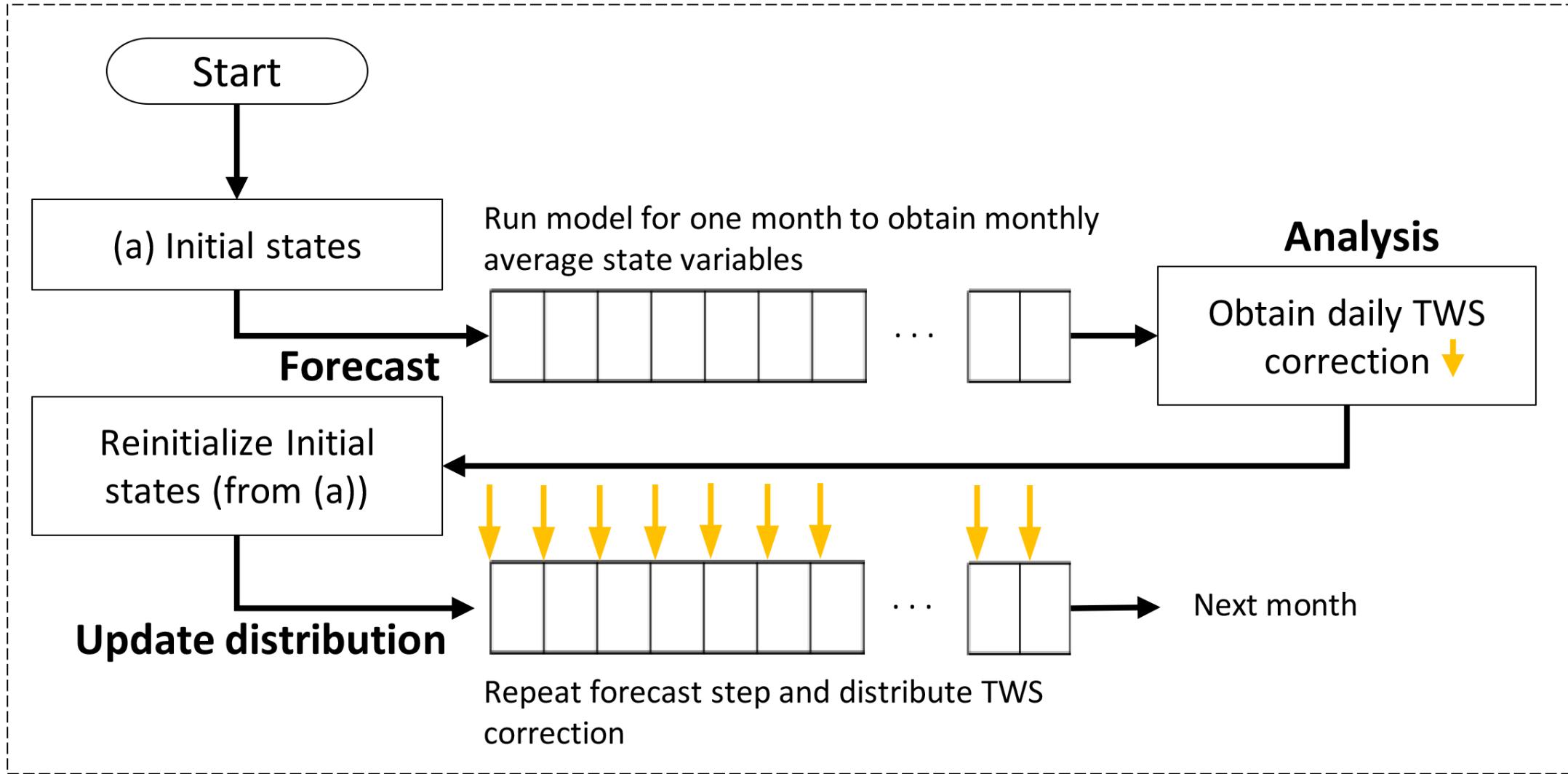
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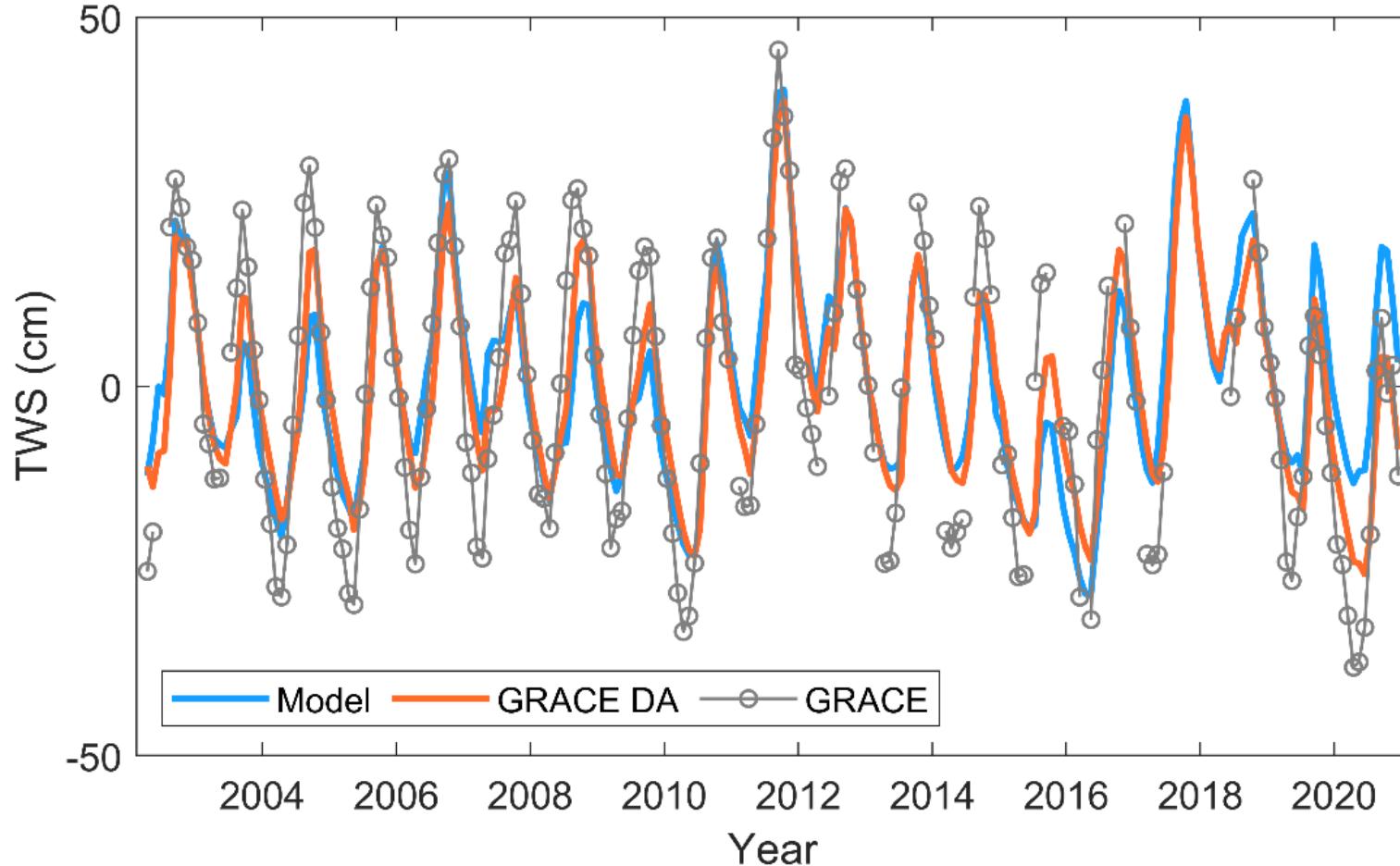


Improving estimates of water resources in a semi-arid region by assimilating GRACE data into the PCR-GLOBWB hydrological model

Natthachet Tangdamrongsub^{1,2}, Susan C. Steele-Dunne³, Brian C. Gunter^{1,4}, Pavel G. Ditmar¹, Edwin H. Sutanudjaja⁵, Yu Sun¹, Ting Xia⁶, and Zhongjing Wang^{6,7}

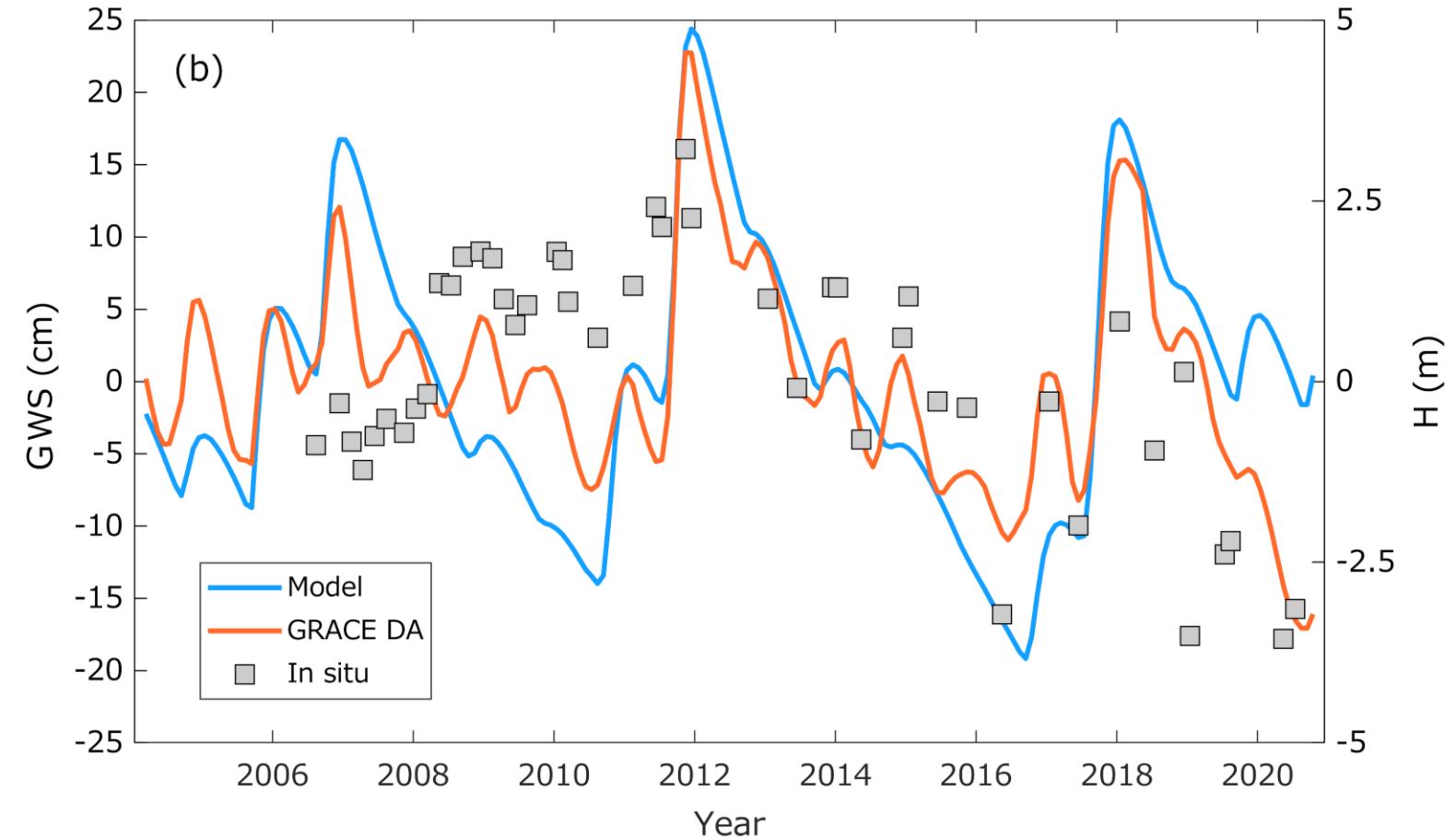
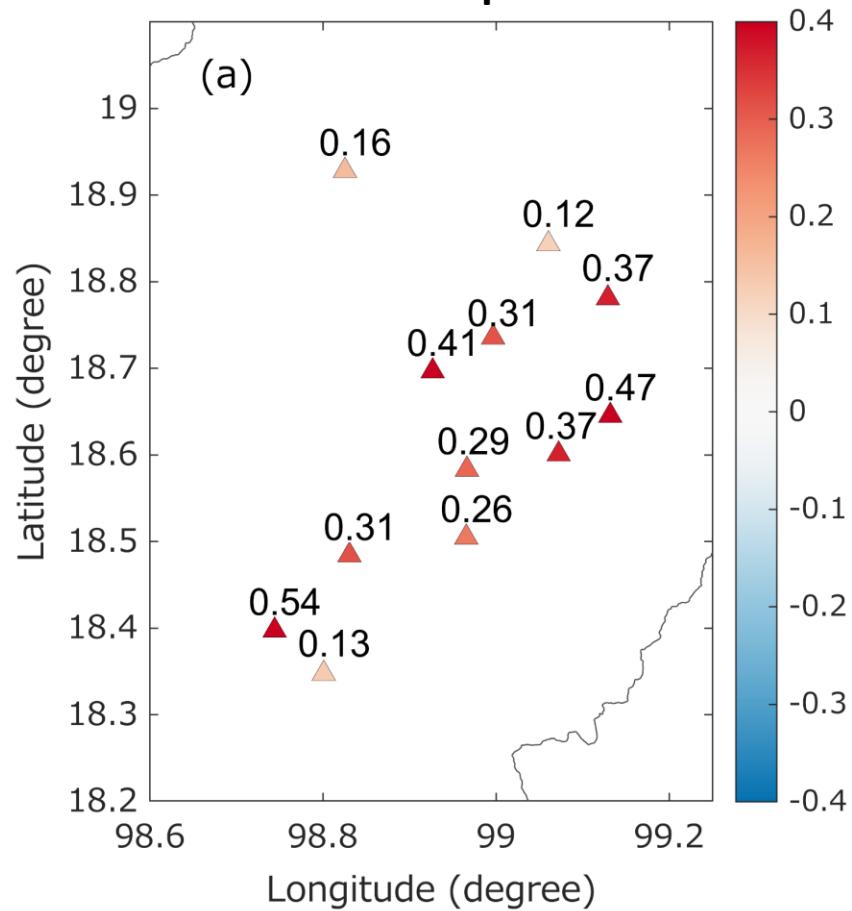




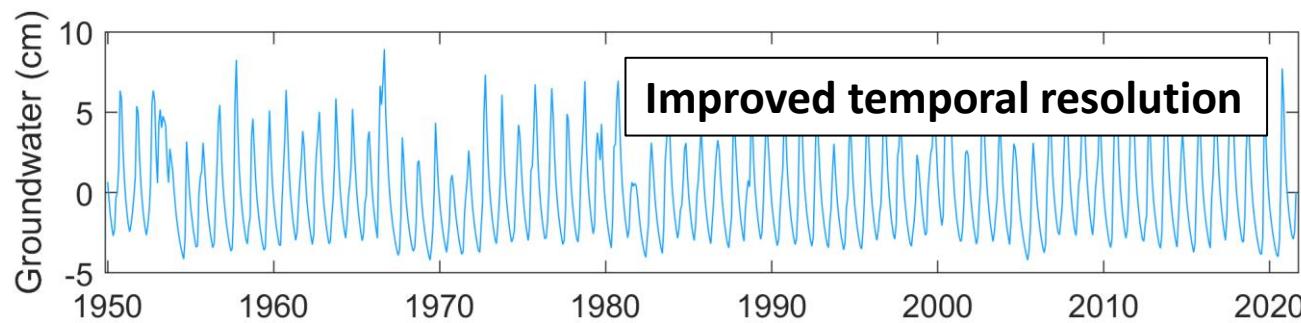
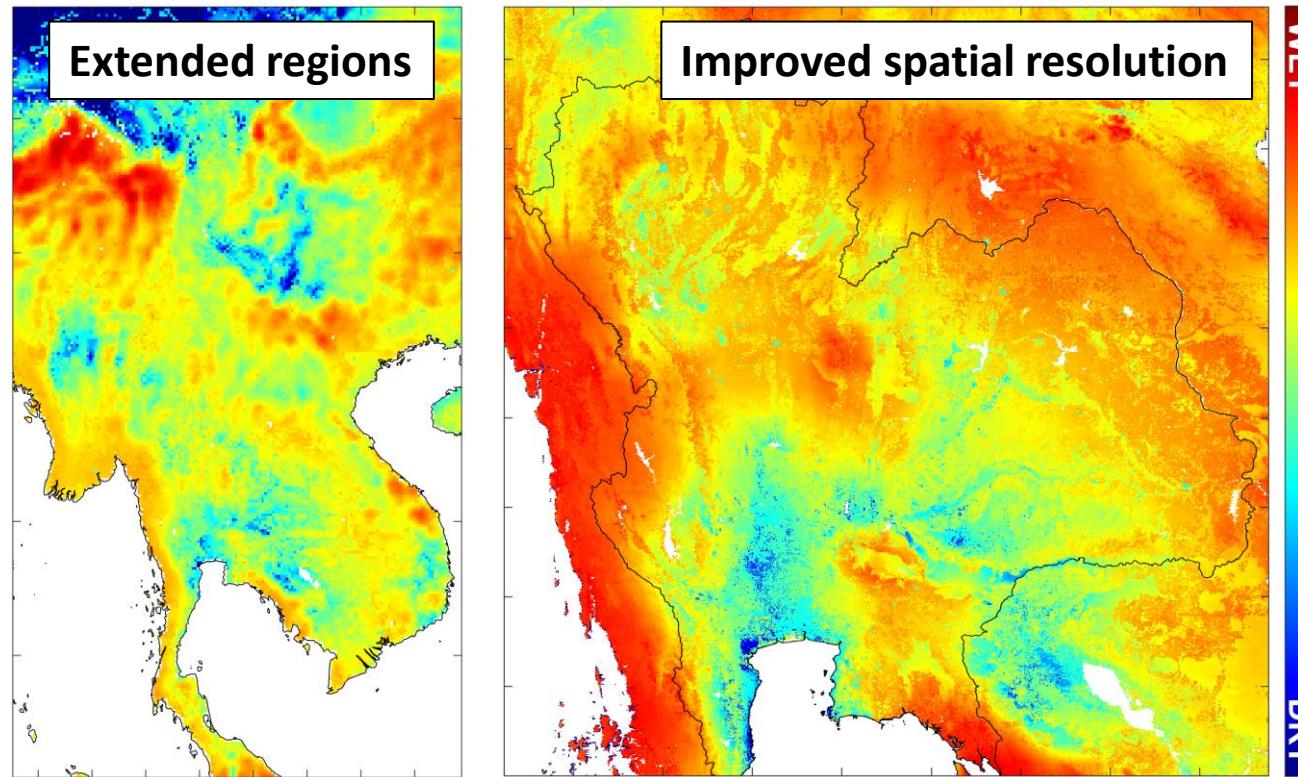


	Model	GRACE DA	GRACE
Correlation	0.82	0.91	-
RMSE (cm)	10.46	8.45	-
Long-term trend (cm/year)	0.13 ± 0.06	-0.13 ± 0.01	-0.49 ± 0.06

Correlation improvement



What's next?



GRACE Data Assimilation for Earth Observation

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USA

Dr. Pavel Ditmar, TU Delft, The Netherlands

Prof Dr.-Ing. Ehsan Forootan, Aalborg University,
Denmark

Question?

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