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Variability of groundwater storage in India: Spatial and temporal aspects

Soumendra Bhanja (1,2), Matthew Rodell (2), Bailing Li (2,3), Dipankar Saha (4), Abhijit Mukherjee (1,5)

(1) Department of Geology and Geophysics, Indian Institute of Technology Kharagpur, India (soumendrabhanja@gmail.com), (2) Hydrological Sciences Laboratory, NASA Goddard Space Flight Center, Greenbelt, USA, (3) Central Ground Water Board, Ministry of Water Resources, Faridabad, India, (4) ESSIC, University of Maryland, College Park, USA, (5) School of Environmental Science and Engineering, Indian Institute of Technology Kharagpur, Kharagpur, India

We used in-situ groundwater level information from 3907 observation wells across India. The spatial and temporal variability of groundwater storage (GWS) anomalies are estimated in 22 major river basin covering the Indian land area. Strong seasonality has been observed for GWS anomalies in all of the basins with maxima and minima are observed during monsoon and pre-monsoon seasons, respectively. Spatial variability of GWS anomaly when converted to logarithmic-scale, is found to be linearly proportional with log of spatial extent. The log-linear relationship has been further tested by altering the well spacing between 0.25, 0.5 and 1 degree grid scales. Our observation shows that GWS anomaly at 0.25 degree grid scale closely follow the unweighted data using all of the wells. Smallest and highest absolute error levels are obtained for unweighted data and data at 1 degree scale, respectively. The output of this study could be used to design a cost effective groundwater monitoring network in the region and the approach can be extended to other parts of the globe for establishing cost effective groundwater monitoring network.