Variability of groundwater storage in Northern India using the GRACE

*Amit K Singh[1], M Saravanan[2], Swetabh Patel[3]

1. School of Environmental Sciences, Jawaharlal Nehru University,New Delhi, 2. College of Health Science,Mekelle University, Ethiopia, 3. Department of Agronomy,Iowa State University USA

Groundwater is the vital and largest source of freshwater in India. Changing climate, anthropogenic activities and rising population have affected groundwater storage. Intensive exploitation of groundwater resources leads to depletion and scarcity of water which significantly affects the ecosystem and economic developments. In this work, we quantified the long-term spatiotemporal changes in the climate and groundwater storage in the northern region of India where significant depletion of the groundwater has been observed in recent years. For the monitoring and measuring groundwater changes in the region, observed well data and the satellite data from NASA’ s Gravity Recovery and Climate Experiment (GRACE) have been used for the period 2002 to 2016. The results were well-validated in correspondence with the observed and satellite data. The rainfall was highly variable during the study period and the satellite data reflects the occurrence of water loss in the region, The GRACE satellite showed a decline with the rate of 2.14 cm/year in the groundwater storage. This loss was influenced by the rise in temperatures and marked drought years which led to the anthropogenic withdrawals of groundwater for sustaining the agricultural crops. The information from the GRACE can be used for the various applications in groundwater studies which will be imperative to formulate the policies to achieve the goals of sustainable agricultural production and groundwater resources management.

Keywords: GRACE, Groundwater storage, , Climate

