Geophysical Research Abstracts
Vol. 17, EGU2015-852, 2015
EGU General Assembly 2015
© Author(s) 2014. CC Attribution 3.0 License.

Understanding the Individual Impacts of Land Use Land Cover (LULC) and Climate Change on hydrologic variables in India

Surbhi Chhabra (1), Tarul Sharma (2), Subhankar Karmakar (3,4), Subimal Ghosh (5,6)

(1) Indian Institute of Technology Bombay, Centre for Environmental Science and Engineering, Mumbai, India (surbhi.chhabra23@gmail.com), (2) Indian Institute of Technology Bombay, Interdisciplinary Program in Climate Studies, Mumbai, India (tarul.0110@gmail.com), (3) Indian Institute of Technology Bombay, Centre for Environmental Science and Engineering, Mumbai, India (subhankar.karmakar@gmail.com), (4) Indian Institute of Technology Bombay, Interdisciplinary Program in Climate Studies, Mumbai, India (subhankar.karmakar@gmail.com), (5) Indian Institute of Technology Bombay, Civil Engineering Department, Mumbai, India (subimal.ghosh@gmail.com), (6) Indian Institute of Technology Bombay, Interdisciplinary Program in Climate Studies, Mumbai, India (subimal.ghosh@gmail.com)

The changes in Land Use Land Cover (LULC) and climate are the major drivers of the hydrologic and energy cycle of Earth. The majority of the previous studies have either examined the influence of climate change or LULC change on the hydrology of India. Since the changes in LULC and climate occur in parallel, there is a need to know about the relative influence of LULC and climate changes in shaping the hydrology of India. To assess if climatic or land use changes are dominant cause of soil moisture, runoff, baseflow and evapotranspiration trends in India, the Variable Infiltration Capacity (VIC) mesoscale hydrologic model was calibrated and verified for the baseline period 1979–1990 using the observed soil moisture data, and then used to reconstruct the natural hydrologic regime from 1991 to 2005. The model has been implemented at 0.5 degree spatial resolution to simulate land surface hydrologic fluxes under four different experimental scenarios- (a) keeping both climate and LULC static, (b) climate change with static LULC, (c) constant climate with dynamic LULC (1987, 1993 and 2001), (d) climate change with dynamic LULC. This study demonstrates the spatial control of climate and LULC on the hydrologic trends of soil moisture, runoff, baseflow and evapotranspiration in four different seasons- monsoon (JJAS), post-monsoon (ON), winter (DJF) and summer (MAM). The model simulates the sensitivity to individual and combined effects of climate and LULC change. The simulations from these scenarios that best match with the observed trends will decide the dominant factor in forming the hydrology of India. The observed soil moisture trends are expected to be best captured by VIC for the experimental scenario where combined effects of change in climate and LULC is considered.