

Increase of East Asian river discharge and freshening of western North Pacific marginal seas by mountain uplift in a climate model

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Ocean and land-surface features in climate system have changed by tectonic events through the natural history of the Earth. Tectonic evolution of land-sea distribution, ocean gateways and mountain uplift are considered as key factors of global climate change together with solar forcing and greenhouse-gas variation. In this study impacts of mountain uplift on freshwater discharge from the East Asian rivers and on salinity in the western North Pacific marginal seas are investigated by climate model sensitivity experiments. During the summer monsoon season, as mountain becomes higher, heavy rain area moves from the South China Sea coast to the East Asian inland with stronger upward winds and larger rainfall over the southeastern Tibetan Plateau region. Freshwater discharge from the Red, Mekong, Yellow and Yangtze Rivers increases with progressive mountain uplift due to the movement of intensified rainfall area into their drainages. Increase of freshwater discharge from these rivers results in significant decrease of Sea Surface Salinity (SSS) in the South China, East China and Yellow Seas. SSS in the Sea of Japan also decreases due to increase of freshwater from river runoff and excess of precipitation over evaporation.