Geophysical Research Abstracts
Vol. 17, EGU2015-7962, 2015
EGU General Assembly 2015

Water Table Response to Climate Variability In The Northeastern United States

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The New England region is one of the few locations of the United States that is experiencing an increasing amount of annual precipitation over the last few decades. This increase in precipitation is not necessarily resulting in higher annual streamflow but is impacting the amount of water recharging subsurface reservoirs. In this contribution we present a quantitative analysis of instrumental data and use that to drive a regional modeling study of the interaction of recharge water and the distinct aquifers of the region. The region is characterized by four main aquifer recharge types, which are shown to have distinct hydraulic responses to recharge variability due to both their aquifer hydraulic properties and their hydrogeologic setting. Assessments of hydraulic properties allows the prediction of ground water storage changes from the water level changes. Modeling results show that the timing of recharge to the aquifer system has not necessarily changed but the amount precipitation during these times has increased significantly. The last ten years of ground water storage prediction shows a significant increase in the amount of time when positive storage conditions are present. Extreme precipitation events from tropical cyclones have resulted in some of the highest water tables recorded in the instrumental record. Comparison of these results to those from paleo-hydrological studies on lake levels suggest that this region is experiencing some of the wettest conditions recorded since de-glaciation. These results have significant implications for management approaches dealing with low flow stream requirements across the region.