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The effect of climate change and climate variability to the Wuding Catchment soil moisture acquired from eco-hydrological simulation model, in situ observations and remotely sensing

S. Liu (1), X. Mo (2), S. Zhang (1), W. Zhao (3), L. Mao (4), W. Wagner (5)

(1) Key Lab. of Water Cycle & Related Land Surface Processes, Institute of Geographic Sciences & Natural Resources Research, Chinese Academy of Sciences (CAS), Beijing, 100101, China, (2) Key Laboratory of Ecological Network Observation and Modeling, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, 100101, China, (3) The Bureau of Hydrology, Yellow River Conservancy Committee, Zhengzhou, 450004, China, (4) China Meteorology Administration, The National Meteorological Center, Beijing, 100081, China, (5) Institute of Photogrammetry and Remote Sensing, Vienna University of Technology, Gusshausstrasse 27-29, 1040 Vienna, Austria (liusx@igsnrr.ac.cn)

The catchment of the Wuding River, Loess plateau, China, is one of the areas incurred most serious soil and water loss since 1970s because of both climatic change and human activities. It has been difficult to differentiate the response either from climate change or human activities. Soil moisture is one of the important, and yet possibly better indexes than runoff, to explore such a response. However, the short records of soil moisture data make it difficult for such a long-term analysis. Based on these facts, the VIP ecosystem model, is used to simulate long-term soil moisture data, in order to explore the response of climate change. The simulated soil moisture data is validated and compared with both the in situ observations and remotely sensed soil moisture. The in situ observations are at two sites within the catchment, Suide and Yulin. The remotely sensed data was produced by Vienna University of Technology, one of the first global remotely sensed dataset based on data acquired with the predecessor instrument of METOP's Advanced Scatterometer (ASCAT) - the scatterometer on board

of the European Satellites ERS-1 and ERS-2. It is shown that the main trends of the soil moisture averaged over the catchment are in agreement with the observations. The soil moisture storage (0-1 m, root layer) is within 100-250 mm, showing the pattern of summer recharge and spring depletion. The yearly variation of soil moisture matches with precipitation. After being validated the soil moisture prediction with remotely sensed data, the model performance at large basin is more reliable. Then the model is used to simulate soil moisture data from 1951 onwards, to explore the responses of soil moisture to climate change at this large scale catchment.