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Climatic consequences of water harvesting in southern Sudan

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Water harvest is often proposed as a solution for water shortages through increase of rivers and tributary catchments without taking into account the regional climatic feedback due to the change in surface conditions. This study examines these regional climatic consequences of the Jonglei Canal proposed to be built in Southern Sudan. The project is designed to change the course of the White Nile in southern Sudan to avoid passing over large area of swamps and marshland called the Sudd. The Sudd is one of the largest wetlands world-wide, covering an area of about 8000 square kilometers with dense vegetation providing a high evapotranspiration rate, estimated to be 4.7 billion cubic meter which is equivalent to half of the southwestern annual inflow. The Jonglei Canal is expected to produce a similar amount of water per year, however severely affecting the Sudd's vegetation and evapotranspiration. In order to simulate the regional climate consequences in high resolution, we are utilizing a regional climate model with land surface component. We run the model for two land surface scenarios, one with the swamp (control) and another scenario with change in land surface representing the canal conditions. We are investigating the changes in surface hydrology, evaporation, soil moisture and precipitation as well the changes in surface energy balance. The most interesting result is that changes in hydrology are spread to the surrounding regions which indicate non-local effects as well. With the advantage of a high resolution model experiment (about 10 km) this study sheds light on the climatic consequences expected to result from the excavation of the Jonglei canal.