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Future change of water vaiables from HadGEM2-AO simulation

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Complex global models developed for climate prediction are now applied to the future climate projection in a number of global modeling centers around the world. In climate prediction aspects, an atmosphere-ocean coupled model (one-tier climate system) has been recognized to exhibit useful skill for a global or certain regions (Graham et al., 2005). Wang et al. (2005) demonstrates that an AGCM coupled with an ocean model, simulates realistic SST-rainfall relationships for the Asia during the summer period. Also the transition from two-tier to one-tier approach in climate prediction are mainly caused by recent progresses in development of coupled climate models and enlargement of understanding air-sea interactions obtained from international collaborative efforts such as TOGA (the Tropical Ocean-Global Atmosphere) program (Wang et al., 2009).
Meanwhile, water resource including river outflow in association with surface and sub-surface water flow is an important part of the global hydrological cycle, and is affected by climate variability and change through recharge processes (Chen et al., 2002), as well as by human interventions in many locations (Petheram et al., 2001). Also, water is critical resource to the social, economic and environmental aspects, and advances of these core elements requires improved water resource management. Better management and use of water need to abundant real time hydro-meteorological (river and weather) information as well as accurate water resource forecasting (Barrett, 1990). For this reason, many studies have recently carrying out the water resource prediction and estimation using hydrology and climate model. For example, Shiklomanov et al. (2011) predicted that water resource in Russian territory increases about 8-10% during 2010-2020 using the unit hydrograph (UH) model based on hydrologic rainfall-runoff model. Anderson et al. (2000) explained the probabilistic seasonal prediction of drought with a simplified climate model coupled hydrology-atmosphere for water resource planning. Arora et al. (1999) and Oki and Sud (1998) developed a method for routing river flows through GCM grid cells. Accordingly, reliable forecasts are expected to help water managers and users with long lead time decisions, leading to greater water use efficiency and better risk management (Wang, 2012).
SO, we analysed hydrological cycle and drought index from precipitation, evaporation, runoff, soil moisture, river outflow, and so on using atmosphere-ocean coupled model which called by HadGEM2-AO. Details and added information by this climate projection system about the future water cycle's change will be presented at the workshop.

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