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Climate andhHydrologic simulation in Lanjiang basin in China

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A nested climate and hydrologic modeling system was established to simulate the climate and hydrologic conditions under current and future SRES A2 scenario to assess the impacts of climate change on water resources in Lanjiang Basin in eastern China. Two sets of 30-year numerical experiments including a control simulation and a future projection simulation, were conducted in eastern China with a regional climate model, RegCM3, applied at 20 km resolution using boundary conditions from the atmospheric model of the global climate model fvGCM. Results of the control experiment from 1961 to 1990 showed the distinct influence of topography on surface temperature and precipitation in Zhejiang Province. At 20 km grid resolution, RegCM3 was able to realistically capture the detailed topography and its impacts on surface temperature and precipitation. However, the simulation shows a general cool bias and the model significantly underestimated precipitation in the west of Zhejiang Province. The distributed hydrologic model DHSVM was calibrated and validated using observed meteorological forcing and hydrologic data. DHSVM reproduced the hydrologic processes of Lanjiang Basin quite well. Two sets of DHSVM simulations for Lanjiang Basin were then produced using meteorological forcing simulated by RegCM3. The simulations showed that monthly averaged temperature increases by 2.84^{o}C from 1961 - 1990 to 2071 - 2100. Annual precipitation also increases especially during the flood season from April to July, which could lead to increased flood frequency in the basin. The DHSVM simulated annual runoff increases in step with the increase in annual precipitation, especially in the flood season. The larger increase in precipitation simulated for April to August, together with the warming between 2 - 3^{o}C produced a maximum increase in runoff during July and ET during August. The coupled climate-hydrologic modeling results are encouraging and suggest that the dynamical downscaling approach can provide reasonable meteorological forcing for hydrologic modeling over small river basins.