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Changing hydrological conditions in the Po basin under global warming

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The Po River is a crucial resource for the Italian economy since 40% of the gross domestic product comes from this area. To quantify the impact of climate change on this water resource is then crucial for planning the water use and distribution in the near future. In this paper a mini ensemble of 8 hydrological simulations are completed from 1960 to 2050 under the A1B scenario, by using as input the output of two regional climate models (REMO and RegCM) at two different resolutions (25 km -10km and 25km-3km). The river discharge at the closing point of the basin shows a change in the spring pick of annual cycle and one month shift is evident from May to April. This shift is entirely due to the changing in the snowmelt timing because that drives most of the discharge in this period. The others two important changes are the increase of discharge in the wintertime and the decrease in fall from September to November. The uncertainty associated with the winter change is bigger compared to that in fall. The spring shift and the fall decrease of discharge imply an extension of the hydrological dry seasons and thus increasing water stress over the basin.
The spatial distribution of the discharge changes are in agreement with what is observed at the closing point and the uncertainty associated with these changes are proportional to the amplitude of the signal.
By looking at the changes in the anomaly distribution of discharge it seems evident that either the increase or decrease of seasonal discharge is tied to the changes in the tails of the distribution, namely to the increase or decrease of the extreme events.