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Estimating trends of annual maximum daily discharge in the twentieth-century

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Available daily discharge observation and discharge estimation by a relatively high resolution GCM, MIROC are investigated to show whether significant changes in high flow have already appeared in the recent decades. Totally 40 stations by the Global runoff Data Centre are assumed to be long sufficient to investigate trends of annual maximum daily discharge between 1901-1980 and 1981-2000. More than half (22) of the gauge stations show significant negative or positive trend. This is partly because the artificial controls, since most of the stations providing long-term observations are commonly located nearby large dams. There are 13 stations showing negative trend in the observed discharge but showing the statistical jumps due to the artificial controls. This result indicates the possible impacts of the artifical peak cut. Because the artifical control on river discharge mainly works as smoothing seasonal variations of discharge, namely, increasing low flows and decreasing high flows, the positive trend of the annual maximum daily discharge is seemed to be not the result of the artifical effect on discharge. Trend analyses of the data in the MIROC at the 8 staitions where the positive trends are seen in the observed high flows show any significant negative or positive trend, suggesting that the MIROC can not attribute the current positive trend seen in the observed high flows. The trend analysis at the 4 non-human-affected stations showed that 3 stations show the same results between the observation and MIROC. Any significant trends are seen in two stations and negative trend is detected in one station for both observation and the model. In one station, MIROC show positive trend but any significant trend is seen in the observation. This inconsistency may be because that the total area size of upper basin of this station is too small, which

leads high model sensitivity to any changes in precipitation.