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Large scale potential sources of predictability for the Danube river seasonal discharges

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Seasonal anomalies of river discharges highly depend on large-scale fluctuations of atmospheric circulation. Heavy precipitation causing catastrophic floods in Central and South Eastern Europe became quite frequent in the last years after a long period of drought. Therefore, an outlook of river discharges becomes an issue of an increasing interest and demand for policy makers and local administrations in order to prevent and mitigate flood consequences.

Using monthly data of Danube river at Orsova station (Romania) for the period 1840-1998 and global data of sea surface temperature (SST), air temperature (T) and precipitation (P) for the period 1901-2002 we search for large scale potential sources of predictability for the Danube river discharge anomalies. Our method is based on stable teleconnections of river seasonal discharge anomalies with the global SST, T and PP fields. We found that key regions where the correlation is stable can be used as significant source of predictability for the river flow variability.

Significant potential predictability of spring flow anomalies using previous winter SST, T and PP anomalies from selected key regions was identified. We have also identified significant potential predictors for the Danube river discharge anomalies in the fields of SST, T and PP anomalies for spring, summer and autumn, respectively. Based on monthly discharges up to the end of 2004 we simulate the exceptionally high river discharge anomalies of spring 2005.

The forecast skill based on our methodology is higher than the that based on indices of atmospheric teleconnection patterns which are traditionally used for statistical forecast of seasonal discharge anomalies