



## Seasonal variability and annual phase shift of the runoff ratio of German river catchments

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In a recent study Stine et al. (2008) show that there exist significant phase shifts of annual temperature records since 1950. For water resources management it is important to know how these seasonal climate changes impact the water budget at the river catchment scale.

Here, the seasonal variability of climate and water budget is analysed for a range of river basins in Saxony. The analysis is based on long measurement records (from 1930 to today) of temperature and the monthly runoff ratio, the ratio of basin runoff and precipitation.

As both, temperature and runoff ratio can be approximated by a sinusoidal function on an annual basis, the seasonal variability can be represented by two parameters, phase and amplitude of the first Fourier component of each year.

For both series we find that the annual phase, representing the timing of the seasons, has a significant trend towards earlier seasons and significant correlation. This shows that the phase shift of temperature being a large scale phenomena has direct impact on the runoff ratio, which is an integral measure, influenced by processes such as evapotranspiration, snow melt, and basin storage. The analysis can help to identify climate change effects on the hydrological cycle hardly traceable in a standard trend analysis.