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Estimation of annual runoff using selected data machine learning algorithm

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Annual runoff is important information on water balance in the catchment and large river basin scale. It forms the boundary conditions for mathematical modelling of hydrological balance on a finer temporal and spatial scale. It is important for the assessment of climate change on water resources. Currently, there are several datasets on global gridded runoff fields available. GRUN and E-RUN provide monthly estimates of runoff rate with the spatial resolution of 0.5 degree. The GRUN is global dataset and E-RUN is covering Europe [1,2].In this study, we evaluate the capability of paleoclimate reconstructions on precipitation, PDSI, and temperature, which are available in the form of gridded fields, to estimate annual surface runoff using selected machine learning techniques. For this purpose, we use as a benchmark runoff information GRUN and E-RUN data sets. Both data are aggregated on the annual time scale for the period 1902 – 2014 (GRUN) and 1952-2015 (E-RUN). Following machine learning algorithms were tested: Random forests, SVM, MLP, LDA and Extra Trees. Reconstructed precipitation, temperature, PDSI[3] and runoff estimated using selected Budyko models with different spatial aggregation served as inputs[4–7] . Different combinations of inputs were analysed.Our results show that the estimated surface runoff is in good agreement with E-RUN and GRUN datasets for analysed periods. The result and newly tested approach based on derived machine learning models can be further applied to the estimation of paleoclimatic reconstructions of runoff fields.

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