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Verification of ECMWF monthly forecasts for the use in hydrological predictions

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In recent years, sub-seasonal forecasts have received increasing attention. These forecasts with a time horizon of 2 to 6 weeks bridge the gap between operational weather forecasts and seasonal predictions. Different sectors (e.g. agriculture, energy, warnings systems) show high demand in seamless forecasts from days to seasons.
Within the HEPS4Power project we aim at developing a hydrometeorological end-to-end ensemble prediction system for several catchments in the Swiss Alps. In order to use the monthly forecast in hydrological modeling, we first explore the performance of the meteorological forecasts separately. This framework allows also an assessment of different bias correction and downscaling techniques. Such a post-processing will be important to couple the hydrological model to the meteorological model data.
We verified the ECMWF extended-range forecast against approximately 1000 observational time series of ECA&D across Europe. To do so, we made use of 20 years of hindcasts of the forecasting system that was operational from May 2014 to April 2015 (cycle 40r1), yielding an analysis period of May 1995 to June 2014. This unique data set is large enough to stratify the performance of the monthly forecasting system with season and region. Weekly temperature and precipitation of both raw hindcasts and post-processed hindcasts were analyzed. Various skill metrics (RPSS, CRPSS, ROCSS) characterizing different aspects of forecast quality were computed using climatology as a benchmark.
Overall, skillful forecasts were found in some regions and seasons up to three weeks of lead time in case of temperature and up to two weeks for precipitation, respectively. Bias-corrections allowed to enhance forecast skill in the first two weeks for most of the stations. Spatial and seasonal differences in skill were found both for temperature and precipitation, with winter forecasts generally being better than those of other seasons. Geographically, forecasts tend to show higher skill in Northern Europe. Consequences for coupling a hydrological model to the monthly forecasts for a catchment in the Swiss Alps will be discussed.