SEASONAL FORECASTING OF EUROPEAN RIVER DISCHARGE: HINDCAST VERIFICATION OF VIC AND LPJML MODELS DRIVEN BY ECMWF SYSTEM4

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Abstract:

The hydrological models VIC (Liang, Lettenmaier et al. 1994) and LPJmL (Gerten, Schaphoff et al. 2004) have been widely used for the assessment of climate change impacts on water resources and water dependent sectors, stand-alone (van Vliet, Franssen et al. 2013) and as part of multi-model ensemble studies (Haddeland, Clark et al. 2011, Prudhomme, Giuntoli et al. 2014). Here we implement the same models to assess their capabilities for seasonal forecasting purposes. We analyse whether any forecasting skill present in seasonal meteorological forecasts propagates into skill in hydrological forecasts.

The VIC and LPJmL models are implemented for the European domain, including routing schemes on a 0.5^{o} grid. As research models, LPJmL model parameters are not calibrated for discharge and VIC only crudely. Baseline runs and model spin up are driven by WFD-EI data (Weedon, Gomes et al. 2011). Hindcast runs are driven by the full 15 member, 30 year, monthly initiated, 7 month forecasts of the ECMWF System4 (Molteni, Stockdale et al. 2011). Each model is driven by both raw forecast data and by the same data bias-corrected against the WFD-EI data. Skill is assessed by ROCSS and RPSS scores of the three terciles (above normal, near normal and below normal), primarily for discharge against both baseline simulations and against observations (mainly obtained from GRDC) from 46 stations covering the whole of the European domain and for other water balance terms against baseline simulations only.

Skills will be presented grouped by the major European climatic zones, as a function of lead time and season. Tentative results show considerable skill in northern Europe for positive and negative spring anomalies with up to 2 months lead time, but decreasing for summer. For central Europe the performance is similar, for western Europe we find very little skill, while for the Iberian peninsula we find some skill for negative anomalies in summer with considerable lead time. More robust results will be presented at the workshop.

Keywords: hindcast verification, river discharge, VIC model, LPJmL model

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