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Use-case specific performance assessment of sub-seasonal to seasonal drought predictions for local-scale applications in the Netherlands, Spain, and Italy

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Sub-seasonal to seasonal (S2S) hydrometeorological ensemble predictions are being put to the test, given their potential to increase preparedness for, and improve management of, extreme events. Whereas forecast skill at the global, continental, and regional scales of S2S hydrometeorological predictions is relatively well-documented and regularly updated in the scientific literature for generic definitions of events, assessments of forecast skill at the catchment and local scale for local use-case definition of events have been reported to a relatively limited extent.

In this research, the forecast skill of S2S predictions is analysed for local preparedness and management of droughts. In case studies in the Netherlands, Spain and Italy; potential end users have been consulted on their definition of drought, warning thresholds, decision-making process, and potential mitigation actions. The result is a variety of meteorological, hydrological and agricultural use-case-specific drought event definitions.

For each of these case studies, a state-of-the-art multi-year (re-)forecast hydrometeorological dataset is downloaded or developed (e.g. for sub-seasonal and seasonal meteorological forecasts from ECMWF Extended Range and SEAS5 prediction systems, respectively, and for hydrological forecasts from the E-HYPE and GLOFAS hydrological systems), and its performance analysed for the user-driven drought definitions.

The results contribute to an improved understanding of the potential of state-of-the-art S2S predictions for local-scale drought preparedness and management, and identify aspects to focus on in further enhancing this potential.