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A regional-scale seasonal climate prediction system based on a CFSv2-RegCM dynamical downscaling

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Anticipating expected seasonal climate anomaly is essential for defining short-term adaptation measures on many natural and anthropic systems. To be actionable, such an information should be provided at regional scale, to be properly coupled to the specific region vulnerabilities. This is especially true over areas characterized by large climate inter-annual variability as the Mediterranean basin, which is also traditionally characterized by a poor seasonal predictability.
In this work, it will be presented a regional-scale seasonal climate forecasting system centered over Central Italy implemented for operational purpose at CETEMPS. This system is based on a double dynamical downscaling performed trough the regional climate model RegCM (4.1 version). A twelve-member lagged ensemble of 3-month NCEP-CFSV2 climate predictions represent the driving fields for the RegCM. In a first step, RegCM (hereafter RegCM-d1) dynamically downscales CFSV2 climate prediction from the original 100 km resolution to 60 km over a domain covering the entire Europe. This first downscaling feeds a second RegCM downscaling (hereafter RegCM-d2) performed over a domain centered over Central Italy with a resolution of 12 km.
In order to present the added value of the downscaled seasonal climate predictions compared to CFSv2, a three-step evaluation methodology is considered. It consists on progressively evaluating the twelve-member ensemble prediction produced in turn by CFSv2, RegCM-d1 and RegCM-d2 over the same (inner) domain. Evaluation involves winter season temperature and precipitation hindcasts over a 22 years reference period (1982-2003). Preliminary results regarding mean bias spatial distribution, inter-annual anomaly variability reproduction and probabilistic hit-rate of anomalous seasons, by means of tercile plots, will be discussed.
These latter identify temperature variability reproduction generally benefiting from the downscaling. At the same time, precipitation shows an improved spatial distribution patterns but not improved inter-annual variability representation if compared to the driving CFSv2 climate predictions.
Finally, regarding the next research steps, it will be briefly described the ongoing activities regarding a second seasonal climate prediction system based on the numerical model WRF-V4.0.1 performing the dynamical downscaling.