

Seasonal temperature prediction skill over Southern Africa and human health

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ABSTRACT

An assessment of probabilistic prediction skill of seasonal temperature extremes over Southern Africa is presented. Verification results are presented for six run-on seasons; September to November, October to December, November to January, December to February, January to March, and February to April over a 15-year retroactive period. Comparisons are drawn between downscaled seasonal 850 hPa geopotential height field forecasts of a two-tiered system *versus* downscaled height forecasts from a coupled ocean–atmosphere system. The ECHAM4.5 atmospheric general circulation model (GCM) is used for both systems; in the one-tiered system the ECHAM4.5 is directly coupled to the ocean model Modular Ocean Model version three (MOM3), and in the two-tiered system the ECHAM4.5 is coupled with Van den Dool sea surface temperature (SST) hindcasts. Model output statistical equations are developed using canonical correlation analysis (CCA) to reduce system deficiencies. Probabilistic verification is conducted using the relative operating characteristic (ROC) and reliability diagram. The coupled model performs best in capturing seasonal maximum temperature extremes. Seasons demonstrating the highest ROC scores coincide with the period of highest seasonal temperatures found over Southern Africa. The above-normal category of the one-tiered system indicates the highest skill in predicting maximum temperature extremes, implying the coupled model predicts skilfully when there is a high likelihood of experiencing extremely high seasonal maximum temperatures during mid to late summer. The downscaled coupled maximum temperature hindcasts are evaluated additionally in terms of their monetary value and quality to the general public. The seasonal forecast system presented in this study should be able to reduce risks in decision making by the health industry in Southern Africa.