Hydrol. Earth Syst. Sci. Discuss., 5, S705–S708, 2008
www.hydrol-earth-syst-sci-discuss.net/5/S705/2008/

Hydrology and Earth System Sciences Discussions

Interactive comment on “Spatially explicit seasonal forecasting using fuzzy spatiotemporal clustering of long-term daily rainfall and temperature data” *by* M. B. Plain et al.

M. B. Plain et al.

Received and published: 18 July 2008

-We agree with the reviewer that we needed to be a bit more careful in our definitions. We have corrected this in the revised paper and indicated that we are concentrating on cumulative seasonal forecasts for rainfall and temperature. We would however like to point out that we have defined the term “seasonal climate” in our paper on line 11 on page 1162

-We thank the reviewer for pointing us to these papers. We agree that probably we should word the section somewhat more careful and presenting the method as an alternative rather than a replacement of statistical downscaling. However, it also clear from the literature (i.e. Køltzow et al. 2008) that the downscaling methods, even when

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

including boundary conditions from GCM’s are still far from being very accurate and in fact have similar results to our work (i.e. Diez et al. 2005).

Díez, E., C. Primo, J. A. García-Moya, J. M. Gutiérrez, and B. Orfila. 2005. Statistical and dynamical downscaling of precipitation over Spain from DEMETER seasonal forecasts. Tellus A 57:409-423. Køltzow, M., T. Iversen, and J. E. Haugen. 2008. Extended Big-Brother experiments: the role of lateral boundary data quality and size of integration domain in regional climate modelling. Tellus A 60:398-410.

- We agree that this is a very small number, and as we indicate in the discussion we think an increase in the number of stations would improve our results. However, sadly this is Australia and the 107 stations are the total number of stations that are available for this area that have 40 years of temperature and precipitation data. Within the 107 stations, only 75 stations are considered complete (less than 10% missing data). The others all have more data missing. The key problem we have is that we needed both temperature and rainfall data on the same dates. While there are more stations with only rainfall, this was not useful in our analysis.

-There are two reasons why we believe that this is valid for the particular dataset that we are using. The first is that the missing data are less than 10% within the 40 year period, therefore this assumption will not alter the distribution of the data much. The second is that within this area, the likelihood of a dry day is much higher than the likelihood of a wet day, which means this further decreases the effect of assigning a zero rainfall event. A sentence was added at the end of section 2.1 to highlight this. We are currently looking at ways of filling geophysical data (i.e. Kondrashov and Ghil 2006)

Kondrashov, D., and M. Ghil. 2006. Spatio-temporal filling of missing points in geophysical data sets. Nonlin. Processes Geophys. 13:151-159.

-We included elevation and SOI with various lag periods together with the fuzzy membership to improve the prediction. In the revised document we have changed Table 1 to also include the models without the included SOI lags and elevation to illustrate the improvement. We have additionally rewritten the text in the section.

-What we meant is that Model 1 has a higher data density in the time series (weekly data) compared to model 2 (biweekly data). Due to the limitations of our computing power and the fact that this paper reports a first attempt at this method, we had to reduce the data size. We agree that of computer power and memory permitted, we would like to run the fuzzy classification on the full dataset and the related to sensitivity analysis. This is part of our on-going work in this area

-As explained in the manuscript, because of the low number of stations, the regression rules created partitions that are based on spatial coordinates. This results in some strange anomalies in the figures. Although we cannot reproduce the climate exactly (We would argue that no model is able to reproduce exactly), we can see that the model produces a good general pattern.

- We have inserted a section on how the paper is structured given that the reviewer feels that this might help the reader of the paper. We feel that Fig. 1 is the most important figure to understanding the steps taken in this model and this highlighted in the section on the structure of the paper. We have also reduced the information in Figure 1 to make the figure more clear.

-Compositional kriging is the correct geostatistical method for kriging compositional data, such as the fuzzy memberships. In the section of the paper we indicated that ordinary kriging with the transformation and back transformation gives the same results as using compositional kriging.

- Rainman is the most commonly used seasonal rainfall prediction method in Australia. This model is based on coupling transition probabilities to the SOI indices to forecast probabilities of seasonal rainfall.

- The 75 stations are already in Figure 3 and we did not want to clutter the figure.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 1159, 2008.

HESSD

5, S705–S708, 2008