Hydrol. Earth Syst. Sci. Discuss., 5, S550–S552, 2008
www.hydrol-earth-syst-sci-discuss.net/5/S550/2008/

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.

Anonymous Referee #2

Received and published: 28 June 2008

General comments:

This paper combines a number of statistical techniques (fuzzy classification, spatial kriging, regression tree) in order to make seasonal predictions of temperature and rainfall based on SOI, location, and elevation. One thing that seems a bit unusual to me is that it predicts the actual temperature and rainfall values rather than the anomalies, which I would have thought were more useful. The high correlations seem to be related to success in predicting the seasonal cycle of temperature and rainfall, which can be obtained from climatology.

The methodology was a bit confusing to me. Were the fuzzy class memberships being

predicted from the (lagged) SOI? And then combined in a weighted average to get the predicted temperature and rainfall? This was not clearly described in the paper. If this is the case, it would be valuable to show how the fuzzy classification approach improved on directly modeling the temperature and rainfall without fuzzy classification.

I like the idea of the fuzzy classification combined with kriging to represent the spatio-temporal variability, but it should be applied to anomalies. For this reason I would recommend that the paper be rejected.

Specific comments:

p.1162, line 4-5: How is seasonal climate "similar to another point in space or time"?

p.1163: You start with daily temperature and precipitation observations, then create a weekly time series. How is this done? It seems that your time series give weekly values of mean temperature maxima and minima and precipitation totals for the subsequent 6 months or a year, is that correct. This could be made clearer. Your statistics do not differentiate the skill of maximum temperature prediction versus minimum temperature prediction. Were they combined, or did you just focus on the maxima?

p.1166, top: What do you mean by "multiple interpolations over a time period"? Presumably you would have generated spatially interpolated fields for every weekly time point, is that right?

p.1169, lines 24-25: Table 1 says nothing about the performance of the original regression models containing only class memberships and station locations.

p.1170: The results in Table 1 presumably apply to the training data (i.e. the 70% sample)- please make this clearer in the text. The terms "northing" and "easting" may be unfamiliar to some readers (they were to me). It might be clearer to say latitude and longitude.

Fig. 7: Why were there no predictions made for southern Victoria?

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p.1172, top: What is meant by "locational accuracy"? Do you mean the realism of the spatial pattern? This section refers to the 30% withheld data (i.e. the testing dataset) - this should be clarified.

p.1172, bottom: I don't understand how the classifications can take up several weeks on modern computers. K-means clustering should not be quite that slow!

p.1173, lines 3-4: I agree with your assessment that the current weather is more auto-correlated to the weather over a 6-month period than over a year.

p.1173: Is the comparison with the Rainman strictly valid? If it gives the rain amount corresponding to the 70% exceedance probability, this is not the same thing as the expected total rainfall. At the bottom of the page, define IPO, DMI, and IDO.

p.1174, top: This first sentence is a bit confusing, as your statistical forecasting method does not balance site-based weather forecasting and GCMs. You could say that is has some of the advantages and disadvantages of both approaches.

Technical issues:

References: The Annas et al reference needs to have the journal capitalized.

Fig. 6 caption: The scatter plots are for both Model 1 and Model 2.

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

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Interactive Comment