

## ***Interactive comment on “Variability of rainfall in Peninsular Malaysia” by C. L. Wong et al.***

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### GENERAL COMMENTS:

This manuscript includes an analysis of the temporal and spatial patterns of past rainfall variability (1971–2006) at Peninsular Malaysia. Based on observed rainfall data, the study region is subdivided into three regions, which are then analysed separately. The authors detected a relatively large positive trend in the west coast region. For detailed spatial analysis, daily rainfall fields were interpolated to 0.05 degree resolution. The effect of ENSO on the weather conditions in Malaysia is analyzed. From the results obtained, the authors conclude that the local and regional conditions have a strong effect on the interannual rainfall variability, and are superimposed on the large-scale conditions induced by ENSO. The applied methods comprise e.g. harmonic analysis, Spear-

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man’s trend test, and a modification of Shepard’s angular distance weighting (ADW). Further calculations (SPI using different time integrations), more detailed descriptions of the applied methods (e.g. spatial aggregation to the three different regions) and the elaboration of potential implications for water resources management (and agricultural planning) are necessary.

Therefore, the reviewer recommends “major revision”.

### COMMENTS IN MORE DETAIL:

- Introduction:

The purpose and implications of the study deserve some more comments. Please elaborate how this study could contribute to improve water resources management and agricultural planning in this region? Which strategies could potentially be derived?

- Methodology:

Selection of characteristic regions: Figure 4 is illustrating three sharply separated regions. However, the criteria mentioned to separate the regions seem to be “fuzzy”, e.g. one criterion mentioned is the semi-annual pattern with two maxima during the monsoon periods. It is not clear to the reviewer what the objective criteria are.

Long-term variability:

The authors calculate the SPI on annual time scale and relate it to the ENSO period. It seems that dry/wet conditions are not exactly corresponding to El Niño/La Niña phases. However, this result could also be an artefact of the large temporal integration. Therefore, the reviewer recommends to additionally calculate the SPI using different time integrations as e.g. short term (1–2 months) and seasonal time (3–6 months), and compare the results to the respective ENSO indices (e.g. MEI) of the same time integration.

- Figures: The number of boxplots in Figure 3 should be reduced.

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Additional recommendations of further investigations:

- The authors stress the importance of the monsoonal rainfalls for the study region (e.g. on page 5481). Therefore, it would be very interesting to analyze whether or not the monsoonal characteristics (e.g. onset, cessation, and duration of the rainy season) changed significantly over the considered period. Similar analyses were e.g. conducted for the West African region by Laux et al., 2008 & 2009.

- Additionally, it would be interesting to know if the observed trends of rainfall amount are due to increasing rainfall rates and/or increasing number of rainy days. Do the observed trends correspond to changed synoptic situations over the region? An objective circulation pattern classification using large-scale atmospheric/oceanic predictor variables could be applied for this purpose (e.g. Bárdossy et al., 2002, Beck et al., 2007) and could help to increase the scientific significance of the manuscript.

Literature:

Bárdossy, A., Stehlik, J., Caspary, H.-J. (2002): Automated objective classification of daily circulation patterns for rainfall and temperature downscaling based on optimised fuzzy rules. *Climate Research*, 23:11-22.

Beck, C., Jacobeit, J., Jones, P. D. (2007): Frequency and within-type variations of large-scale circulation types and their effects on low-frequency climate variability in central Europe since 1780. *International Journal of Climatology*, 4:473-491.

Laux P., Kunstmann, H., Bárdossy, A. (2008): Predicting the Regional Onset of the Rainy Season in West Africa, *International Journal of Climatology*, Volume 20, Issue 3, pp. 329-342, DOI: 10.1002/joc.1542.

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