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Utrecht, 14/7/2018

Subject: Review doctoral thesis Nikola Jajcay

Dear prof. Kratochvil,

I read the doctoral thesis of Nikola Jajcay with much interest. It is a nice piece of work dealing with the application of modern complex systems techniques (e.g. nonlinear time series analysis) to problems in climate dynamics. As such it contains several new results to explain aspects of interannual-to-decadal climate variability in the midlatitude atmosphere and equatorial Pacific.

Although the chapters 1 to 3 do not contain much new material, they provide a good overview of the complex systems approach, on midlatitude atmospheric variability and on modern techniques of statistical analysis. The new material starts in chapter 4 where a cross-scale coupling of 7-8 years variability to interannual and shorter time scale variability (e.g. in surface air temperature data) is demonstrated in the midlatitude atmosphere. In chapter 5, novel results on the phase-amplitude coupling between the dominant statistical modes of variability in the Tropical Pacific are presented, for example leading to a characterization of strong El Nino events over the last decades.

The material of chapter 4 has been published in Geophysical Research Letters, one of the top journals in the climate research field. The work done in chapter 5 does not appear to have been published yet in a climate research journal but is potentially publishable. Whether these results will have impact in the field of climate dynamics is difficult to assess, because the analysis techniques are far beyond the level of the tools used by climate scientists which may hinder the acceptance of the results. From the list of publications, it appears that Nikola Jajcay has also contributed substantially to more methodological oriented papers with many coauthors, which certainly will have impact in the field of complex systems science.

In summary, I think that the doctoral thesis of Nikola Jajcay demonstrates his capability to carry out independent and creative research and recommend that he is granted the doctorate.

Sincerely,

Prof. dr. ir. H.A. Dijkstra
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