

Interactive comment on “Simulated climate variability in the region of Rapa Nui during the last millennium” by C. Junk and M. Claussen

Anonymous Referee #3

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The main objective of this paper was to test the hypothesis that climate played a major role in the rapid vegetation changes known to have occurred on Easter Island (Rapa Nui) in the past (850–1750 AD). To do this, Junk and Claussen use both observational and satellite data of the last ~50 years and climate simulations from Earth system models (ECHAM5/MPIOM and ECHO-G/ECHAM4) under varying time dependent forcings. The results from the model simulations indicate that climate in the grid cell that comprises Easter Island did not change significantly enough to have caused the rapid transition from woodland to grassland that is known to have occurred on the island sometime between 800–1750 AD. The conclusion by the authors is that given this finding, climate is an unlikely candidate and that other factors contributed to the demise of the palms that once existed on the island.

C164

Based on the simulated climate timeseries provided by the authors, I would agree that a significant enough change in their modeled climate does not exist to explain the vegetation changes that occurred at Easter Island around 1200 AD. However, the authors have failed to convince me that the models being used can adequately address this problem. How well does each model reproduce pre-industrial climate? Can these models be used to address ENSO changes (a prerequisite if it is to be used to test Orliac and Orliac's (1997) argument)? Do the models faithfully reproduce paleoclimate conditions during 'benchmark' periods in the past (i.e. 3, 6, 9, 12, 15, or 21 ka)? Can the models reproduce both atmospheric and ocean anomalies/currents/processes/etc. reasonably well for the pre-industrial, thus providing confidence in their ability to do it in the past? The answer to all of these questions may be yes, but it needs to be demonstrated or discussed by the authors in order to allow the reader to properly evaluate the model results and the author's conclusions. My other major concern with the model results is the ability for the model to accurately reproduce climate, in this case precipitation and temperature, for a single grid point. Again, had the authors provided the regional climatology around Easter Island it could have strengthened their argument that climate from 800–1750 AD was not significantly changing enough to have caused the local vegetation changes on Easter Island. Even providing information on the adjacent grid cells would have at least allowed the reader to get a sense of what was going on in the model simulations.

Minor Comments: -Title: Rapa Nui is chosen in the title over Easter Island. To be consistent in the body of the paper, the authors may consider using Rapa Nui over Easter Island in the text as well.

-p.383, line 26: 'und' should be 'and'

-p.385, line 24: It is stated that the horizontal resolution of the model is $3.75 \times 3.75^\circ$. My read of the ECHAM5 model is that it has T63 grid spacing ($1.75 \times 1.75^\circ$) (Roeckner et al., 2003).

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-p.387, line 22-23: It is stated that -0.4°C is much weaker than the global cooling trend. Is the global cooling trend being referenced for the model simulations or for the proxy data? If the later, a reference is needed.

Fig 1: Highlighting the Nino3.4 index would be useful.

Fig 2 and 3: The x-axes need to be labeled.

Interactive comment on Clim. Past Discuss., 7, 381, 2011.