

A review of
**Climate and stratospheric ozone during the mid-Holocene
and Last Interglacial simulated by MRI-ESM2.0**

(by Watanabe et al.)

Review. This paper explores the effect of stratospheric ozone changes – if any – on the climate of the mid-Holocene (MH) and the Last Interglacial (LIG). The question is well posed, and most interesting. To answer it the authors have performed an excellent set of model runs: 3 epochs (1850 PI control, MH and LIG) and, for each epoch, 2 runs (with PI ozone and with interactive ozone). So, they should be able to answer the question clearly.

Unfortunately the manuscript, in its current form, is really a mess. The authors waste 7 figures (each with many panels) discussing all manner of secondary considerations, and only show an ozone field for the first time in Figure 8. So, the narrative is completely backwards. If one is trying to tell the impact of ozone changes, one should start by showing the ozone changes. But this need to be done properly. Why are we shown ozone at the 3 hPa level in Figure 8? Is that where the ozone layer is? I would imagine the readers want to see ozone at 50 or 70 hPa. What about a latitude/height map of ozone changes in the ML and LIG? Or again, how about showing a lat/lon map of total column ozone (TCO)? Is the ozone layer thicker or thinner than under PI forcings? By how many Dobson units? I have no idea what the answer is (as I have not run the models), but none of this is shown in the paper. Again: the paper needs to start with 2 or 3 well chosen figures telling us what ozone looks like in the MH and LIG, and how it differs from the PI control.

Next, the key results are at the very end of the paper, in Figures 12, 13 and 14: these show that ozone changes in the ML and LIG have *basically no statistically significant impact* on surface climate. So, why are the most important figures left at the end of the paper? And why are the authors not stating clearly that the effect of interactive on surface temperature are minuscule? And what about precipitation (which is not shown)? I suspect ozone is also irrelevant for that. In my mind that should be the key point of the paper: ozone changes in the ML and LIG don't matter. It is a null result, but null results are *very much* worth publishing. In all honesty, I am not surprised that ozone changes make no difference: this is because I suspect these changes are small. It takes something like an ozone hole over the South Pole (as we have seen in the late 20th century) to make a substantial climate impact. Hence the key figure the readers need to see: *how big* are the ozone changes in the ML and LIG compared to those caused by CFCs?

Recommendation. The paper – in its present form – should be rejected. However, the authors should be strongly encouraged to resubmit. They have a nice set of runs, and a very clean story to tell: the ozone changes in the ML and LIG are small, and therefore they make little difference for the surface climate. Such a paper is easy to write, as the key points can be made with a few simple figures, and no complicated mechanisms needed to be invoked. It will be a nice contribution to the literature. I look forward to it.