

Review of the study “Sensitivity Experiments on the Response of Vb Cyclones to Ocean Temperature and Soil Moisture Changes”

from

Martina Messmer, Juan José Gómez-Navarro, and Christoph C. Raible

The manuscript has improved through the changes, and I see that the Authors considered my comments. Although in one aspect, regarding the soil moisture sensitivity experiment, I still want to ask the Authors to reconsider their simulations, or if different sensitivity experiments are not possible reconsider some of their statements.

My main concern regarding the soil moisture experiment is that, by starting the model with 6 hours spin up time, the model is initialised with atmospheric moisture, which is partially evaporated from the land areas during the previous days. In other words in this kind of sensitivity experiment I do not think that one can investigate the full effect of the soil, as moisture source for these cyclones, since its moisture is partially included through the atmospheric initial and boundary conditions. Maybe this is also the reason, why this experiment did not show such significant changes as the Mediterranean SST experiment. In my opinion, changing the soil relatively close to the cyclones' initialisation, shows mainly the effect of moisture recycling during the cyclones' lifetime.

I would recommend for example to try and start the model (in case of the soil moisture experiments) from a previously simulated dry soil experiment, where the soil moisture have been decreased not just in the initial conditions, but during the integration of the model, and thus the atmosphere had time to adapt to the altered dryer or more moist conditions. This could be achieved by changing the parametrisation of soil moisture or at the calculation of surface fluxes. Of course this can cause other problems with the cyclones' initialisations.

An other solution could be to make the soil moisture experiment more similar and comparable to the SST experiments, by drying/irrigating the soil in every time step, in a similar manner as the SST field is kept altered during the whole simulation.

If such an experiment is not possible, then I would like to ask the Authors to change some of the sentences in the text:

1. Abstract Line 5-6: I think that the statement that the Vb events are rather insensitive to the soil moisture changes, can not be concluded from these results, please reformulate it, because in this form I think it is too strong and possibly misleading.
2. Section 4.1, Page 9 Line 15-17: It might be worth mentioning that the dry soil experiment shows significant changes (Fig. 4a and b).
3. Section 4.4, Page 11 Line 26-27: Same as in the Abstract.
4. Section 4.4, Page 11 Line 30-32: The soil experiment is called unrealistic, but on the other hand the +5K SST experiment is also a rather unrealistic scenario. So I am not convinced that justifying the conclusions by calling them unrealistic is correct here, especially because the other sensitivity experiments are similarly unrealistic.

5. Section 4.4, Page 12 Line 6: The reason for marginal contributions from the soil can be due to that, the moisture originating from the soil was already initialised through the atmospheric moisture. See my main comment.

6. Section 6 Page 14 Line 13-15: See the 4th comment.

7. Section 6 Page 14 Line 23: Both experiments are extreme. Here, you consider the results from the soil moisture experiment equally important to the +5K Mediterranean SST results, but the rest of the paper is considering the Mediterranean much more important. I feel that the conclusions are biased towards the Mediterranean in a way, which is not in accordance with the results. Also since climate projections not only predict the increase of Mediterranean SST but also dryer conditions (so dryer soil) in this region, the effect of soil moisture can not be “ignored” in the Mediterranean region.