

Interactive comment on “Atmospheric Blocking: The Impact of Topography in an Idealized General Circulation Model” by Veeshan Narinesingh et al.

Anonymous Referee #1

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General comment

This paper studies the topographic effect on blocking formation, using an idealized GCM. The authors have done aquaplanet simulations and simulations with different types of topographies (idealized mountains). They compared the simulation results with and without topographic forcing to demonstrate the influences of topography on blocking formation in terms of dynamics, spatial frequency, duration and displacement. They conclude that the simulation results have important implication for understanding blocking dynamics in the real atmosphere. Overall, the paper is interesting and clearly written, and it would certainly improve our understanding in blocking dynamics, which suddenly became a hot research topic in recent few years. I would recommend publication with minor revision. My comments in the following are for the authors' reference.

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Specific comments

1. In the simulation by Hu et al. (2008), solar insolation is fixed at March equinoctial condition. It generates greater meridional temperature gradients in the middle and upper troposphere and thus stronger baroclinic eddies. This could be the reason why there are frequent blocking events in their simulations. In the present study, if insolation has seasonal variations, it would be good to look at whether there are seasonal variations of blocking frequencies.
2. It would be good if the authors add a couple of sentences about why the mountain size of 15 degrees in latitude and longitude is chosen. Is it large enough to generate stationary waves?
3. Line 247: Why do you choose the 85% confidence level? Is it too low? People usually use at least the 90% confidence level.
4. Line 51: may be key → may be the key
5. Line 108: Q-flux, is there horizontal heat flux?
6. Section 2.4: there are too many short paragraphs. It would be good to put them together.
7. Line 505: surface forcing → topographic forcing 8. Lines 537 and 545: “resonance” may not be a good terminology. It is actually nonlinear eddy-eddy interaction or interaction between transient waves and stationary waves.
9. Fig. 4b: I am confused by this plot at beginning, and I thought blockings occur at the equator. It is good to point out in the figure caption that the reference latitude is removed.