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Climate of the Past Discussions

Interactive comment on "Impact of geomagnetic events on atmospheric chemistry and dynamics" *by* I. Suter et al.

Anonymous Referee #2

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This is a nice climate sensitivity study that after some revision should be suitable for publication in "Climate of the Past". Even though it is a nice sensitivity study, the paper is setting itself a task for which the model used is nor suitable, namely to discuss regional precipitation changes in the past. Given the poor horizontal resolution of the model system, it is obvious that this task must fail. I am not saying the authors should not mention this motivation, but it should be much clearer from the beginning that they cannot expect an answer, and that they are focusing on the question "Is the global climate sensitive to a reduction in dipole moment¿' Another major comment is that the authors treat some aspects of the coupled circulation-chemistry system as very deterministic: Quite often they describe consistent changes as causality (examples below). Finally, it would be nice to close with a nice conclusion regarding the sensitivity of the climate system to changes in dipole moment and not with a non-conclusion about

regional climate change that cannot be resolved at T32.

6606, L16-18: This is one example of overstated causality. Yes, the ozone change is certainly a driver of circulation change, but the circulation change itself will change the ozone. A slightly stronger focus on the seasonal development would help.

6606, L21-25: This is not a challenge. It cannot be done with the model used.

6607, L19: word order: last global

6607, L23: Why is this odd acronym introduced (SWW)? You discuss the NH as well (without acronym).

6608, L04: Odd reference for long-standing text-book knowledge.

6608, L15: Just say that you test one of the mechanisms.

6609: Please make sure you explain the quantities (e.g. phi) before you use them.

6609, L25: You use a constant NOx conversion factor of 1.25, which is an approximation.

6610, L27: insert "magnetic" before pole

6611, L4: What is a normal magnetic field?

6613, L20-23: I don't follow the implied causality here, please see main comment above.

6614, L4-13: Not sure I can follow the lightning argument: Lightning NOx sources are below the tropopause, your change seems higher (obviously the model diagnoses the lightning NOx sources and you could check). What are augmented ozone concentrations? Are you talking about an increase?

6614, E1: Why do you need the equation? It is never used.

6615, L3: Give this a positive twist: Seasonal development of change is important!

6615, L11: colder should be lower, another case of overstated causality, see above

6616, L11: I have no idea what this statement means! Taking differences of two geostrophic wind fields, there is no reason for not having a vertical anomaly. Delete! As mentioned above, I would suggest finishing with a clear and positive message about large scale changes and an outlook what could be done about regional change in the future. (I have skipped the proxy discussion, because I am not familiar with the cited literature.)

Interactive comment on Clim. Past Discuss., 9, 6605, 2013.