

Interactive comment on “The Norwegian Earth System Model, NorESM1-M – Part 2: Climate response and scenario projections” by T. Iversen et al.

Anonymous Referee #2

Received and published: 23 October 2012

***** General comments *****

This paper presents a clear summary of results from the NorESM1-M model across a range of experiments determined by CMIP5. The authors have done a great job of showing and discussing results that are the most relevant and scientifically interesting without making the paper too long. They cover many aspects of climate change including climate sensitivity; cloud feedbacks; attributing changes to greenhouse gases and aerosols; comparisons with the rest of the CMIP5 models; future temperature and precipitation changes under different RCP scenarios; changes in the AMOC; changes in storm tracks and blocking; changes in the NAO and NAM; and changes in ENSO.

C811

Overall I think this is a very good paper and should be accepted pending one minor issue that I had (see specific comments below) and a few grammatical corrections (see technical corrections below).

***** Specific comments *****

Page 2951, line 26:

I had a hard time trying to understand how increased precipitation over land and an increased flux of moisture from the oceans to the land supports the statement that “the space-time fraction of dry spells over land must increase and thus also the average intensity of precipitation”. The trick is trying to explain how it is possible to get increased precipitation over land without getting increased evaporation from an apparently more waterlogged land surface. The answer is more extreme events with longer droughts between them. To try and describe this theory more clearly I have made an attempt to rewrite the start of your paragraph but feel free to edit it as you see fit as you insert it in the text.

“Evaporation from the land surface is heavily influenced by water availability in the soil and would normally be expected to increase with increased precipitation. However here we are seeing that this is not happening and land evaporation is not changing. This means that the soil is being allowed to dry out more by either having longer dry spells between precipitation events or by increasing the spatial scale of dry regions. Thus we can hypothesise that in NorESM1-M future climate change scenarios there is an increase in both the precipitation intensity and space-time fraction of dry spells. Such effects were deduced for a warmer climate by . . .” (rest of paragraph can remain unchanged)

***** Technical corrections *****

Page 2935, line 21: Delete “for inclusion in the fifth Assessment” as this has already been suggested earlier on in the same sentence and is not needed.

C812

Page 2936, line15: The start of this sentence is hard to read. I suggest changing it to “Over the last 15 years, research and modelling groups at the Univeristy of Oslo and the Norwegian Meteorological Institute (also in Olso) have used NCAR models to develop representations of aerosols and . . .” (the rest of the sentence can stay the same).

Page 2936, line 28: Change “times” to “by”.

Page 2937, line 4: Do not capitalise “Convective Momentum Transport”.

Page 2939, line 12: Change “influence” to “influences”.

Page 2940, line 3: Change “increase” to “increases”.

Page 2944, line 14: Change “Table 2” to “Table 3”.

Page 2946, line 3: This sentence is hard to read and hard to determine what time periods the trends are calculated from. I suggest changing it to “While a negative trend is simulated for both the long-wave and short-wave from 1850 to 1970, the net radiative flux has a trend close to zero.”

Page 2961, line 26: The El Nino Southern Oscillation is not a “weather pattern” but a combination of oceanic (El Nino) and atmospheric (Southern Oscillation) components (the word “weather” suggests it is atmospheric only). Thus remove “weather pattern” from the text. Perhaps reword it as “The El Nino Southern Oscillation phenomenon is a dominant mode of interannual climate variability based in the tropical Pacific but with far reaching atmospheric teleconnections (Trenberth, 1997).”.

Page 2962, line 1: Change “weather pattern” to “climate pattern”.

Page 2962, line 16: This sentence is hard to read. I suggest changing it to “It is possible to identify a more frequent occurrence of ENSO events in the piControl and Historic1 simulations compared to HadISST.”.

C813

Interactive comment on Geosci. Model Dev. Discuss., 5, 2933, 2012.

C814