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Interactive comment on "Cyclone impact on sea ice in the central Arctic Ocean: a statistical study" *by* A. Kriegsmann and B. Brümmer

Anonymous Referee #1

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I recommend that this manuscript be accepted for publication with minor revisions.

The authors investigate in their paper "Cyclone impact on sea ice in the central Arctic Ocean: a statistical study" the impacts of cyclones on the Arctic Sea ice using a purely statistical approach. The title of this paper fits the work very well. They use the NAOSIM model, forced by ECMWF analysis for the period 2006 – 2008, and extract counts of cyclones using a well-recognized cyclone tracking algorithm. They present and discuss their results well, including a detailed region-by-region discussion of the identified statistical linkages. This work represents a relevant scientific topic that certainly falls within the scope of 'The Cryosphere.' The paper makes use of existing concepts, ideas, tools, data, etc. but present a valuable statistical discussion of Arctic cyclones during a time period where sea ice was observed to be in rapid decline. Sub-

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stantial conclusions are reached within the paper following rigorous scientific methods and assumptions which strongly support the conclusions of the paper.

The methods and datasets used within this paper appear to be well-described by literature, and I have no doubt that this work could be reproduced by others. The use of literature throughout this paper is appropriate and at an acceptable number of cited articles. I would suggest a few more process-oriented papers could be included, particularly on the implications of cyclones upon dynamic and thermodynamic processes in sea ice. The abstract well-summarizes the results of the paper, but perhaps could use a few key statistical results. Key elements of a good academic article are present. Aside from some grammatical errors throughout the text (noted below), the language is very clear, mathematical formula are well-defined, and used correctly, and the figures and tables are of good quality. There are 13 figures, each which provide unique and valuable details and insight into the key results of the paper, and are well discussed within the text.

Line-by-line comments are provided below: Page 1143: line 9: A reference would be good here, perhaps Perovich et al., 2008. Page 1144: Line 13: Cite Simmonds and Rudeva, 2012. Page 1145: Is NAOSIM just a name, or is it an acronym for something? Page 1147: Line 21: How do you gauge ice strength in this paper? Do you have a metric for this? Page 1150: line 12, its “becomes” not “becames” Page 1151: Using AMSR-E to gauge day-to-day changes in sea ice concentration is tricky due to error inherent to the algorithms used to process the passive microwave brightness temperatures. I would suggest addressing AMSR-E error in your paper. Page 1152: Line 26: I think you may need to add a brief discussion about cyclone impacts on sea ice concentration due to divergence / convergence from surface winds. Page 1153: Line 1-2. The changes you present here are pretty small and may fall within AMSR-E instrument and algorithm error. This goes with my above comment. Line 27 “cylone” Line 28 “growths” . . . should be ‘grows’ or ‘increases.’ Page 1154: “Impact of a cyclone in winter is nearly completely vanished. . .” This seems like an awkward way of saying this. Try

TCD
7, C690–C692, 2013

:"The impact of a cyclone in winter is greatly diminished after about 5 days. . ." Line 27: "Canadian coast" this is too generalized. Best to say "Canadian Arctic Archipelago." This is what you mean? Page 1155: Are the changes in SIC presented statistically significant? Page 1157: Line 12, I would suggest that cyclone impacts on SIC depend by season. In summer, ice can actually end up diverging quite a bit following a summer cyclone, due to the ice being broken up by wave forcing, and rapid in situ melt, ice floe size being key. Your point about ridging is valid for the entire cold season.

Interactive comment on The Cryosphere Discuss., 7, 1141, 2013.