Review of ACP MS No. acp-2015-432 entitled "Ice Melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling and Modern Observations that 2 ° C Global Warming is Highly Dangerous" by Hansen, Sato, Hearty,... and Lo.

General Comments and Recommendation. This MS focuses on several questions and phenomena in the science of climate change. A major goal is to define "dangerous anthropogenic interference", an important phrase from the 1992 United Nations Framework Convention on Climate Change (UNFCCC), as follows:

> "...to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

The MS significantly advances this quest for a more quantified definition of such human impact. Very few serious efforts have been made to arrive at useful definitions of "dangerous anthropogenic interference". Previous efforts focused on sea level rise have been less rigorous, I believe, with less analysis of the coupling of ice meltwater with oceanic dynamics. A few other examinations have focused on (another irreversible phenomenon) biodiversity loss, not comparable to sea level rise.

I recommend the publication of this MS in *ACP*.

In the remainder of this review, I suggest some useful revisions and I comment on a potentially controversial section of the MS (Section 6.2 and parts of 6.3). I also add other technical comments.

Technical Comments, Criticisms and Suggestions.

1. As described in the Abstract and elsewhere, the authors use numerical modeling of the climate system, paleoclimatic data and interpretations and other climate observations. Their model has coarse spatial resolution (4deg X 5deg). While the low resolution is a weakness of this study, the MS discusses its limitations in several places. Also, several improvements to the pre-existing model were incorporated for this study. However, in its favor, the variety and number of phenomena being simulated, along with the length of simulated runs, do require a simplified model. I judge that the numerical modeling part of this MS is very well done; the calculations and results are significant contributions to climate research. For example, the exploration of time constants for ice melt, deep water circulations and surface temperatures and several feedbacks, are important and they will stand until and unless a higher resolution model with a good physical basis can go beyond this MS. The use of a low resolution model is appropriate at this stage of development in this field. Indeed, it will lead to much subsequent progress.

Can the authors give information to characterize the computational burden that must be met to reproduce their computations or to reproduce them with a higher resolution model? What are run times on your computers?

2. The sections that discuss the possibility of large boulders being raised by stormy seas near the end of the Eemian period (MIS stage 5e); see also Figures 25 and 26 --- these sections argue for "dangerous interference" in new and novel ways. They raise serious new possibilities to be considered. While I find these sections of text to be scholarly and evidence-based, they and related parts are long. If the MS is judged to be too long (and difficult to read), then perhaps the MS could include these parts in Supplemental Information or even another MS. Separately, I saw a request (but cannot find it now) in the *ACP Discussion* comments for the authors to present estimates of energy requirements for the raising of these boulders by ocean waters. Such estimates might enable physical oceanographers to consider this possibility more fully.

3. The sections of the MS that deal with consequences of injection of fresh water from melted glaciers are very important, and rather original. The calculations are nicely conceived and they disclose time constants of subsequent phenomena and the importance of feedbacks as in oceanic circulation. The calculations illustrate impacts of ice meltwater on climate dynamics (e.g. on AMOC and SMOC). Also see Lines 1341-1342.

The statement comparing their model predictions with other predictions is very useful for current and future research (see e.g. Lines 1791-1799).

Detailed questions: units of false color images (Fig. 6, Fig. 17)? What is meant by "recovers" on lines 395-396? What is meant by "our prior simulations" in Line 447? "Eulerian" is misspelled in Fig. 17 caption. "Relics" is misspelled on Line 1078 as is "porosity" on Line 1160. The caption of Fig. 33 should specify that it is for oceans.

4. The terms' linearity", "nonlinearity" and "exponential" are sometimes used vaguely. Precision in language would help. In physics or mathematics linearity is represented by $y = Kx + c$.
(I have not done a word search for these words, so the list that follows might not be complete.) In the Abstract, Line 15, what is "nonlinear disintegration"? What is "nonlinearly growing sea level rise in Line 35-36 ? Is time the independent variable or is it radiative forcing?
Similarly, what is "nonlinear behavior" in Line 569? See also Lines 617, 731, 732, 733, 738, 827, 843, 1788, 1789 and 1799. In some of these uses, the independent variable is not clear.

5. Predictions from the numerical modeling appear in the last several lines of the Abstract and in Section 10.1, for example, that the Southern Ocean might cool due to meltwater input. These predictions are very valuable; they sharpen the paper and they can be evaluated by subsequent research.