Discovery: Increased Ocean Evaporation Mitigates Ocean Rise Due to Melting Glaciers

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Abstract

In January 2017 a Global and Regional Sea Level Rise Scenarios for the United States paper was published [1]. It speculated four scenarios of ocean level rise. In this report we show the correct ocean rise data to determine which scenario is most correct. The current earth warming had started in the 1970s. Ocean evaporation is a flux from ocean to air. It has been described mathematically many times. In this report I will show that increased evaporation from warming oceans and dilution of salt content is offsetting most, if not all, of ocean rise due to melting glaciers. I worked with the NOAA Satellite Altimetry group to make graphs every 10 degrees latitude. They clearly show no increase of ocean rise since 1880, when ocean measurements began to be taken.

Keywords

Ocean rise, ocean evaporation, sea level rise

Method

I contacted Dr. Laury Miller, Chief of NOAA's Laboratory for Satellite Altimetry in Washington, to make graphs by every 10 degrees for ocean rise. We also installed NOAA RADS software to make the graphs [2]. The NOAA group provided direction for making a script to create the graphs in this report.

Results & Discussion

Since 1880, over a period of one hundred thirty-seven years, we have had a global sea rise of 354 mm, a rate of 2.6 mm per year. The global satellite measurement data since 1993 match the previous data and show a 2.5 mm/year increase. Ocean rises in the northern latitudes are increasing in rate while those in the southern latitudes are increasing at a slower rate.

Additionally, "latent heat of evaporation" cools the oceans down.

Figure 1. Global Average Absolute Sea Level Change, 1880–2015

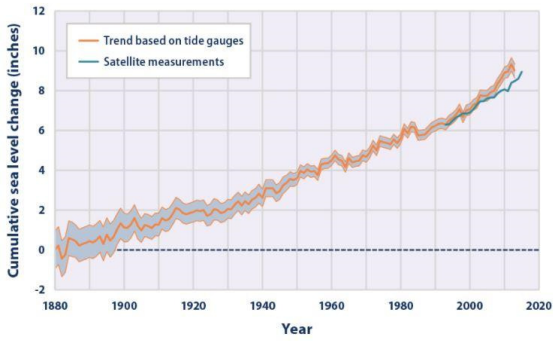


Figure 1. Global ocean rise since 1880, 2.6 mm/year

Ice from ice bergs which are melting actually lower the ocean rise because water expands when it is frozen and contracts during melting.

The graphs I made are by latitude from north to south latitudes. I know this combined both the Atlantic, Pacific and other sea's data in each graph. However, I am mostly interested in a trend by latitude. The first graph, Figure 1, is for the entire ocean rise set. This data is the familiar ocean graph from NOAA. [3]. The ocean rise is 2.6 mm/year historically. Figure 2 is global ocean data from Satellite Altimetry. Figures 3 through 13 are every 10 ° latitude ocean rise measurement graphs. This data clearly shows no increase of ocean rise worldwide due to melting glaciers from a warming earth. Oceans in the northern latitudes are rising slightly due to a thermal expansion in the northern hemisphere.

Oceans in the southern hemisphere are rising at a slower rate due to thermal contraction. The only thing that can keep the oceans from rising faster is increased evaporation from two causes. First, we have warmer oceans from a warmer earth. Second, we have diluted salt concentration from melting glaciers, which also increases evaporation. Clausius-Clapeyron Equation, which defines the slope of the vapor pressure curve, describes ocean evaporation. The rate of water vapor pressure change by temperature is defined by the heat of vaporization divided by the flux. The flux is the temperature times the quantity of Vg-Vf . Water vapor concentration varies from trace amounts in polar regions to nearly four percent in the tropics [4]. As the troposphere temperature increases, the vapor pressure of water in the atmosphere decreases and the ocean evaporation increases until equilibrium. Therefore, the increased evaporation is offsetting all ocean rise due to melting glaciers. The troposphere is only 4% clouds and has a great amount of increased evaporation capability especially with warming. The troposphere is a transport mechanism for ocean evaporation to land.

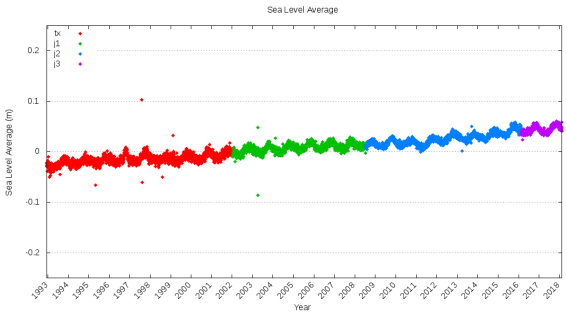


Figure 2. Global ocean rise 2.5 mm/year

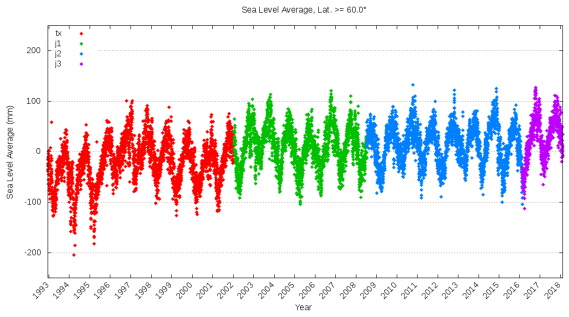


Figure 3. 60° north ocean rise 3.2 mm/year

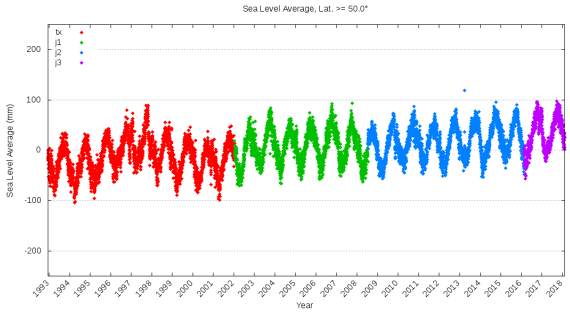


Figure 4. 50° north ocean rise 3.2 mm/year

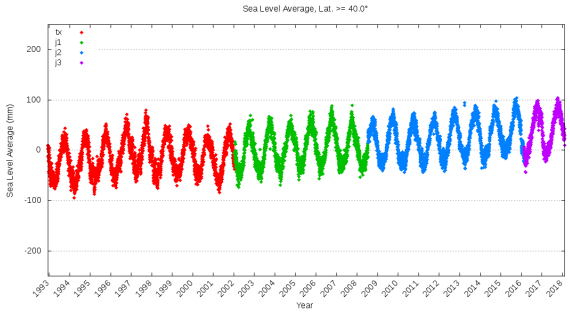


Figure 5. 40° north ocean rise 2.8 mm/year

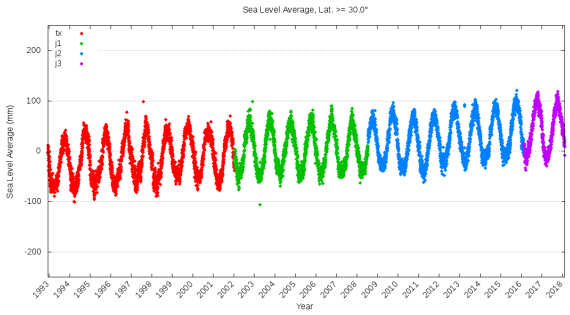


Figure 6. 30° north ocean rise 2.8 mm/year

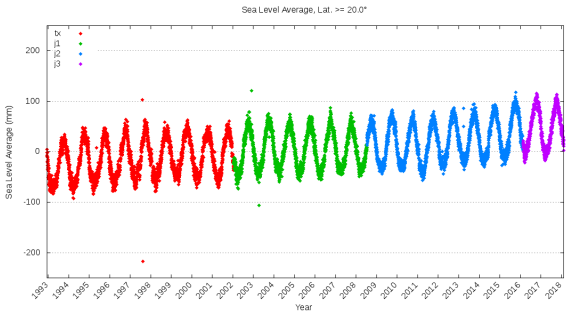


Figure 7. 20° north ocean rise 2.4 mm/year

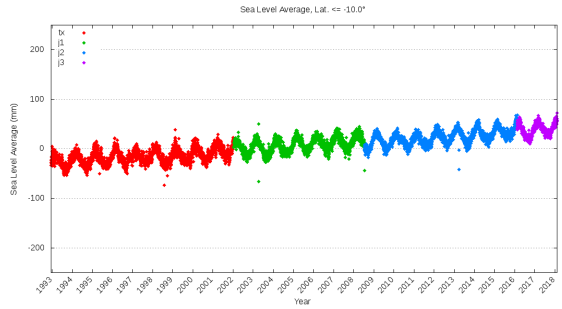


Figure 8. 10° north ocean rise 2.8 mm/year

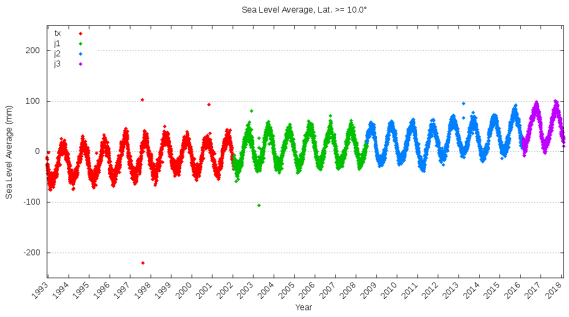


Figure 9. 10° south ocean rise 2.4 mm/year

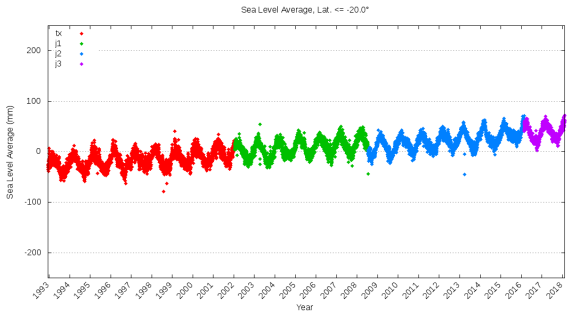


Figure 10. 20° south ocean rise 2.4 mm/year

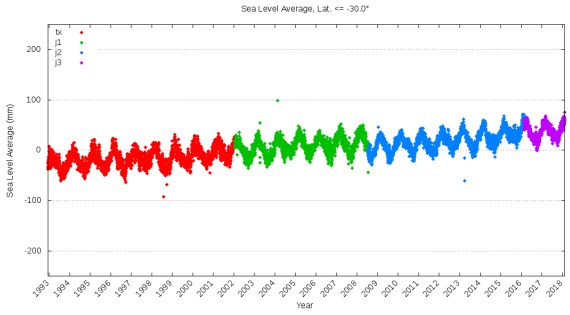


Figure 10. 30° south ocean rise 2.4 mm/year

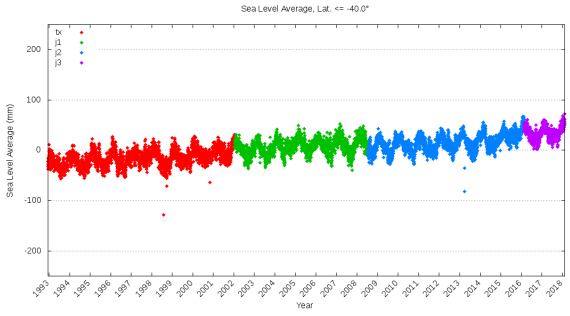


Figure 11. 40° south ocean rise 2.4 mm/year

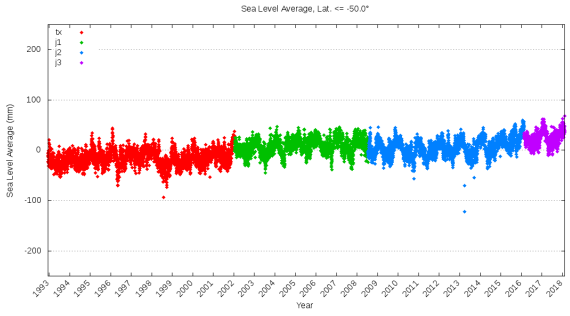


Figure 12. 50° south ocean rise 2.0 mm/year

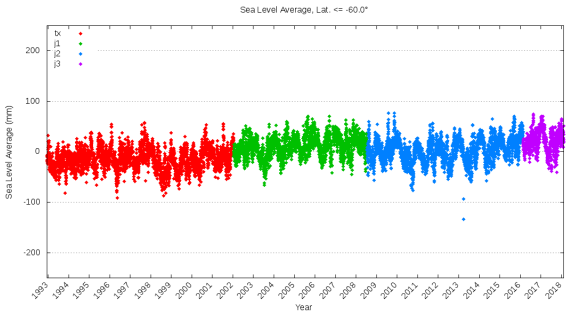


Figure 13. 60° south ocean rise 2.0 mm/year

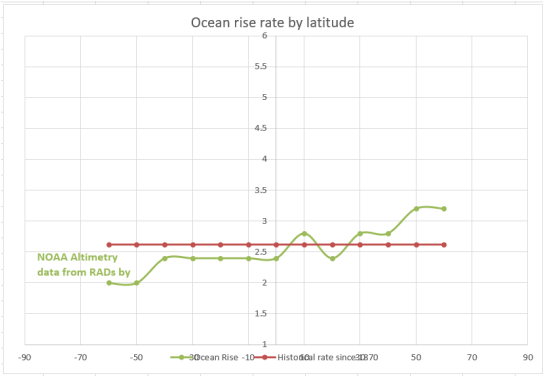
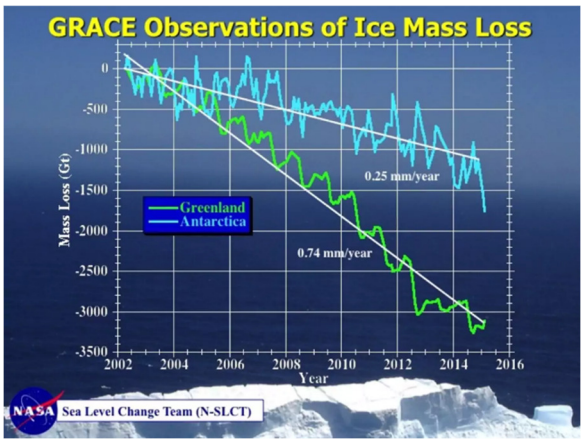


Figure 14. Summary graph of RADS data with GHCNM data

Model for ocean level drivers.

We have had forty years of heating in the world and glaciers are melting. The ocean rise rate is lower in the south where the glaciers are melting at a rate which is 1/3 of the artic glaciers from GRACE data (5).



Model:

1. Increased water temperature: Increased evaporation from warmer water.
2. Increased air temperature: increased ocean evaporation from diffusion flux.
3. Increased melting of ice in the water lowers the sea level. Also Changes the salt concentration which increases evaporation.

Conclusion

In one hundred years the oceans will rise 260 mm. Even at the 3.2 mm rate, the rise would be 0.32 meters. Increased evaporation is offsetting the ocean rise due to melting glaciers. Increased evaporation also cools the oceans down. The scenario from the Global Ocean Rise paper that shows the lowest increase in ocean rise is the correct scenario. We will make a script to keep these graphs up to date on our site at cctruth.org. I will monitor the ocean level graphs each year. The correct statistics to put on a global ocean rise graph are 2.7mm/yr +/- 0.6 mm

References

1. NOAA Technical Report NOS CO-OPS 083 Global and Regional Sea Level Rise Scenarios for the United States. William V. Sweet et al. https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf
2. Altimetry data are provided by the NOAA Laboratory for Satellite Altimetry.
3. https://www.epa.gov/climate-indicators/climate-change-indicators-sea-level.
4. https://web.physics.ucsb.edu/~lgrace/chem123/troposphere.htm

5. https://climate.nasa.gov/vital-signs/ice-sheets/

Conflict of Interest section:

I have no known conflict of interest in the production of this paper.