



2023

## Geologic Analysis of Ice Age Simulation Results

Elizabeth G. Sultan  
*Cedarville University*

Steven M. Gollmer  
*Cedarville University*

Follow this and additional works at: [https://digitalcommons.cedarville.edu/icc\\_proceedings](https://digitalcommons.cedarville.edu/icc_proceedings)



Part of the [Geology Commons](#)

[DigitalCommons@Cedarville](#) provides a publication platform for fully open access journals, which means that all articles are available on the Internet to all users immediately upon publication. However, the opinions and sentiments expressed by the authors of articles published in our journals do not necessarily indicate the endorsement or reflect the views of DigitalCommons@Cedarville, the Centennial Library, or Cedarville University and its employees. The authors are solely responsible for the content of their work. Please address questions to [dc@cedarville.edu](mailto:dc@cedarville.edu).

Browse the contents of [this volume](#) of *Proceedings of the International Conference on Creationism*.

### Recommended Citation

Sultan, Elizabeth G. and Gollmer, Steven M. (2023) "Geologic Analysis of Ice Age Simulation Results," *Proceedings of the International Conference on Creationism*: Vol. 9, Article 62.

DOI: 10.15385/jpicc.2023.9.1.79

Available at: [https://digitalcommons.cedarville.edu/icc\\_proceedings/vol9/iss1/62](https://digitalcommons.cedarville.edu/icc_proceedings/vol9/iss1/62)

## GEOLOGIC ANALYSIS OF ICE AGE SIMULATION RESULTS

**Elizabeth G. Sultan**, and **Steven M. Gollmer**. School of Science and Mathematics, Cedarville University, 251 N. Main St., Cedarville, Ohio 45314 [esultan@cedarville.edu](mailto:esultan@cedarville.edu), [gollmers@cedarville.edu](mailto:gollmers@cedarville.edu)

### ABSTRACT

Ice ages are believed to have occurred at least 5 times in the past, with each glacial period lasting tens of thousands of years and interglacial periods lasting up to 400,000 years. It is hypothesized, however, that the Genesis Flood would have provided the conditions necessary to trigger an ice age within a few hundred years, that could account for the glacial deposits we find worldwide. This research project compared the output data from a 360-year ModelE2.1.2 run of an ice age simulation, to the geologic record of the last glacial maximum (LGM). The simulation was inputted with conditions based on Michael Oard's proposed model for the flood causing the ice age.

### KEYWORDS

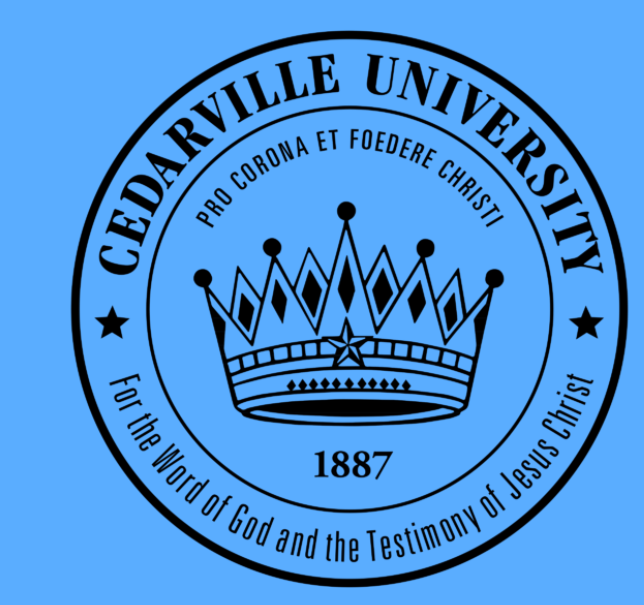
Ice Age, Global Flood, Last Glacial Maximum

### THE AUTHORS

Elizabeth Sultan is an undergraduate at Cedarville University with majors in Geology and Environmental Science.

Dr. Gollmer is a Senior Professor of Physics at Cedarville University. He holds a PhD in Atmospheric Science from Purdue University. His research interests include analysis of satellite imagery and climate modeling. He teaches an honors course comparing different worldviews as they relate to questions of physical, biological, and human origins.





# Geologic Analysis of Ice Age Simulation Results

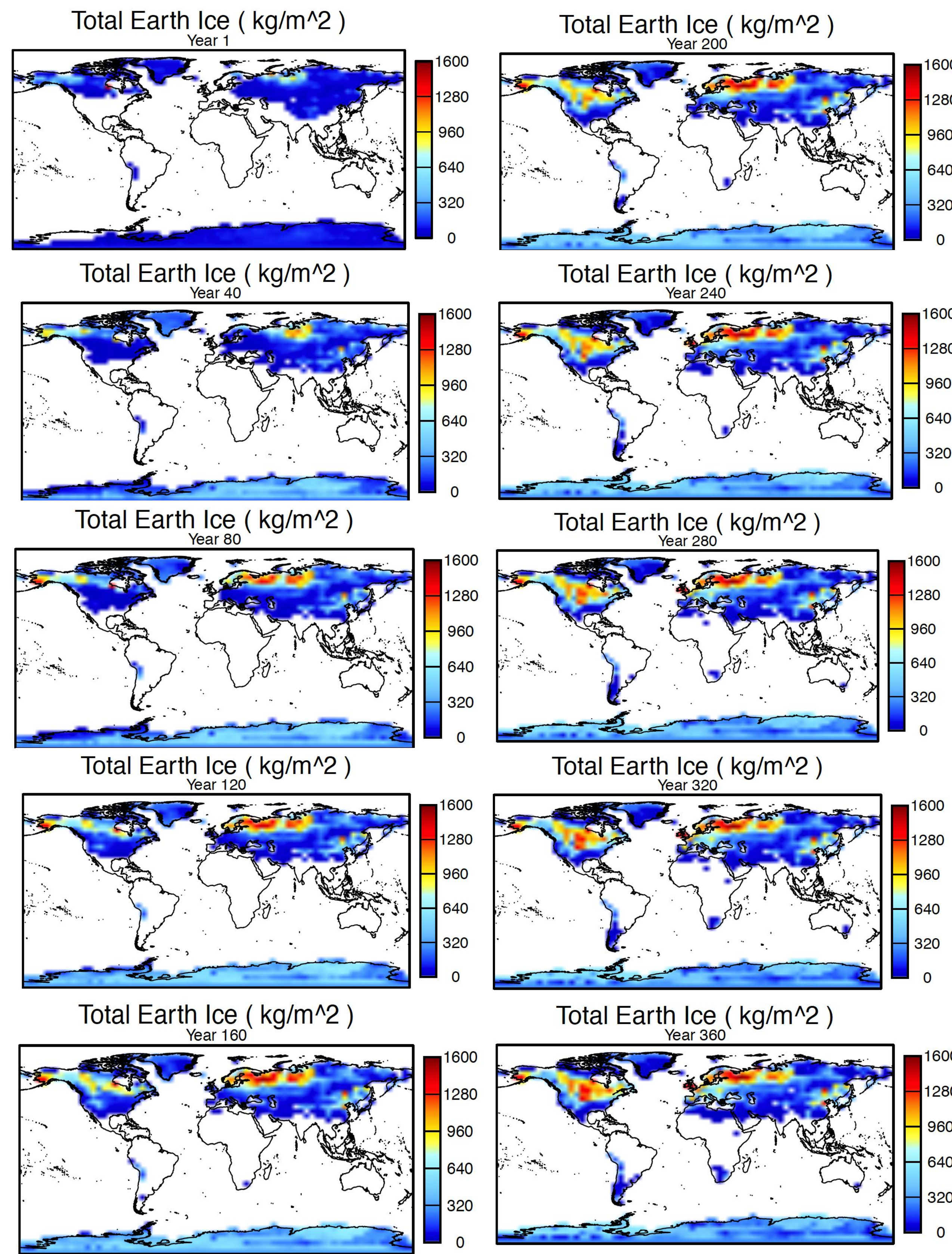
Elizabeth Sultan, [esultan@cedarville.edu](mailto:esultan@cedarville.edu) | Dr. Steven M. Gollmer, [gollmers@cedarville.edu](mailto:gollmers@cedarville.edu)  
Cedarville University Department of Science and Mathematics

## Abstract

Ice ages conventionally have required long periods of time to form, it is hypothesized, however, that the Genesis Flood would have provided conditions triggering an ice age within a few hundred years. This research project compared the output data from a 360-year ModelE2.1.2 run of an ice age simulation, to the geologic record of the last glacial maximum (LGM). The simulation was started with conditions based on Michael Oard's proposed model of the ice age. The outputs were compared to the LGM in ArcGIS Pro. The results showed that the model produced ice age conditions with both similarities and differences to what is observed in the geologic record of the LGM within a few hundred years.

## Methods

This simulation was run based on Michael Oard's ice age model. The key pieces for this model are warm oceans and atmospheric aerosols. These conditions would have been found in the post flood world due to the increase in tectonic activity during the flood. Dr. Steven Gollmer ran the simulation using ModelE2.1.2 by NASA which is a coupled atmospheric-ocean model. The model had simulated 360 years at the time of this project. Dr. Gollmer changed the initial conditions to mimic the proposed post flood conditions by increasing ocean temperatures to 24 C, changing the atmospheric aerosols to 2.0 tau, and removing previous ice coverage to 1/3 the original height to account for isostatic rebound. This project then analyzed the output data, comparing the snow and ice extent to the currently defined last glacial maximum (LGM). This was done by overlaying a GIS map of the LGM with the simulation raster output files in ArcGIS Pro.



Total Earth Ice map at 40-year intervals throughout the model run.

## Discussion

Based on geological evidence such as isostatic rebounding and glacial geomorphology an estimate of the last glacial maximum (LGM) has been mapped. When the geologic LGM was compared to the simulation outputs there were some key features that correlated well while others were missing.

Some key features that correlated well were the glaciation that occurred in high mountains worldwide. This can be seen on the snow and ice coverage map in the Himalayas, and Andes especially. Also, the Laurentide and Cordilleran ice sheets could be outline in the model based on the snow depth and snow and ice coverage maps. Finally, many of the ice-free zones worldwide were predicted in the model. This includes Siberia and some of the ice-free corridor in North America.

There were also several features that did not line up well with what is seen geologically. Primarily, the Total Earth Ice map shows Greenland and northern Canada as mostly ice free, This issue was likely caused by the surface type not being changed for this area after the ice was removed in the initial conditions. This means that the snow was not converted to ice at those locations. The other issue that can be seen is in the total snow and ice coverage map the arctic ocean is completely covered while geologically it is hypothesized that the arctic ocean was too warm to be covered in ice during the LGM.



Map of the Last Glacial Maximum in North America showing the Cordilleran and Laurentide ice sheets.

## Conclusions

This project was able to analyze the output data from a ModelE2.1.2 run of an ice age simulation based on Micheal Oard's post flood conditions. During the simulation run an ice age was produced in a few hundred years that had several correlating features with what is seen in the geological record. More research needs to be done to further refine the inputs and further analysis of the outputs is needed.

## References

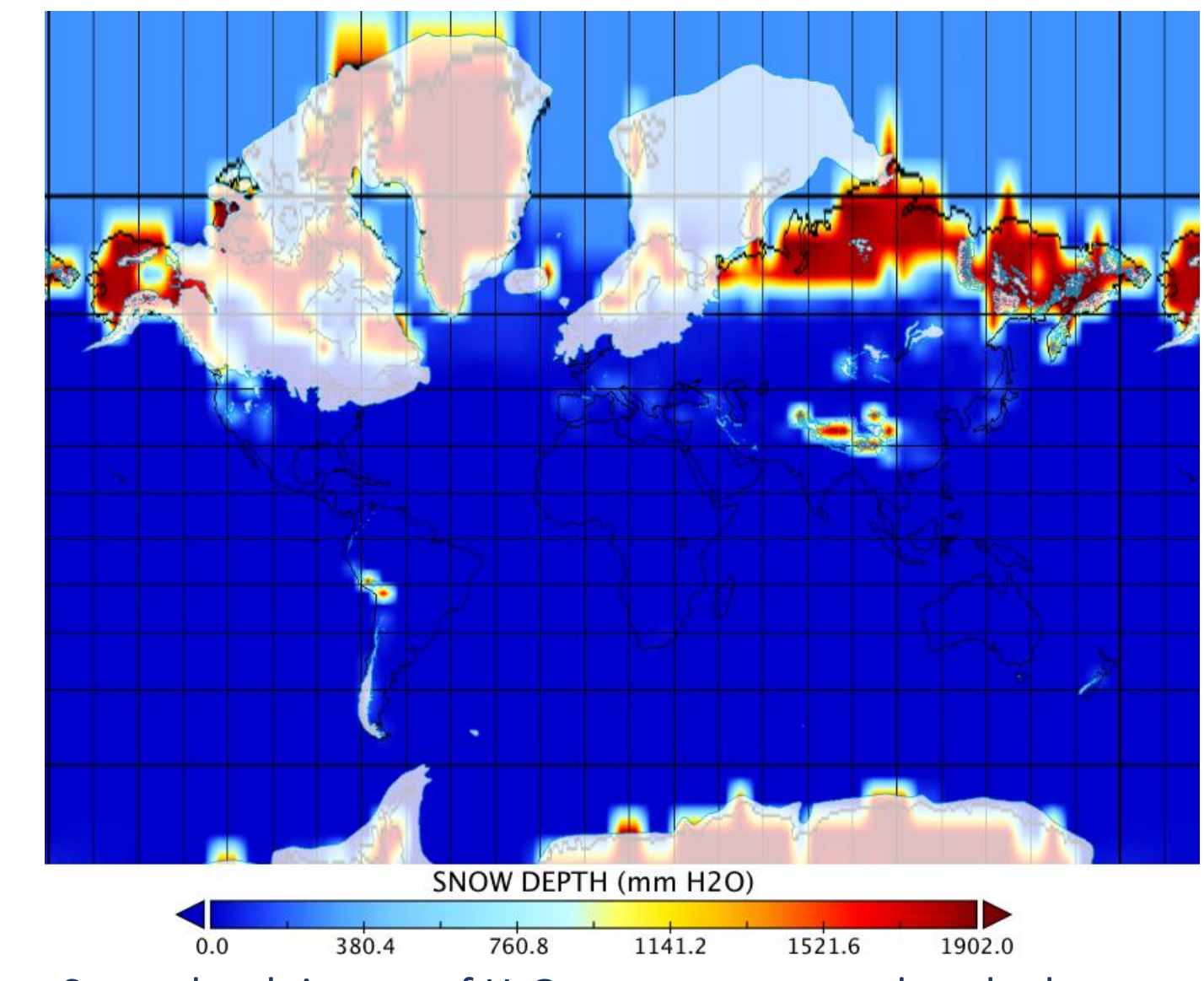
Map of North America showing the extent of late pleistocene glaciati... Map of North America showing the extent of Late Pleistocene glaciati... | U.S. Geological Survey. (n.d.). Retrieved April 12, 2023, from <https://www.usgs.gov/media/images/map-north-america-showing-extent-late-pleistocene-glaciati>

Oard, M. J. (1990). *An ice age caused by the Genesis Flood*. Institute for Creation Research.

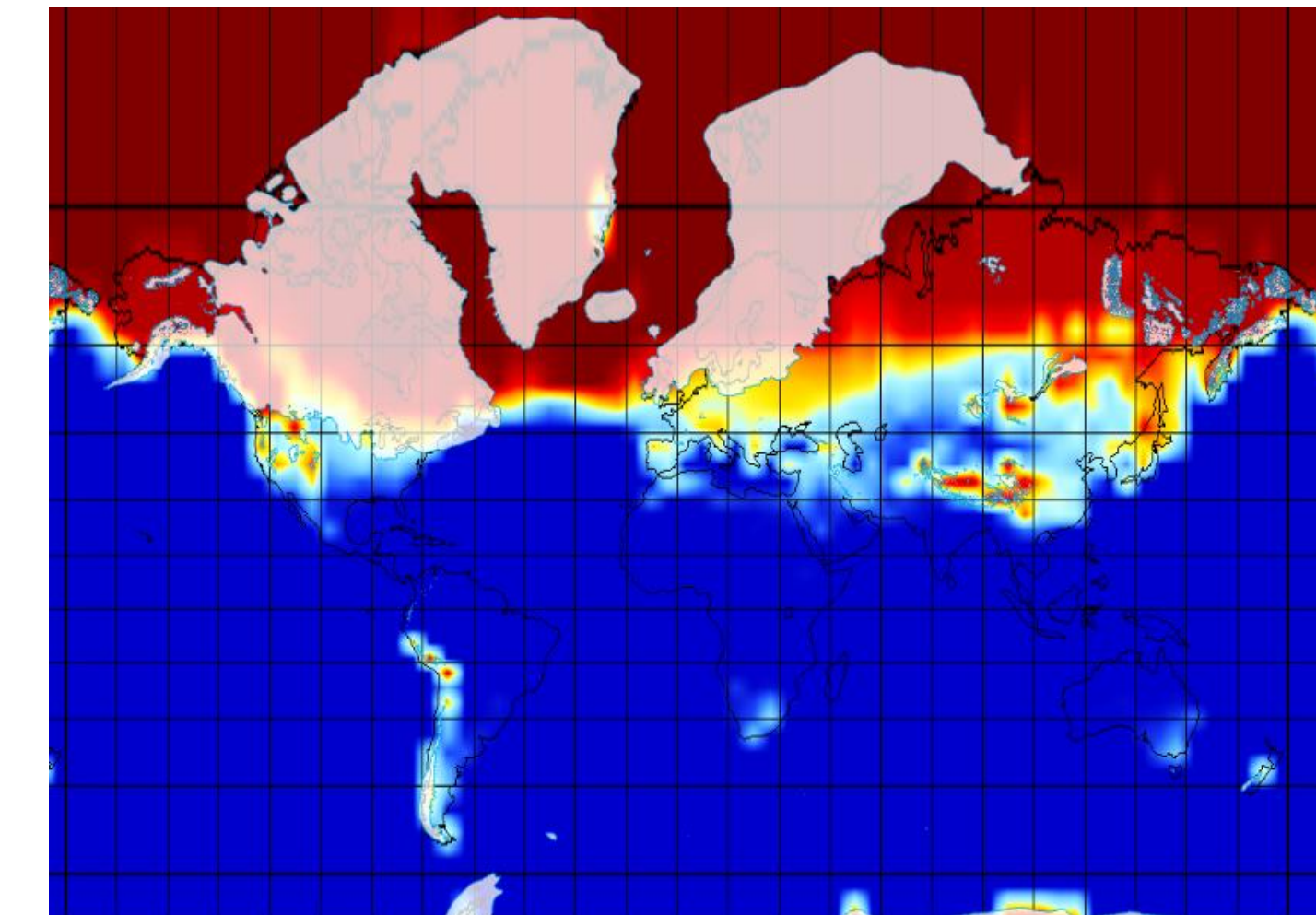
Oard, M. J. (2006). *Frozen in time*. Master Books.

## Acknowledgements

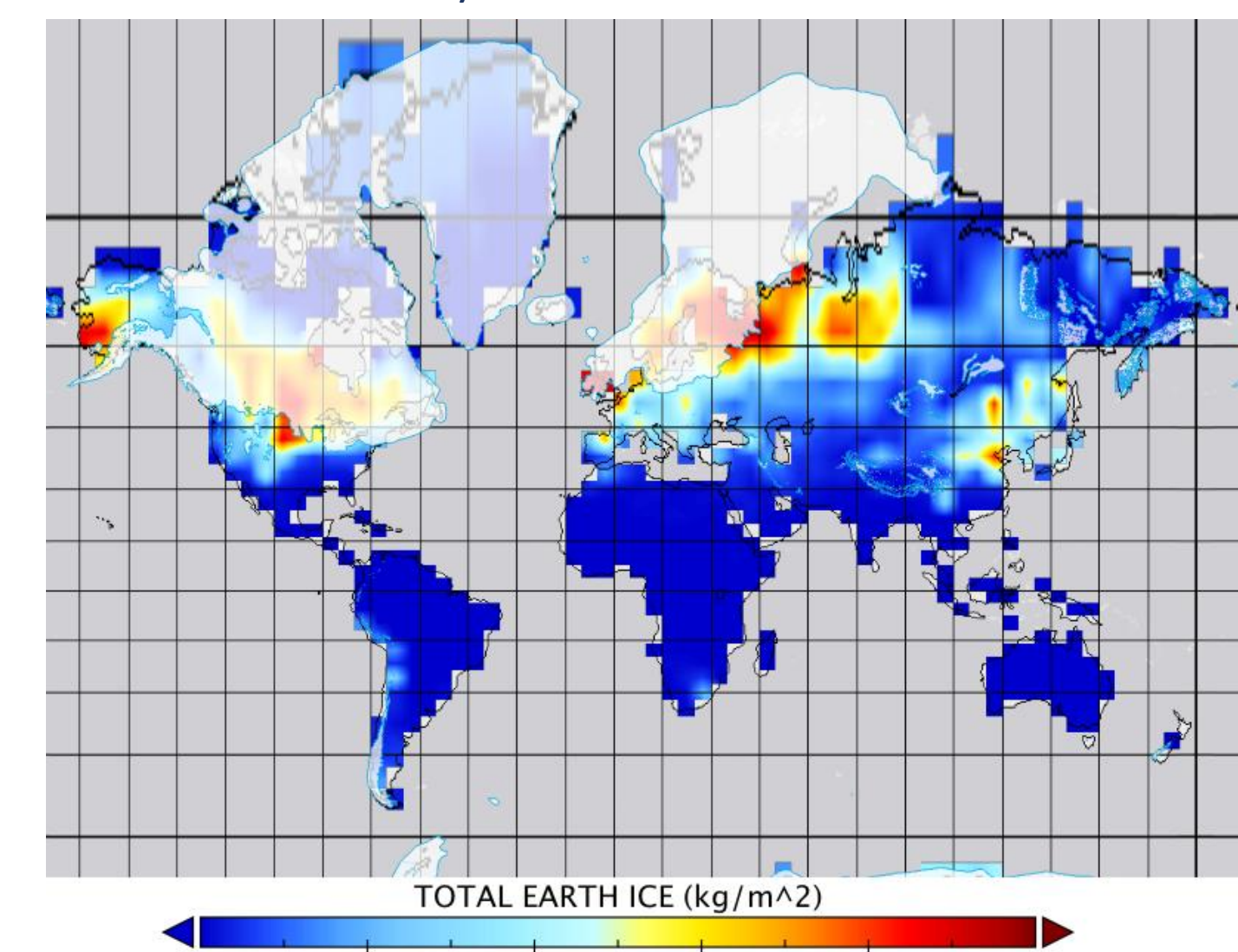
I would like to thank Dr. Gollmer, Dr. Whitmore, and Professor Rice for their guidance. I would also like to thank Mr. Nathanael Davis, and Dr. Gathany for their help in the research process.



Snow depth in mm of H<sub>2</sub>O output compared to the last glacial maximum at model year 360



Snow and ice coverage output compared to the last glacial maximum at model year 360



Total earth ice in kg/m<sup>2</sup> output compared to the last glacial maximum at model year 360



CEDARVILLE UNIVERSITY

9<sup>th</sup> International Conference on Creationism