Ice cores vs the Flood

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Paul H. Seely has sought to rebut creationists' ice-sheet and ice-core interpretations in the December 2003 *Perspectives on Science and Christian Faith*, a journal put out by the American Scientific Affiliation. He primarily challenges my reinterpretation of the 110,000 claimed annual layers in the GISP2 Ice Core from the top of the Greenland Ice Sheet to the depth of 2,800 m and defends the extensive timeframe, claiming independent corroboration by multiple methods. These methods, however, are not independent and are open to significant reinterpretation. The root of the problem is the uncritical acceptance of the uniformitarian paradigm.

A question of starting assumptions

In my articles on ice cores, I reinterpreted the annual layers in the middle and lower portions of the GISP2 core as subannual layers, based on a Flood Ice–Age model, incorporating warm oceans, cooling continents and high levels of atmospheric particulates from volcanic activity.[1–3] Thus, my starting assumptions assume significant climate instability post-Flood and rapid accumulation of snow and ice. In this scenario, annual ice layers would be on the order of metres.

On the other hand, uniformitarians start with an assumption of great age, generally stable conditions and Milankovitch orbital cycles to create ice ages. As a result, uniformitarians are looking for very thin annual layers on the order of centimetres and even millimetres near the bottom of the ice sheet.

The resulting difference in age-interpretation is a result of the starting paradigm; the data is the same and does not speak for itself. What we believe colours what we see.

Dating methods are not independent

Seely superficially analyzes the main methods of counting annual layers.[4] He concludes that my reinterpretation is invalid because the timescale has been corroborated by up to three independent annual measuring methods that agree with volcanic acidity spikes and deep-sea cores:

> 'The first 110,000 annual layers of snow in that ice core (GISP2) have been visually counted and corroborated by two to three different and independent methods as well as by correlation with volcanic eruptions and other datable events.'[5]

However, contrary to what Seely believes, neither the annual layer counting methods nor the external correlation methods are independent, they are all tied to the same starting assumptions of deep time. The 110,000 annual layers are based on the assumptions that the Greenland Ice Sheet has been in equilibrium for several million years and that ice ages oscillate between glacials and interglacials with a period of 100,000 years based on the astronomical theory of the ice age (the Milankovitch mechanism). Equilibrium means that the annual snowfall and height of the ice sheet have remained nearly constant for several million years. All late 'Cenozoic' climatic data sets, including deep-sea cores, must (according to the reigning paradigm) follow this assumed mechanism, which has enumerable problems.[6–10]

The deep-sea core timescale, based on the astronomical theory of the ice age, provides the timescale for ice cores by dating such events as the Younger Dryas and the stage 5e interglacial in the broad-scale oxygen isotope ratios in ice cores. Then glacial flow models are tuned to this scale, *assuming* equilibrium of the ice sheets. The flow model then provides the *first guess* for the annual layer counting. Seely

Modified drilling rigs are used to obtain ice cores.

is aware of this bias, but denies it operates in the counting of annual layers:

> 'Contrary to Oard, the expected annual thickness of the layers down the core does *not* determine what uniformitarian scientists conclude with these latter methods. The truth is exactly the opposite: LLS counting is used to correct the initial estimated thickness of the annual layers.'[11]

LLS (laser light scattering) is a method for counting dust bands by passing a laser beam through the ice. Seely is technically correct, but generally incorrect. He must have misinterpreted my statements because such constraints on annual layer thickness *do determine the general annual layer thickness within certain limits*. I have used the term *first guess* or *estimated* annual layer thickness in my articles on the subject:

> 'Based on their **expected** annual thickness [from flow models], uniformitarian scientists take enough measurements to resolve what they believe are annual cycles.'[12]

In other words, the counted annual layers can deviate a little from the first guess, but the *first guess constrains the limits of variability*. It is like numerical analysis in which a first guess is required to begin and then successive computer iterations change the first guess somewhat to arrive at hopefully the correct answer. For instance, if the first guess concludes that the annual layer thickness at the 2,500-m depth is around 1 cm, annual layer counting will not allow an annual layer thickness of 5 cm, let alone about 3 m as in the creationist model. The variability in the measured parameters and the impact of non-periodic events provide adequate scope to find a preferred fit to the data.

In contrast, in a creationist model, the annual layers in the middle and lower portion of the GISP2 ice core would be subannual layers due to sub-storm, storm or other cycles of weather lasting anywhere from days to months.

To demonstrate that the astronomical theory biases all data sets and that annual layer counts can be adjusted to come close to expectations, all one has to do is read how the count of 'annual' layers below 2,300 m was changed in the GISP2 core. Based on the deep-sea core chronology applied to the Vostok Antarctica ice core, Meese noted that their timescale for GISP2 was off by 25,000 years at 2,800 m depth:

> 'They predicted the age of the ice at 2800 m to be about 110,000 years, 25,000 years older than had been originally counted on the basis of visual stratigraphy.'[13]

The senior author then went back to the laboratory to 'recheck' the visible stratigraphy or dust layers. She discovered that by using a 1-mm wide laser beam in the LLS method instead of an 8-mm wide beam, 25,000 more 'annual' layers of dust were 'discovered' between 2,300 and 2,800 m! One must be especially careful when evolutionary/

Ice cores are retrieved in short sections and transferred from the core barrel to a protective plastic sleeve.

uniformitarian scientists claim 'agreement' between two or more 'independent' dating methods and/or data sets.

Depth hoar from storms

In regard to each annual layer counting method, much could be written to show that Seely misunderstands the methods. Furthermore, he only partially understands the climatic differences between the uniformitarian model and the creationist Ice Age model.[9,10,14,15] I will only briefly discuss the annual layer methods, a more detailed treatment will be provided in a future monograph.[16]

Seely states that surface hoar frost forms only during the summer due to sunshine and fog. However, surface hoar frost is only a minor player in the annual layer method; *depth hoar* is the main marker.[17] Depth hoar develops when a large, vertical temperature gradient causes vapour to sublime, diffuse and crystallize in a layer.[18] This occurs just below the surface, mainly during the summer. However, it has been observed from snow pits that many depth-hoar/wind slab couplets can form each summer.[19–22] Alley and colleagues measured about 15 alternating depth-hoar/finer-grained wind crusts per year in snow pits at the top of the Greenland Ice Sheet.[23,24] These layers were observed to have formed by individual storms.[24] Although considered rare today, winter depth hoar can also form, but it is normally

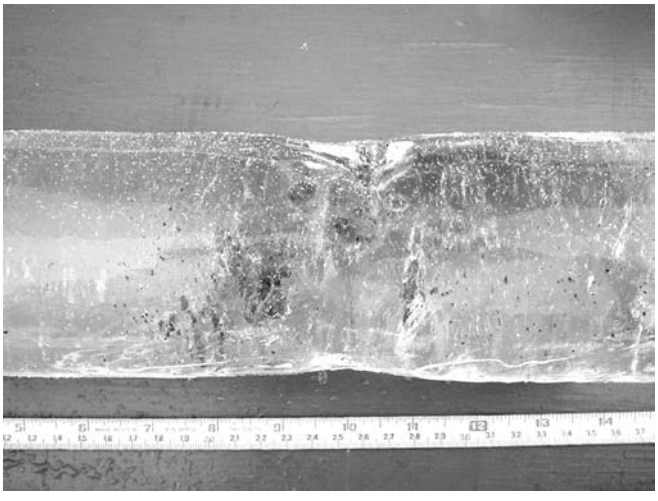
thin and discontinuous.[23,25,26] Storms can cause depth hoar layers if the temperature gradient is sufficient during the changes between warm and cold sectors of storms. These depth hoar complexes, as they are called, can usually be counted as annual layers in the top portion of the GISP2 core. It is more likely that a subannual depth hoar layer, formed by a storm, would be counted as an annual signal if the snowfall were significantly higher in the past, as in the Creation/Flood model for the middle and lower portions of the ice core.[4,16]

Subannual dust layers

Seely makes the claim that dust variations are primarily seasonal, so that every dust band, whether counted visually or by LLS, are evidence for annual layers. Such dust bands are mainly responsible for the counting of annual layers from around 12,000 years to 110,000 years and even older in the uniformitarian timescale of the GISP2 ice core. Although dust bands are generally annual today, this does not mean they were annual in the past. The period between 12,000 and 110,000 years would correspond to the Ice Age—a very dusty period with a unique climate. In the compressed Creation/Flood model with much thicker annual layers during the Ice Age, the dust represents an extremely dusty atmosphere, especially near glacial maximum and during deglaciation. Storms would be very dirty and multiple bands of dust could be deposited on the ice sheet by several mechanisms, such as by dry deposition between storms or during showery periods in one storm. In a high snowfall model, such as the Creation/Flood model, one can find oscillations in dust at almost any frequency, which is demonstrated when Meese and colleagues found 25,000 more annual dust layers using a finer analysis!

Alley admits that subannual events can be produced during one year in all the annual layer methods, storms being one of the mechanisms:

> 'Fundamentally, in counting any annual marker, we must ask whether it is absolutely unequivocal, or whether non-annual events could mimic or obscure a year. For the visible strata (and, we believe, for any other annual indicator at accumulation rates representative of central Greenland), it is almost certain that variability exists at the sub-seasonal or storm level, at the annual level and for various longer periodicities (2-year, sunspot, etc). We certainly must entertain the possibility of misidentifying the deposit of a large storm or a snow dune as an entire year or missing a weak indication of a summer and thus picking a 2-year interval as 1 year.' [27]



Variations in chemical and ash content along the core are assumed to indicate variable atmospheric conditions.

Other misinterpretations

I could go on and on, but will briefly mention a few other misinterpretations in Seely's article. Seely states that volcanic spikes in acidity can be used to check the dating from deep in the ice cores. There are numerous problems relating volcanic acidity spikes as marker horizons. Volcanic history is known accurately to only *200 years*![28] A few large eruptions are known beyond 200 years, but with all the other acidity spikes, it is difficult to match the eruption with an acidity spike in the ice core. It is very difficult to pin a precise date on an acidity peak beyond 2,000 years ago.[29–33]

Seely seems to think that the formation of nitric acid that is picked up by the ECM (electric conductivity method) shows well-behaved seasonal oscillations with a summer maximum. This is only generally true today and the past would be different. Seely assumes that only nitric acid is significant; however ECM also picks up other acids including sulfuric acid.

There are quite a few unknowns and variables associated with atmospheric acidity generation, transport, deposition and locking in the ice.[34] There are many sources for sulfuric and nitric acids, which can vary with time and complicate the seasonal cycle. For instance, the nitrogen cycle in the atmosphere is highly complex with a number of variables affecting the nitrate and nitric acid generation that can end up in the ice:

> 'The atmospheric nitrogen cycle is highly complex and there is a wide range of factors that can affect the nitrate level in polar ice.'[35]

Wolff corroborates:

> 'However, the [nitrate] data are not easy to interpret and we do not have an adequate knowledge of even the present-day sources of nitrate in polar snow, nor of the deposition processes that control the concentrations seen.'[36]

Furthermore, acidity can rarely be applied to the glacial portion of the Greenland ice cores because the significant quantity of dust neutralizes the acid, except in short, dust-free sections.

Uniformitarian assumptions

If one starts with the uniformitarian paradigm, it is easy to see how the various methods appear to be corroborating. However, when one steps back and questions the unspoken

starting assumptions and allows the parameters to vary by the full range available, completely different consistent results can be obtained. This shows the importance of where we start. The Bible claims to be a reliable historical record, and this history from the very beginning was attested to by Christ and the Apostles. Thus, it is a logical starting position from which to create our worldview. On the other hand, belief in deep time may be internally reinforcing, but has no external reference point. Either must be accepted by faith, only one will be right.

It is unfortunate that Seely and others in the American Scientific Affiliation accept man's fallible, continually changing stories about the past rather than God's clear Word.

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References

1. Oard, M.J., <www.answersingenesis.org/docs2001/0704icecores.asp>, 2001.
2. Oard, M.J., Do Greenland ice cores show over one hundred thousand years of annual layers? *TJ* **15**(3):39–42, 2001.
3. Oard, M.J., Are polar ice sheets only 4500 years old? *Acts and Facts Impact 361*, ICR, Santee, **32**(7):i–iv, 2003.
4. Seely, P.H., The GISP2 ice core: ultimate proof that Noah's Flood was not global, *Perspectives on Science and Christian Faith* **55**(4):252–260, 2003.
5. Seely, ref. 4, p. 252..
6. Oard, M.J., Ice ages: the mystery solved? Part I: the inadequacy of a uniformitarian ice age, *CRSQ* **21**(2):66–76, 1984.
7. Oard, M.J., Ice ages: the mystery solved? Part II: the manipulation of deep-sea cores, *CRSQ* **21**(3):125–137, 1984.
8. Oard, M.J., Ice ages: the mystery solved? Part III: paleomagnetic stratigraphy and data manipulation, *CRSQ* **21**(4):170–181, 1985.
9. Oard, M.J., *An Ice Age Caused by the Genesis Flood*, ICR, El Cajon, pp. 15–18, 1990.
10. Vardiman, L., *Sea-Floor Sediments and the Age of the Earth*, ICR, El Cajon, 1996.
11. Seely, ref. 4, p. 256.
12. Oard, ref. 3, p. 41.
13. Meese, D.A., Gow, A.J., Alley, R.B., Zielinski, G.A., Grootes, P.M., Ram, M., Taylor, K.C., Mayewski, P.A. and Bolzan, J.F., The Greenland Ice Sheet Project 2 depth-age scale: methods and results, *J. Geophysical Research* **102**(C12):26417, 1997.
14. Vardiman, L., *Ice Cores and the Age of the Earth*, ICR, El Cajon, 1993.
15. Vardiman, L., *Climates Before and After the Genesis Flood*, ICR, El Cajon, 2001.
16. Oard, M.J., *The Greenland and Antarctic Ice Sheets: A Remnant of a Post-Flood Rapid Ice Age*, ICR monograph (in press), 2004.
17. Alley, R.B. *et al.*, Visual-stratigraphic dating of the GISP2 ice core: basis, reproducibility, and application, *J. Geophysical Research* **102**(C12): 26367–26381, 1997.
18. Sturm, M. and Benson, C.S., Vapor transport, grain growth and depth-hoar development in the subarctic snow, *J. Glaciology* **43**(143):42–59, 1997.
19. Alley, R.B., Saltzman, E.S., Cuffey, K.M. and Fitzpatric, J.J., Summertime formation of depth hoar in central Greenland, *Geophysical Research Letters* **17**(12):2393–2396, 1990.
20. Shuman, C.A. and Alley, R.B., Spatial and temporal characterization of hoar formation in central Greenland using SSM/I brightness temperatures, *Geophysical Research Letters* **20**(23):2643–2646, 1993.
21. Shuman, C.A., Alley, R.B. and Anandakrishnan, S., Characterization of a hoar-development episode using SSM/I brightness temperatures in the vicinity of the GISP2 site, Greenland, *Annals of Glaciology* **17**:183–188, 1993.
22. Shuman, C.A. *et al.*, Detection and monitoring of stratigraphic markers and temperature trends at the Greenland Ice Sheet Project 2 using passive-microwave remote-sensing data, *J. Geophysical Research* **102**(C12): 26877–26886, 1997.
23. Alley, R.B., Concerning the deposition and diagenesis of strata in polar firn, *J. Glaciology* **34**(118):283–290, 1988.
24. Alley, R.B. and Koci, B.R., Ice-core analysis at Site A, Greenland: preliminary results, *Annals of Glaciology* **10**:1–4, 1988.
25. Alley *et al.*, ref. 19, p. 2393.
26. Alley *et al.*, ref. 17, p. 26368.
27. Alley *et al.*, ref. 17, p. 26378.
28. Clausen, H.B. *et al.*, A comparison of the volcanic records over the past 4,000 years from the Greenland Ice Core Project and Dye 3 Greenland ice cores, *J. Geophysical Research* **102**(C12):26707–26723, 1997.
29. Zielinski, G.A. *et al.*, Record of volcanism since 7,000 BC from the GISP2 Greenland ice core and implications for the volcano-climate system, *Science* **264**:948–952, 1994.
30. Grönvold, K. *et al.*, Ash layers from Iceland in the Greenland GRIP ice core correlated with oceanic and land sediments, *Earth and Planetary Science Letters* **135**:149–155, 1995.
31. Meese *et al.*, ref. 13, p. 26413.
32. Cole-Dai, J., Mosley-Thompson, E., Wight, S.P. and Thompson, L.G., A 4,100-year record of explosive volcanism from an East Antarctica ice core, *J. Geophysical Research* **105**(D19): 24431–24441, 2000.
33. Basile, I., Petit, J.R., Touron, S., Grousset, F.E. and Barkov, N., Volcanic layers in Antarctic (Vostok) ice cores: source identification and atmospheric implications, *J. Geophysical Research* **106**(D23):31915–31931, 2001.
34. Legrand, M. and Mayewski, P., Glaciochemistry of polar ice cores: a review, *Reviews of Geophysics* **35**(3):219–243, 1997.
35. Curran, M.A.J., van Ommen, T.D. and Morgan, V., Seasonal characteristics of the major ions in the high-accumulation Dome Summit South ice core, Law Dome, Antarctica, *Annals of Glaciology* **27**:389, 1998. Also see Röthlisberger, R., *et al.*, Nitrate in Greenland and Antarctic ice cores: a detailed description of post-depositional processes, *Annals of Glaciology* **35**:209–216, 2002.
36. Wolff, E.W., Nitrate in polar ice; in: Delmas, R.J. (Ed.), *Ice Core Studies of Global Biogeochemical Cycles*, Springer, New York, pp. 195–224, 1995.

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