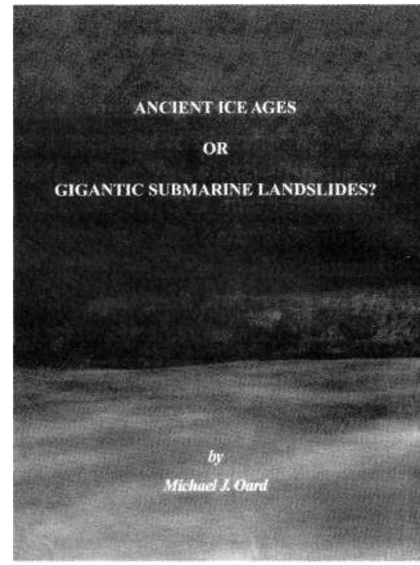
Ancient ice ages or gigantic submarine landslides?



by Michael **J.** Oard,
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130 pages.

Reviewed **by Andrew A. Snelling**

The topic of this monograph is clearly summed up in its title, and its contents live up to expectation. As the author says:

> *'My goal in this book is to examine thoroughly just one geological problem facing the creationist's interpretation of earth history. ... This geological problem is thepre-Pleistocene "ice ages".'* (p 3)

Chapter 1 thus sets out the challenge to creationists of the ancient ice ages claimed by the geological establishment to have occurred millions of years ago in the Permian, Ordovician, upper and mid Precambrian.

Claimed evidences and their problems

What is the evidence for these claimed ancient ice ages? Geologists will usually answer this question by appealing to the present as the key to understanding the past. They use their observations of sediment deposits forming today as an aid in recognising similar sediment deposits among the rock layers. From this they theorize about the agency by, and environment in, which they were deposited.

Today glaciers transport and deposit rock debris from boulders to 'flour'. The resultant unsorted and unlithified material is called *till.* As a glacier moves, it plucks rock debris from the valley floor and walls. The debris is thus concentrated on the sides and base of the glacier. This often abrades the rock pavement beneath leaving behind long scratches and grooves called striations. If the glacier melts, usually in the warmer summer months at its terminal end and at its base, the rock 'flour' is washed out. It is then transported by the meltwater to be deposited as what are known as varves (or laminites). And occasionally icebergs broken off from glaciers or ice sheets will carry boulders and other coarse debris with them some distance. When the ice melts, the boulders, pebbles, etc. are dropped into finer-grained sediments on the ocean or lake floor below. These are called dropstones, and are sometimes found in varves.

So geologists have used their observations of glacial deposits today to identify in the rock record what they believe are ancient glacial deposits and evidences of ancient glacial action — tillites, varves, dropstones and striated pavements. In chapter 2, Oard provides an outline of the history of the recognition of ancient ice ages, beginning with Permian rocks in England. He shows how once the novel idea of a Permian glaciation was established in England, geologists in other countries 'jumped on the bandwagon'. That is, they identified rocks in their countries as part of this same Permian ice age, even if they had to juggle the labelling of rock units to make them Permian.

However, such fine-tuning need not be considered as cheating or the 'reinforcement syndrome', contrary to what Oard supposes, because such adjustments were bound to happen as more field data were collected in remote places. In any case, the resultant correlations on a global scale assist creationist geologists in building their model of global catastrophic processes during the Flood. Once the Permian 'glaciation' was established globally, the evidence rapidly accumulated for the Ordovician, late Precambrian and mid Precambrian ice ages, and rock units initially thought to be of glacial origin that belonged to non-ice-age time periods in the geological column were reclassified as of non-glacial origin. Such is the nature of interpretation in historical geology!

Oard next (Chapter 3) briefly contrasts the rocks and features of these supposed ancient ice ages with those of the Pleistocene (post-Flood) ice age. The tillites (or rather diamictites, a non-generic term) of these supposed ancient ice ages are all probably marine, and are geographically small and commonly thick, whereas those of the Pleistocene (post-Flood) ice age are mostly continental, continentally extensive and comparatively thin. Small random cobbles and pebbles are common in pre-Pleistocene diamictites, whereas Pleistocene glaciers often transported erratic boulders over 1 m in diameter, and megablocks over 1 km^2 in area are known.

Modern and Pleistocene icebergs have been known to carry rocks larger than 5 m across, whereas presumed pre-Pleistocene ice-rafted diamictites contain boulders up to only 40 cm in diameter. There are no fossils associated with pre-Pleistocene 'dropstones', whereas in modern glaciomarine environments, organisms densely cover glacial dropstones. And there are no iceberg plowmarks in the pre-Pleistocene glaciomarine diamictites. Thus the present is not the key to the past in identifying ancient 'ice ages' and their deposits.

The biggest problem for the late Precambrian 'ice age' hypothesis is highlighted in Chapter 4. This is that the paleolatitude data (based on paleomagnetism) for the relevant 'tillites' in Australia, Africa, Canada, Greenland and parts of Europe indicate that they were all at low to equatorial latitudes. Furthermore, limestones and dolomites are frequently associated with late Precambrian 'tillites'. This is problematical for the glacial hypothesis given that such carbonates today form in warm water.

Submarine mass flows can explain these same evidences

Next comes the pivotal section of this monograph. In chapter 5, Oard discusses the characteristics of submarine mass flows, as compared to grain flows, liquified sediment flows and turbidity currents. The deposits produced by the latter are characterised by laminations and graded beds. On the other hand, debris or submarine mass flows transport large boulders, flow rapidly, settle on nearly flat terrain, and can deposit debris over a large area. The resultant deposits have scattered boulders in them that are surrounded by a finer-grained matrix. Thus they mimic the appearance and characteristics of 'tillites'.

Therefore, if 'tillites' appear the same as debris mass flow deposits, then what are the diagnostic features in 'tillites' that have convinced geologists that they were produced in ancient 'ice ages'? Answer — striated and faceted stones, striated bedrock, and varvites (laminated siltstones) containing 'dropstones'. But Oard shows in chapter 6 that striated and faceted stones are not uniquely diagnostic of glacial deposits. Scratches called slickensides, which resemble striations, can be caused by movements on fault and joint planes, and even silt and fine sand grains can striate clasts in debris and mud flows. Then in chapter 7, Oard discusses striated bedrock as a supposed diagnostic feature of glacial action. He finds that mass flows can also cause striated and grooved pavements and can duplicate exotic features on striated bedrock. Even boulder pavements can be produced by mass flows.

Finally, in chapter 8, Oard argues that not all claimed varves are really varves that have formed as annual laminated lake sediments, because varve-like laminated rhythmites can be deposited by turbidity currents. Even in lakes, multiple laminae can form in any one year. Furthermore, he shows that the so-called dropstones could not have been dropped into the laminated sediments at all, because stones dropped from icebergs should have ruptured the laminations. Instead, such stones in claimed varvites must have been emplaced laterally with the enclosing sediments. In any case, erratic stones can be dropped from uprooted tree stumps rather than icebergs, and can be emplaced by turbidity currents and other mass flows.

Specific examples of ancient Ice age' deposits refuted

The 'acid test' is to apply these findings to specific examples. Oard does this in chapter 9 where he examines the mid Precambrian Gowganda 'Tillite', which crops out in three main areas over a 300 km by 400 km section of southern Ontario, Canada. The thickness of the Gowganda diamictite is quite variable, generally ranging from 300 m to 1000 m with a maximum of 3000 m at one locality. The reason the Gowganda Formation is considered to be good evidence of an ancient glaciation is because of impressive outcrops of 'dropstone varvites'. Other diagnostic criteria are present, but these are not as impressive — striated clasts are rare, faceted clasts are only locally common, and only two striated pavements have been found.

Furthermore, there is much scepticism in the literature over the supposed glacial origin of the Gowganda Formation because of abundant evidence in it for mass flow. Ripped up soft sediments, contorted bedding with a variety of ball and pillow structures, load casts and the lens shape of some diamictite bodies are not seen in known glacial deposits. Also, paleocurrent directions in the Gowganda 'Tillite' indicate southward flow, as in the whole of the Huron Supergroup of which the Gowganda is a part. This is totally uncharacteristic of glacial action in the middle of what is a very thick marine sequence. As for the impressive outcrops of 'dropstone varvites', ripple cross-lamination and contorted bedding are reminiscent of distal turbidites, while the 'dropstones' are small, scattered and lacking the expected indentations from being dropped.

Oard discusses (chapter 10) the claimed late Ordovician 'ice age' of northwest Africa. The diamictite in the Sahara Desert crops out as scattered erosional outliers, and its most notable feature is a striated and grooved lower boundary that is said to cover hundreds of square kilometres. 'Dropstone varvites' and striated and faceted clasts are rare. However, the diamictite lies on an exceptionally flat surface over all of the western and central Sahara. This is a truly remarkable phenomenon because no modern or Pleistocene glacier developed on such a large-scale flat surface or maintained one.

Furthermore, the diamictite itself is overwhelmingly sandy with only a few large pebbles, and would otherwise be described as a coarse sandstone (identical to the thin supposed Ordovician 'tillite' outcropping on the top of Table Mountain, Cape Town, South Africa — personal observation), yet no known glacial deposit is predominantly sand. And then the upper boundary is also perfectly flat and overlain by Silurian graptolite-bearing (marine) shales. The paleoflow directions for this supposed Ordovician ice sheet are 'strikingly parallel' towards the north throughout the entire western and central Sahara, which is unlike any modern or Pleistocene ice sheet.

The two formations underlying the diamictite have an identical sandy matrix and a northward paleoflow direction. Finally, the abraded pavement consists mainly of grooves with parallel striations along the grooves, all northerly and remarkably parallel over the entire area! Only a gigantic sediment mass flow could explain all these features.

Card's final example (chapter 11) is the famous Dwyka 'Tillite' of the Permian 'ice age' of South Africa. Covering an area of 600,000 km^2 at the base of the Karoo Basin sequence and up to 800 m thick, the Dwyka Tillite' sits directly on some of the most beautifully striated, grooved and polished pavements, with special glacial-like markings occasionally embellishing them. 'Dropstone' rhythmites, faceted and striated clasts, U-shaped valleys and boulder pavements all add to what appears a truly impressive case for a Permian 'ice age'.

This was originally thought to be a terrestrial deposit, the evidence of mass flow, particularly in the stratified diamictites and mudrocks that make up half the Dwyka.

However, marine microfossils in interbedded mudrocks and arthropod trackways and fish trails with the Dwyka, plus the Dwyka's geochemistry, together indicate a marine depositional environment.

Indeed, the evidence for mass movement is ubiquitous in the Dwyka — diamictites grade into rhythmites in the same way as debris flow deposits grade into turbidites, arenaceous diamictite forms part of a continuous spectrum grading from conglomerate to sandstone and siltstone, and the texture of the 'tillite' resembles non-glacial mass flow debris from other regions of the world.

The Dwyka also displays large-scale uniformity with several facies that stretch laterally for hundreds of kilometres; thin beds, stringers and lenses of carbonate within the Dwyka, plus recently-discovered thin bands of phosphorite, indicate warm water conditions; and a close association with fossil plants and coal are all uncharacteristic of an 'ice age'. And finally, Oard discusses the evidence that the Dwyka abraded pavements and the features associated with them fit a mass flow hypothesis.

A fitting conclusion

To draw his discussions together to a fitting conclusion that achieves his stated objective, Oard's final chapter (chapter 12) presents the case for gigantic submarine landslides during the Genesis Flood. Oard rightly points out that the thick sediments deposited catastrophically during the Flood would have been unstable. Therefore huge earthquakes and massive Flood tectonics would have commonly mobilised large landslides and submarine mass/debris flows. Thus huge Flood diamictites would have been deposited on nearly flat basin bottoms. This is a feature of the diamictites that have been touted as deposits of pre-Pleistocene 'ice ages'. Indeed, Oard maintains that Flood-generated landslides would have duplicated the unusual features of these diamictites. In other words, huge landslides mimic the diagnostic features of these pre-Pleistocene 'ice age' deposits.

To 'wrap up' his analysis, Oard briefly returns to the three key examples he discussed in-depth to paint the Flood scenario for deposition of each with their distinctive features, before making some concluding comments.

An appraisal

I can heartily recommend this monograph to any creationist with more than a passing interest in this topic of the alleged geological evidence for ancient 'ice ages'. Though once a serious challenge to creationists, this geological 'evidence' is now firmly countered, thanks to this extensive research by Mike Oard.

The monograph comes with a helpful glossary, which should make it readable for those who consider they don't have adequate geological knowledge. It is clear that countless hours of research have gone into this monograph, as attested by the extensive bibliography.

However, while we can applaud the Creation Research Society for publishing this monograph, the production needs improvement. There are far too many typographic errors, probably due to failure of electronic codes in the typesetting procedure. Also, while the many photographs are very helpful, their reproduction in many cases is very poor, so that some of them appear to be out of focus. I hope that the next print run will eliminate these unfortunate irritations.

Those brickbats aside, this is an excellent piece of literature research. However, lest we think this challenge has now been dealt with so that we can put it to one side, I hasten to counsel that this monograph should only be viewed as a beginning, or even just an introduction. What is needed now is for extensive in-depth field-oriented research on each of these pre-Pleistocene 'tillites', so that the contrary evidence is fully documented in an irrefutable case for submarine debris/ mass flows during the Flood.

But a warning is in order. In an aside on pages 3-4, Oard cautions that the geological 'periods' of the geological 'time scale' are 'theoretical' and 'highly questionable'. By this I hope he is **only** rejecting the millions of years imposed on the geological column, because the latter is neither theoretical nor highly questionable as the observable rock layers making up the record of Earth history. By all means we must reject the millions of years, first and foremost on the basis of the Scriptures. But let's remember that there is a physical rock record called the geological column which is the very data we observe as testimony primarily to the Flood, but also to other biblical events.

I'm sure this monograph will enjoy a long reign as a benchmark publication on this topic in the creationist literature. I have only scantily summarised large chunks of digestible information, so be sure to get your copy and enjoy being armed with the ammunition to repel the critics of Flood geology. Hopefully, this solid foundation will be built on with further creationist research.