

# Only one glaciation observed in western Alberta, Canada—the ice-age reinforcement syndrome

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For about 60 years, from about 1910 to 1970, it was claimed that there were four global ice ages, give or take one.<sup>1</sup> This notion first arose with the recognition of four gravel layers in river valleys along the north slope of the Alps in Europe by Penck and Brückner in the late 1880s. These were correlated with the four ice ages believed to have occurred in America's Midwest. This correlation thus established the 'four ice ages' paradigm, which was reinforced with locations from all over the world that consistently claimed four ice ages.

It was once postulated that there were up to four glaciations in Alberta, based on deposits in river valleys and assuming the chronology in the US Midwest.<sup>2,3</sup> Since the ice is believed to have propagated from the same source area, the Laurentide Ice Sheet centred over Hudson Bay, ice is believed to have covered all of Alberta about four separate times just as previously thought for the Midwest.

However, all that changed with the acceptance of the astronomical theory of the ice ages in the 1970s. Uniformitarian scientists went from believing in four to accepting dozens of ice ages.<sup>1</sup> It is now assumed there were about 50 ice ages of various intensities based on deep-sea cores

during the past 2.6 million years of the Pleistocene within evolutionary/uniformitarian time.<sup>4</sup>

For instance, Stalker originally interpreted the data in Alberta as representing four ice ages.<sup>5</sup> However, once the astronomical theory of ice ages was accepted, and geologists concluded that there were many more than four ice ages, Stalker saw many more than four in his later papers. At a site near Pincher Creek, he summarized 26 tills of which most were of minor significance but 9 or 10 were supposedly major ice ages:

"The rest of the sequence consisting of till sheets with interfingering beds of alluvial and lacustrine sand, silt, and clay, is divided into fifteen units, nine or ten of which represent separate Laurentide ice advances."<sup>5</sup>

However, Jackson *et al.* pointed out:

"In this regard, Stalker commonly failed to clearly separate observation and interpretation. He routinely described glaciogenic diamictons as till with each serving as evidence for a separate glaciation. ... This led to his conclusion that there is widespread evidence of multiple glaciations throughout southern Alberta (rather than only in the eastern part of that region as we argue below). ... evidence for up to four glaciations were purported to be recorded by some sections such as the Brocket Section near Pincher Creek Alberta."<sup>6</sup>

In other words, both the 'four ice ages' and Milankovitch paradigms are classic cases of the reinforcement syndrome<sup>7</sup> that is ubiquitous within earth science.<sup>8</sup>

## One late Wisconsinan ice sheet over most of Alberta

However, it is becoming obvious that there was just one glaciation of the Laurentide Ice Sheet in western Alberta, occurring in what is

called the late Wisconsinan in the secular timescale.<sup>9-13</sup> Jackson *et al.* summarized the new information:

"Jackson and Little (2004) concluded that the last glacial maximum (LGM) was the only time that the Rocky Mountain Foothills of Alberta, Canada were glaciated by a *continental* ice sheet [emphasis original]."<sup>14</sup>

In fact, it was actually recognized back in 1961 that the glacial debris in Alberta generally showed one ice age and it was an assumption that there was more than one:

"Although it is generally recognized that Alberta has been glaciated more than once, no buried soils or other evidence of any long period between glacial deposits have been found."<sup>15</sup>

## Evidence for multiple glaciations can be explained by one ice age

But what about the apparently non-glacial sediments between till sheets that reinforced multiple glaciations? Jackson *et al.* showed that stacked till sequences in southern and central Alberta can be explained by one ice age:

"They [Jackson and Little, 2004] showed that stacked till sequences in this region can be related to belts of moraine and glacial limits dated to the *last* (Late Wisconsinan) glaciation ... . It has also been documented in northern, central and south-central Alberta by radiocarbon dating or organic material in preglacial gravels underlying a single continental till in those areas."<sup>14</sup>

They go on to say that sand between till sheets can be deposited in one glaciation and that shearing at the boundary can cause multiple stacked till sheets with other deposits between.

Multiple layers of glacial till have been observed to form in Iceland. For instance, Evans and Twigg state: "Stationary glacial margins in

Iceland are capable of superimposing numerous till layers to produce large composite moraines ...”<sup>16</sup>. Multiple till layers can be also formed by thrusting till up and over other layers, or mass wasting of debris from within or on top of the glacier onto previously deposited till.

### Multiple ice ages mainly an assumption

The history of ice-age interpretation in western Alberta provides an instructive lesson: the idea of multiple glaciations has mostly been based on an earlier assumption:

“Glacial reconstructions commonly assume a multiple-glaciation hypothesis in all areas that contain a till cover. On the basis of demonstrated multiple events in the American Midwest, this assumption has been reasonable in Alberta Quaternary stratigraphic research [emphasis added].”<sup>17</sup>

Nevertheless, the authors tried to justify their assumption of multiple glaciations by pointing to the ‘demonstrated’ four ice ages in the American Midwest.<sup>18</sup> However, even the Midwest chronology has come under renewed scrutiny since the 1970s, probably because of the influence of the astronomical theory of the ice ages.<sup>19–21</sup>

Despite assumptions still used in interpreting the ice-age debris, especially the dozens of ice ages now assumed by the astronomical theory of the ice ages, the actual physical evidence shows there was only one ice age on the continents, consistent with the ice age model based on biblical history.<sup>22</sup>

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