Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01728, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01728
EGU General Assembly 2008

The proximal cause of glacial terminations

E.W. Wolff
British Antarctic Survey, Cambridge, UK (ewwo@bas.ac.uk)

Approximately every 100 ka, Earth enters a period of exceptional warmth in both hemispheres, which is accompanied by deglaciation for the large northern ice sheets. The literature is almost unanimous in ascribing this change to orbital variations, but is much more fragmented in explaining the details of how this leads to the observed timing of warming. There are also conflicting discussions about whether warming is led from the north or the south. In fact warming of Antarctica and the Southern Ocean is not restricted to the terminations. It was recently shown that each Dansgaard-Oeschger (D-O) event has a southern counterpart, known as an Antarctic Isotopic Maximum (AIM). The amplitude of the AIM appears to be related to the length of the cold part of the D-O cycle, and at least for the larger AIMs, the D-O warming occurs at the maximum of southern temperature (EPICA Community Members, 2006). This finding can be stated in a different way: there are numerous periods when the south is warming, and it appears to be the occurrence of a D-O warming that reverses the southern increase. At glacial terminations, warming in the south also commences at a very similar rate to that seen for AIM, and is accompanied by similar changes in other measured parameters. The difference is that no D-O event occurs, so warming of the south simply continues. In most terminations, it continues until full interglacial conditions are reached. In Termination I, the warming is reversed by the northern Bolling warming, but it is too late: amplifiers such as CO_2 have already reached a level at which termination is inevitable. If this interpretation is correct, then the proximal "cause" of deglaciation is the inability of the system to produce a D-O event. We can also start to understand why there is confusion about the roles of north and south, because the warming (as indeed each AIM warming) is led from the south, but it is most likely the conditions in the north that allow it to proceed unchecked.