Numerous observations in different areas have testified to the frequent oscillations of the glaciers during the Ice Age. The glaciers appeared to have frequently retired, and ice-fields to have diminished in size as often as any amelioration in climatic conditions set in. Such variations may be observed in ice-clad regions at the present day. And as the liquefaction of the ice-masses gives rise to larger volumes of water, the frequent local floods, of which evidences are afforded in the intercalation of fluvio-glacial deposits within the glacial series, are thought to have been associated with periodic oscillations.

Two main advances of the mountain glaciers and of inland ice were determined by Ramsay for the British Isles and by Heer for the Alps, and have been confirmed by Scandinavian and German geologists upon the evidence of the glacial and fluvio-glacial deposits in their respective countries. In all these areas a prolonged interlude of milder climatic conditions appears to have intervened between two chief epochs of glaciation. But Professor Penck in recent papers has augmented the number of distinct epochs of glaciation in the Alps and North Germany to three or four, thus approaching the "five" glacial intervals enumerated by Professor James Geikie, and the "seven" by James Croll. On the other hand, Holst in Norway, Upham and Wright in North America, and many other authorities recognise only one Ice Age, marked by occasional seasonal or periodic variations of no great significance in the dimensions of the glaciers and inland ice.

It is still more doubtful whether geologists have been right in supposing that several Ice Ages occurred during geological epochs previous to the Diluvial Age. Ramsay, in 1855, explained certain Permian conglomerates in England as accumulations transported by glacial action, and Dr. Blanford applied a similar explanation in 1856 to the "Talchir" conglomerates of almost the same geological age in Central and Southern India. It then became commonly accepted that extensive glaciation had occurred in the Permian geological epoch. Erratics and scratched pebbles have since been described from the Silurian rocks in the southern counties of Scotland by Moore and James Geikie, and also in the Old Red Sandstones or Devonian rocks of Scotland by Ramsay.

The Miocene conglomerates in the neighbourhood of Turin were explained by Ramsay, Lyell, and Gastaldi as material