David Pannett's History of Bicton part 143

More on Climate

In between issues of Brexit and the behaviour of celebrities, the topic of 'climate change' continues to attract media attention. We have also discussed it here in these pages several times over the last ten years and, perhaps in the spirit of those BBC repeats, we could say it all again for those who may have forgotten or who have recently arrived.

In particular, we tried to point out that so much current discussion (and demonstration) fails to put the present situation in its wider geological and historical context. The significance of population growth to any man-made contribution to climate also gets glossed over.

Our local rocks accumulated in different climatic zones as our continental plate drifted north, so that, for instance, our church is built of sand and gravel originating in a tropical desert. However, this must not be confused with 'global' climate change going on at the same time, which owes much more to 'greenhouse' gases in the atmosphere.

The long term 'carbon cycle' in geological history involves volcanoes pumping out carbon dioxide, with organic activity and chemical weathering of exposed rocks locking it up or washing it into the sea as carbonate sediments. Thus, during those periods when great continents were splitting, more was produced than was consumed, so that excess CO_2 warmed the Earth. Then, as continents collided, forcing up mountain chains such as the Himalayas, the situation was reversed. Now, thanks to such mountain chains the Earth is experiencing a 'cool' phase with reduced CO_2 in the atmosphere.

Towards the end of that earlier, warmer period, 55 million years ago, when the northern end of the Atlantic started to split open, particularly powerful volcanic activity occurred in the north west of Britain and Greenland producing enough CO_2 to bring tropical climates to northern Europe. In Antrim, soils which developed between successive lava flows preserve evidence of tropical plants, while in southern England and nearby France, some areas of sandy soils experienced temperatures and humidity high enough to dissolve silicon at the surface, which was washed down and concentrated at lower levels. Today, tourists visiting the famous Giant's Causeway lavas or Stonehenge, whose big stones are relics of that concentrated silica, may not realise their climatic connections.

By 40 million years ago, the weathering on the new mountain chains from the Alps to the Himalayas started to cool the Earth again as it consumed the CO_2. While all this was going on, variations to the Earth's orbit and angle of tilt had always been causing regular variations in the solar heat reaching us, but a warm Earth would hardly notice them. Now, however, they became critical, allowing ice to accumulate at the poles. Such reflective ice surfaces then caused even greater cooling, exaggerating the initial variations in solar input, which now drove a succession of Ice Ages. Ice sheets spread over part of North America and North West Europe leaving landscapes such as we are familiar with in Bicton.

Clues provided by marine sediments suggest that the last 4 million years have been 80% cold and only 10% mild, so that we may be already over half way through our current 'interglacial' ration.

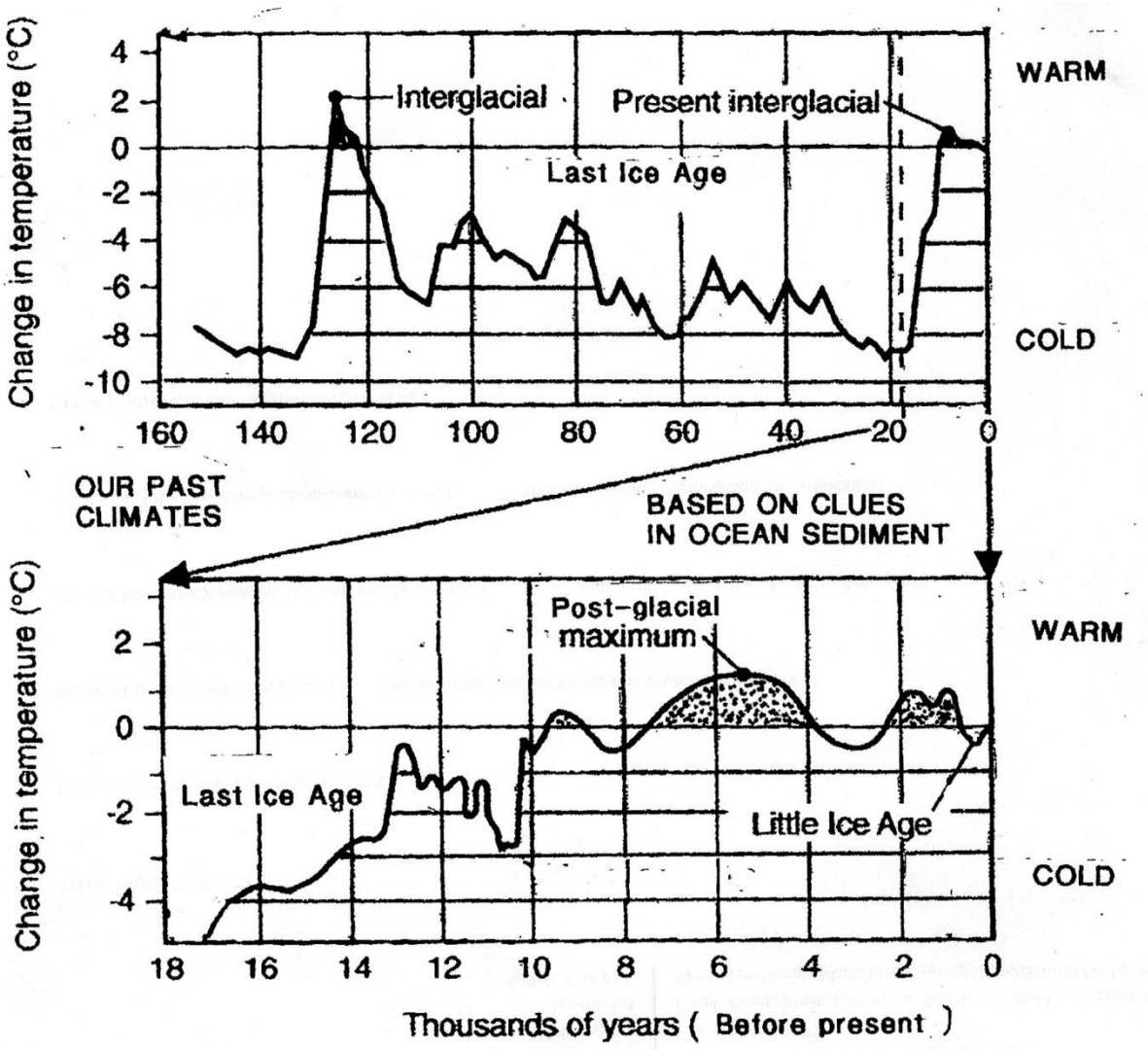
In some ways it is easier to understand the growth of ice sheets that it is to explain their sudden departure. Again CO_2 concentrations could provide the mechanism since, while a cold restricted chemical weathering and biological activity, volcanoes continued to 'do their bit'. Eventually, the 'greenhouse' effect took over, helped by the bare ground absorbing more heat once clear of ice and snow. Once frozen methane may have also escaped to add to that 'greenhouse' effect. Abundant meltwater thus created new valley systems across the glacial deposits, as seen in our local area.

Thanks to these 'greenhouse' gases, temperatures actually rose higher than today's, after the last glaciations, but vegetation and normal rock weathering soon got to work reducing them.

From now on minor fluctuations continued as human history unfolded. The Bronze Age, for instance, was mainly warm and dry in Europe, but the following Iron Age tended to be cooler and wetter. Later, in the Middle Ages there was another warm period, when Vikings could even colonise Greenland. From the fourteenth century, however, the 'Little Ice Age' brought famine, the plague and advancing glaciers in the Alps, which built moraines from which they can now be seen to be retreating. The question is, are we now getting any warmer than that earlier medieval period or Bronze Age?

Throughout all this story of cyclic change, the unexpected have played a part in providing 'short, sharp shocks' to the system and human history: super-volcanoes and even 'heavenly' bodies filling the atmosphere with dust and sulphur.

There is a lot more which could be said about these 'events' some other time but, for the moment, just think what advice Corporal Jones might have given: 'Don't panic, the Earth has seen this all before'.


Change in temperature (°C)
4
2
0
-2
-4
-6
-8
-10
Interglacial
Present interglacial
Last Ice Age
WARM
COLD
160
140
120
100
80
60
40
20
0
OUR PAST CLIMATES
BASED ON CLUES IN OCEAN SEDIMENT
Change in temperature (°C)
2
0
-2
-4
Post-glacial maximum
Last Ice Age
Little Ice Age
WARM
COLD
18
16
14
12
10
8
6
4
2
0
Thousands of years (Before present)