Carbon cycle was already disrupted millions of years ago

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Dutch researcher Yvonne van Breugel analysed rocks from seabeds millions of years old. Carbon occurs naturally in two stable forms; atomic mass 12 (99 percent) and atomic mass 13 (1 percent). Episodes in the Jurassic and Cretaceous periods were characterised by a relatively strong increase in 12C. The analyses have shown that this was caused by a sudden large-scale release of carbon from stocks stored in the ocean floor or peats and bogs.

The atmospheric carbon dioxide concentration is increasing as a consequence of the large-scale use of fossil fuels in the industrial era. This has apparently brought about a stronger relative increase in the light carbon isotope 12C. Due to this the ratio of the stable carbon isotopes 13C/12C has show a clearly measurable decrease of 0.1%. However in the Jurassic and Cretaceous periods, 180 and 120 million years ago, there were periods with a shift four times as large in a period of just several tens of thousands of years. Where did all of that light carbon suddenly come from?

Van Breugel investigated chemical fossils of marine algae and land plants from sediments deposited in the aforementioned periods. Plants and algae assimilate CO_2 from the air and water. Consequently changes in the isotope ratio are recorded in organic material. These chemical fossils have been well preserved because large parts of the oceans in the Jurassic and Cretaceous periods contained little (if any) oxygen.

In sediment cores from various widely-separated areas Van Breugel

found a 0.4% decrease in the 13C/12C ratio. This means that there were large-scale changes in the carbon cycle over a short geological timescale of several tens of thousands of years. From the results Van Breugel deduced that large quantities of 12C in the form of CO_2 or methane were suddenly released into the atmosphere.

This could have been the result of methane being released from gas hydrates which were buried in the ocean floor. It is not clear which mechanism was responsible for this. Methane could also have been formed under high pressure in coal seams and then subsequently released upon coming into contact with magma. A third option is that carbon from organically-rich sediment came into contact with hot magma. As a result of this the organic molecules combusted into CO_2 and water.

Source: NWO