# Evidence of Pliensbachian climatic hot snaps and organic matter production and preservation in the Lusitanian Basin (Portugal)

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The Late Pliensbachian is currently regarded as a generic cool interval in the Pliensbachian Stage. We belive that there is compelling evidence that short lived extreme warming events - hot snaps - conditioned organic matter production and deposition in the Lusitanian Basin.

We suggest that the basin-wide black shale events observed in the early Late Pliensbachian series of this basin, corresponding to widespread mucilage and microbial outbreaks, are contemporaneous of a worldwide organic matter preservation interval and were driven by extreme climate warming coupled with high oceanic productivity and intermittently stratified epeiric seas. Regionally, these hot snaps promoted the rapid but short-lived expansion of Tethyan ammonites into Boreal domains or led to decrease benthic diversity. Ensuing cooling during the Margaritatus Chronozone was accompanied by southwards influx of northwards ammonite fauna or radiation of cyst forming dinoflagellates.

Worldwide preservation of organic matter during the Late Pliensbachian may have resulted in decreased atmospheric $CO_2$ levels through geological storage of carbon, triggering and/or amplifying the Spinatum Chronozone icehouse event. This may have contributed to the occurrence of permafrost and/or methane gas hydrates in locations easily disturbed by the subsequent Early Toarcian warming, or/and volcanic activity driven by crustal unloading due to deglaciation.

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