New insights into environmental conditions for the Early Jurassic Toarcian Oceanic Anoxic Event from boron and lithium isotopes

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The current anthropogenic progressive climate warming will have an effect on the marine system with ocean acidification and deoxygenation being two of the main stressors. Ocean acidification is caused by the ocean's absorption of CO_2, hence the rising amounts of this greenhouse gas in the atmosphere will lead to a more acidic ocean. The lower pH value of the seawater in turn is corrosive for calcifying organisms and induces their disappearance.

During the Early Jurassic Toarcian Oceanic Anoxic Event (T-OAE, ~183 Mya) acidification of the surface oceans is assumed to be one of the proposed extinction mechanisms, propably linked to the massive and rapid release of CO_2 from the intense volcanic activity of the Karoo-Ferrar Large Igneous Province. The T-OAE is also related to higher atmospheric temperatures, leading to an increase in continental weathering, which favoured a rise in organic productivity in the oceans and finally resulted in the critical phenomena of the oceanic anoxic event. However, enhanced silicate weathering is also a process that draws down the amounts of CO_2 in the atmosphere, helping to terminate the anoxic state of the oceans.

To document changes of seawater pH and weathering conditions for the T-OAE we present a new high resolution boron and lithium isotope profile from the marine carbonate record of the Rabaçal section in Portugal (Lusitanian Basin).