Geophysical Research Abstracts
Vol. 14, EGU2012-13092, 2012
EGU General Assembly 2012

The uses of charcoal to reconstruct fire history in deep time.

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Fire and combustion have been an integral part of the Earth system for over 400 million years (Scott and Glasspool, 2006; Bowman et al, 2009) and are now an integral part of our industrial world (Bowman et al., 2011). Studying fire and fire events has significant practical application yet fire science is a discipline still with many unanswered questions. Macroscopic charcoal provides an important indicator of past fire events and yields information not only on the occurrence of fires but also on the identity of the plants that have been burnt, as well as on fire temperature (Scott, 2010). There is an intimate link between fire and the evolution of atmospheric oxygen (e.g. Glasspool and Scott, 2010) and the fact that fire can be intimately linked to sedimentation events means that it has a more important role in deep time Earth systems processes than has been fully appreciated. However, much research still needs to be undertaken, across a range of modern ecological settings, to permit a better understanding of the distribution of charcoal in the fossil record and what it implies for our interpretation of past fire events (Scott, 2000, 2010; Glasspool and Scott in press). Until more data is collated on the generation and subsequent incorporation of charcoal into the sedimentary environment it is unlikely that we will be able to comment comprehensively on the scale, nature and frequency of past fires and so their impact on atmospheric evolution or the development of Earth system processes.

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