



Pre-lithification tectonic foliation development in a clastic sedimentary rock sequence from SW Ireland

Patrick Meere (1), Kieran Mulchrone (2), and David McCarthy (3)

(1) School of BEES, University College Cork, Ireland., (2) School of Mathematics, University College Cork, Ireland., (3) British Geological Survey, Edinburgh, Currie EH14 4AP, UK

The current orthodoxy regarding the development of regionally developed penetrative tectonic cleavage fabrics in sedimentary rocks is that it postdates lithification of those rocks. It is well established that fabric development under these circumstances is achieved by a combination of grain rigid body rotation, crystal-plastic deformation and pressure solution. The latter is believed to be the primary mechanism responsible for the domainal nature of cleavage development commonly observed in low grade metamorphic rocks. While there have been advocates for the development of tectonic cleavages before host rock lithification these are currently viewed as essentially local aberrations without regional significance. In this study we combine new field observations with strain analysis, element mapping and modelling to characterise Acadian (>50%) crustal shortening in a Devonian clastic sedimentary sequence from the Dingle Peninsula of south west Ireland.

Fabrics in these rocks reflect significant levels of tectonic shortening are a product of grain translation, rigid body rotation and repacking of intra- and extra-formational clasts during deformation of an unconsolidated clastic sedimentary sequence. There is an absence of the expected domainal cleavage structure and intra-clast deformation expected with conventional cleavage formation. This study requires geologists to consider the possibility such a mechanism contributing to tectonic strain in a wide range of geological settings and to look again at field evidence that indicates early sediment mobility during deformation.