Geophysical Research Abstracts, Vol. 8, 08399, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08399

Dating of Variscan deformation in southern Ireland

M. Ennis (1), P . A. Meere (1) and M. J. Timmerman (2)

(1) Department of Geology, National University of Ireland, Cork, Ireland, (2) Institut für Geowissenschaften, Universität Potsdam, Postfach 601553, 14415 Potsdam, Germany.

The study area in southern Ireland lies within the Upper Palaeozoic Munster Basin, a major intracratonic half-graben which was initiated in the middle Devonian. This basin was rapidly filled with Devonian Old Red Sandstone sediment and small volumes of igneous material, with sediment thickness reaching in excess of 6km in certain areas. A smaller fault-bound structure, the South Munster Basin, was superimposed on this largely alluvial basin at the end of the Devonian. The development of the South Munster Basin marked the start of a conformable transgression into an early Carboniferous marine environment where sedimentation continued into the Namurian. This Upper Palaeozoic sequence in southern Ireland underwent deformation at the end of the Carboniferous and lies within the Rhenohercynian Zone of the European Variscan. Deformation was heavily influenced by the pre-existing basin architecture. The principle phases of deformation involve folding, cleavage, faulting and late stage jointing, with bulk shortening ranging from 30-40% in the west (Meere, 1992, 1995, Bresser & Walter 1999) to 44-52% further east (Cooper *et al.* 1984). The maximum temperature of deformation associated with the Irish Variscides is 330ºc.

The direct isotopic dating of deformation in orogenic forelands, such as southern Ireland, has been greatly restricted by the lack of suitable syn-kinematic low-grade mineral phases associated with deformation in these settings. The mix of detrital, metamorphic and alteration phases in low-grade sedimentary rocks makes the task of dating deformation in these settings especially difficult. Recent developments in low-grade geochronology have included the Rb/Sr and Ar/Ar dating of material in strain fringes which are directly related to ductile deformation (Müller *et al.* 2000, Challandes *et al.* 2003, Sherlock *et al.* 2003). These new methods directly target syn-kinematic, authigenic minerals which avoids the problems associated with the dating of whole rock samples and so provide precise dates for ductile deformation and cleavage develop-

ment.

The aim of this study is to apply $^{40}Ar/^{39}Ar$ laser microbeam techniques to syn-deformational white micas that define microstructures – both foliations and strain fringes – in the low-grade rocks of southern Ireland. These anchi to epizone sediments have formed well below the blocking temperature of argon in white mica. It is hoped that dating on a thin section scale will minimise the contribution of detrital white micas which would produce spurious older age dates. In order to achieve resolution on a microstructural scale the techniques to be used are $^{40}Ar/^{39}Ar$ in situ UV laser ablation of individual grains. This technique will be used in tandem with infrared step-heating of microsamples drilled from thin section and of hand picked mica separates. Precise dating of such white micas will build up an absolute chronology for the ductile phase of the Variscan deformation event in southern Ireland