Journal of Structural Geology 35 (2012) 1

Contents lists available at ScienceDirect

Journal of Structural Geology

journal homepage: www.elsevier.com/locate/jsg

Photograph of the month

Kink band and associated en-echelon extensional vein array

This photograph shows a textbook example of a contractional kink band with an associated en-echelon extensional quartz-vein array (Ramsay and Hubert, 1987, figure 20.36B, p. 431). The kink band deformed a pervasive slaty cleavage fabric. In a classical paleostress interpretation of such a single set of kink bands (cf. Ramsay and Hubert, 1987) the maximum principal stress is oriented oblique to both the kink-band boundary and the external foliation (lower left to top right). Applying the modified kink-band triangle of Srivastava et al. (1998) (Debacker et al., 2008) the kink-band development should have lead to a small internal volume increase of ~5% ($\Psi = \sim 30°$; $\phi_k = \sim 80°$; $\phi = \sim 70°$). The extensional veining could have accommodated this dilational component of the kink-band development. The en-echelon extensional vein array shows an apparent sigmoidal pattern. The orientation of the individual veins complies with the inferred maximum principal stress. The angular relationship of foliation and vein wall is identical inside and outside the kink band (~45°), suggesting a passive rotation of pre-existing extensional veins during kinking causing the sigmoidal pattern. The interpretation, based on vein geometry, seemingly contradicts the interpretation based on kink-band geometry. So, did the veins form as a result of kinking or did the kink band form on a pre-existing vein array? The kink band developed in low-grade metamorphic slates of the Upper Silurian to Lower Devonian Plougastel Formation, exposed in the Monts d'Arrée slate belt in Central Armorica (Brittany, France) (cf. van Noorden et al., 2007; Sintubin et al., 2008) (48°23′08″N 3°57′55″W). Photograph Manuel Sintubin.

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16 August 2010
Available online 3 September 2010

0191-8141/$ – see front matter
doi:10.1016/j.jsg.2010.08.008