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Limits on the vorticity flow analysis within extensional shear zones and extrusive context: some consideration on flow kinematic of the Greater Himalyan Slab in Tibet area.

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In these last year several methods have been proposed to establish the kinematic vorticity number Wk of flow in rocks, i.e the ration of pure shear to simple shear. It has been demonstrated that within homogeneous flow the rotational behaviour of rigid objects in non coaxial flow depend amongs other factor (see Ceriani et al.,2003) on the particle/matrix interface, shape of object and Wk of the bulk flow. Consequently the shape of porphyroblast mantles and the orientation distribution of the long axes of porphyroblasts together with their aspect ratio can be theoretically used as vorticity gauge to calculate Wk. With these purpose several method has been proposed (Passchier, 1987; Wallis, 1991) and then applied in different context. All these methods however, assume as bulk flow an homogeneous and volume constant flow. Moreover, in the application of such methods it is rarely discussed in detail the source of error due to the mismatches between the theoretical bulk flow assumed and the real natural strain and heterogeneities within such shear domains.. In this abstract some preliminary results on this topic are described focusing on two main aspect :

1. The source of error due to the sum effect of dilatant flow (using the consideration proposed by Grasemann et al.(2006)), the wrong recognition of the sectional vorticity vector (in monoclinic or possible weak triclinic flow) and the presence of discontinuity as c or c' structure that act as passive marker within the shear zones (Passchier, 1991; Simpson & De Paor, 1993; Jiangh,1994) is estimated .

2. we calculated the vorticity flow in a ideal ductile zones simultaneously undergoing heterogeneous simple shear and bulk shortening, and describe the expected deviation of such values respect to the bulk flow generally assumed in a homogenous flow system

Such considerations are then applied to the Greater Himalayan Slab (GHS). The GHS is composed of a north dipping anatectic core of crystalline rocks bounded above by the South Tibetan detachment system (STDS). In the upper part, within the footwall of the STDS the GHS is defined by amphibolite facies schist gneisses and syntectonic leucogranite. This zone is characterized by a variety of well developed mesoscopic and microscopic kinematic indicators that consistently suggest a well developed to - down - to- north - north east sense of shear that imply a southward extrusion of the footwall rock. From the upper border defined by the unmetamoprhosed Tethyan sediments down to the High grade rocks, the amphibolite facies gneisses and deformed leucogranite show nice example of rotated porphyroclast bearing gneisses with heterogeneous strain pattern and well developed extensional shear band structure. This make such area a natural example and an ideal section where to test such limits on vorticity flow. Such result are compared with previous kinematic and vorticity analysis (Law et al.,2004) and the possible kinematic meaning are suggested.

Ceriani et al.(2003). J.Struct.Geol 25, 2005-2021

Grasemann B et al. (2006) In press J. Geol. Soc London.Special paper.

Jiang, D.1994. J.Struct. Geol. 16, 121-130

Law R et al. Journ. of Geol Soc.London

Passchier, C.W. 1987. J.Struct.Geol. 9, 679-690.

Passchier, C.W. 1991 Geologie in Mijnbouw. 70, 203-211.

Simpson & De Paor, 1993.J.Struct.Geol. 15, 1-20.

Wallis, S. 1991. J. Struct.Geol.