Geophysical Research Abstracts
Vol. 15, EGU2013-3423-1, 2013
EGU General Assembly 2013

Conflicting interpretations of petrogenetic processes recorded by reaction textures in peridotite xenoliths.

Christiane Wagner (1), Marie-Lola Pascal (1), and Michel Fialin (2)

(1) UPMC, Univ Paris 06, ISTeP, CNRS-UMR 7193, Paris, France (christiane.wagner_raffin@upmc.fr), (2) CAMPARIS UPMC, CNRS-UMR 7094, IPGP, Paris, France

Mantle xenoliths rapidly brought to the surface by recent intraplate volcanism are a valuable source of information about the nature and evolution of the mantle. A common feature of many xenolith suites is the presence of reactions, which have been variously and controversy interpreted both in terms of processes (partial melting, interaction with various melts, mineral breakdown) and in terms of timing/ locations (in the mantle, in crustal magma chambers, during the transport to the surface, or as post-entrainment reactions.

In this contribution we review different disequilibrium textures observed in a xenolith suite from the Massif Central. The xenoliths are anhydrous or amphibole (and minor mica)-bearing spinel lherzolites, which have been variously cryptically or modally metasomatized by the percolation of melts prior to their entrainment in the host magma (Wagner and Deloule, 2007). Some "hydrous" xenoliths are totally surrounded by an amphibole selvage whereas other show cross cutting amphibole veins and disseminated amphibole crystals mostly around spinel.

A variety of reaction textures will be examined: 1) Spongy/sieved textures developed in clinopyroxene. 2) Spongy/sieved textures developed on spinel rim in contact with glass. The rim may be compositionally zoned with an inner Al-enriched and an outer Cr-enriched rim. 3) Reaction zones developed around amphibole in contact with spinel contain secondary clinopyroxene, olivine, spinel and fresh colorless vesicle-rich glass; sometimes plagioclase is also observed. 4) Glass-rich patches with similar texture of clinopyroxene, olivine and spinel disseminated through anhydrous xenoliths. 5) Reaction zones around orthopyroxene with secondary clinopyroxene, olivine and glass. 6) Symplectites developed around clinopyroxene, amphibole or orthopyroxene. It should be noted that these reactions are not mutually exclusive and that glass is present in most reaction sites. The development of the reactions is independent of the proximity of the host magma contact. The reactions may be well-developed in some xenoliths and totally absent from other samples of the same occurrence.

The aim of this contribution is to place constraints on the origin and the timing of formation of the reactions from detailed chemical investigations, thermometry, simulations, and fO_2 estimates and taking into account recent experimental studies (e.g. Shaw, 2009; Shaw & Dingwell, 2008; Lo Cascio et al., 2008). In this contribution we evidence the involvement of fluids/melt in the development of the different reactions as well as the role of amphibole, even in some "anhydrous" xenoliths.

Wagner and Deloule, 2007, Geochim. Cosmochim. Acta, 71, 4279-4296; Shaw, 2009, Lithos, 110, 215-228; Shaw & Dingwell, 2008, Contrib.Mineral. Petrol., 155, 199-214; Loscacio et al., 2008, Contrib.Mineral. Petrol., 156, 87-102.