

# On the fluid-mobility of molybdenum, tungsten, and antimony in subduction systems

H. WEHRMANN<sup>\*1</sup>, R. HALAMA<sup>2</sup>, D. GARBE-SCHÖNBERG<sup>2</sup>, K. HOERNLE<sup>1,3</sup>, G. JACQUES<sup>1</sup>, K. HEYDOLPH<sup>1,3</sup>, J. MAHLKE<sup>1,3</sup>, K. SCHUMANN<sup>1,3</sup>

<sup>1</sup> Sonderforschungsbereich 574, IFM-GEOMAR, Kiel, Germany  
(\*hwehrmann@ifm-geomar.de)

<sup>2</sup> Sonderforschungsbereich 574, Institute of Geosciences of the University of Kiel, Germany

<sup>3</sup> IFM-GEOMAR, Kiel, Germany

Molybdenum (Mo) and tungsten (W) have long been regarded as being more or less immobile during slab fluid-induced arc magma generation. Here we characterize about 180 samples of young, predominantly mafic to intermediate tephra and lavas for their Mo, W, and antimony (Sb) concentrations, to examine the fluid-mobility of these elements in subduction systems. Samples were taken along the active arcs of the Chilean Southern Volcanic Zone (SVZ) and the Central American Volcanic Arc (CAVA). When relating Mo, W, and Sb to trace element ratios typically used to constrain the involvement of subduction fluids in magma formation, such as Ba/La or U/Th, Mo, W, and Sb are enriched in the most fluid-influenced, highest-degree melts. W/Mo ratios correlate positively with Pb/Ce, which is established to reflect a recent subduction signal or assimilation of crustal material with an ancient subduction signature, suggesting that subduction processes promote enrichment of W over Mo. This is well expressed at the SVZ and most of the CAVA; while few OIB-type rocks from Central Costa Rica form an opposite trend. Moreover, Mo/W ratios co-vary with Cl contents derived from melt inclusions, indicating that the relative degree of mobilization responds to the composition of the subduction fluid.

To evaluate the mobility of Mo, W, and Sb during metamorphism in the slab, eclogites with no or minor metasomatic overprint and a fluid-induced overprint in an eclogite-blueschist sequence were investigated. None of the three elements shows a systematic variability related to metasomatism and the minor variations are interpreted to reflect protolith heterogeneity. This suggests that Mo, W and Sb remain relatively immobile up to depths of 70 km in the subduction zone.