Zircon saturation in silicate melts: An improved model for peraluminous to peralkaline melts

FERNANDA GERVASONI[1], STEPHAN KLEMME[1], JASPER BERNDT[1] AND EDUARDO R. V. ROCHA-JÚNIOR[2]

[1]Westfälische Wilhelms-Universität Münster, Institut für Mineralogie, Münster, Germany

[2]Departamento de Física da Terra e do Meio Ambiente, Instituto de Física, Universidade Federal da Bahia, Salvador, BA, Brazil

Zircon is a mineral present in many igneous rocks, and it is known to host numerous trace elements, including U and Th. This is why zircon is an essential mineral for geochronology. Knowledge about zircon saturation in crustal melts can provide information about the temperatures of zircon crystallisation or it can help to identify inherited zircon [1]. Watson and Harrison [2] proposed a consistent model for peraluminous to metaluminous melts, which links zircon saturation with temperature (750°C to 1020°C) and composition. Considering the fact that zircon is an ubiquitous mineral and occurs not only in peraluminous or metaluminous but frequently also in peralkaline rocks, we present new experimental data on zircon saturation in more complex compositions (i.e. metaluminous to peralkaline melts) and at higher temperatures (1200°C) to serve as an extention of Watson and Harrison (1983) model [2].

Some preliminary saturation experiments were performed at 0.7GPa, 1000°C and 1200°C in a piston-cylinder apparatus. The quenched glasses were analyzed by electron microprobe with an acceleration voltage of 15 kV and a beam current of 15nA.

Our first results show much higher zircon saturation in peralkaline melts compared to more aluminous melts. Furthermore, our data clearly indicate that zircon saturation critically depends on temperature and melt composition. Zr in melts at zircon saturation increases with increasing NBO/T, which indicates that zircon saturation is strongly related to changing melt structure. We are currently working on an improved model to decribe zircon saturation in a wide range of melt compositions, pressures and temperatures.

[1] Hanchar, J.M., Watson, E.B., 2003. Zircon saturation thermometry. *Reviews in Mineralogy and Geochemistry* **53** (**1**), 89–112. [2] Watson, E.B., Harrison, T.M., 1983. Zircon saturation revisited: temperature and composition effects in a variety of crustal magma types. *Earth and Planetary Science Letters* **64**, 295–304.