ZIRCON FORMATION DURING ECLOGITE-FACIES METAMORPHISM: EXAMPLE FROM THE CALEDONIDES OF W NORWAY

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The Proterozoic Lindås Nappe, Caledonides of W Norway, was affected by Sveconorwegian granulite-facies metamorphism (929+/-1 Ma), followed by fluid-driven eclogite- and amphibolite-facies Caledonian overprinting (419+/-4 Ma), spatially restricted along fractures and shear zones. Mafic lithologies were studied using BS- and CL-imaging, microprobe, ID-TIMS and ion-probe techniques. In granulites, a CL-bright anhedral zircon overgrowth (Th/U=0.5) surrounds a magmatic zoned core (Th/U=1.3). A discontinuous corona of ca. 10 µm flat zircon crystals is commonly observed at the outer margin of ilmenite. Locally baddeleyite and srilankite (Ti2ZrO6) occur at the contact between ilmenite and feldspar, baddelyite being separated from ilmenite by a srilankite rim. Baddeleyite is interpreted as an exsolution product from magmatic ilmenite, whereas srilankite and CL-bright zircon as reaction products during granulite metamorphism, with ilmenite as a probable source for Zr. In unsheared amphibolites, coronas of titanite and relict micro-zircons surround relict ilmenite. No evidence for Caledonian-age zircon was identified in amphibolites, indicating that the amphibolite-facies overprinting is not associated with any significant growth of zircon. In unsheared eclogites, zircon displays specific euhedral oscillatory zoned to luminescent Caledonian overgrowths (428+/-42 Ma; Th/U0.1). Coronas of micro-zircons are observed in garnet at some distance around rutile. They are interpreted as granulite-facies relicts and locally show prismatic overgrowths. This specific zircon growth event is related to eclogite-facies forming reactions, especially the ilmenite to rutile breakdown. The low Th content of zircon probably stems for the coeval precipitation of clinozoizite. Oscillatory zoned zircon records fluid infiltration and coeval eclogitization in the crust.