

**ALLANITE AS UHP PHASE IN SULU UHP ECLOGITES (CCSD):  
EVIDENCE FROM ELECTRON-MICROPROBE CHEMICAL DATING  
OF EPIDIOTE-GROUP MINERALS**

WANG, R.C., WU, J W & WANG, S.

<sup>1</sup>State Key Laboratory for Mineral Deposits Research, Department of Earth Sciences,  
Nanjing University, 22 Hankou Road, 210093, Nanjing, PR China  
e-mail:rcwang@nju.edu.cn

Epidote-group minerals are common accessory minerals in eclogites. They are stable over a wide P-T range. Zoisite is certainly considered as a primary phase in UHP eclogite. However, there are debates on the occurrence of two other species, allanite and epidote under UHP conditions. Does allanite occur as a relict phase or as a UHP phase? Does epidote appear as a relict or as a secondary mineral in retrograde eclogites? In fact, a profound understanding of the behaviour of LREE in subduction zone processes needs to know in which phases LREE are incorporated, how stable these phases are and how they interact with subduction zone liquids.

Chinese Continental Scientific Drilling (CCSD) provides us an opportunity to make a systematic study on distribution of REE-bearing accessory minerals in the Sulu UHP eclogites. Aggregates of epidote, allanite, apatite and thorite are observed in the rocks. Allanite grains are cored by apatite, and mantled by epidote; micro-inclusions of thorite are found within the apatite core or allanite, or at the contact between them; allanite transforms progressively to epidote; epidote reveals zoned texture, which is represented by variations in Fe and Al contents. Electron-microprobe analyses reveal that the apatite contains up to 1 wt% LREE<sub>2</sub>O<sub>3</sub> and 0.5 wt% ThO<sub>2</sub>, particularly allanite incorporates not only LREE, but also as high as 2.1 wt% ThO<sub>2</sub>.

High-resolution spot U, Th, Pb analyses of epidote and allanite on the electron microprobe are powerful geochronological tools. Results give an age of 485 Ma for the epidote mantle, and an age of 236 Ma for the allanite core, which is interestingly similar to the UHP metamorphic age in the Dabie-Sulu terrane.

Relationships and chemical dating of epidote and allanite indicate that there is a continuous transition from epidote to allanite. The latter is stabilized due to the presence of LREE, deriving possibly from the breakdown of primary LREE- and Th-bearing apatite in the course of UHP metamorphism: (Th,REE)-apatite + Epidote (UHP) → allanite + thorite + apatite.

This work was financially supported by Chinese Ministry of Science and Technology (2003CB716507).