U-Pb cassiterite dating by LA-ICPMS and a precise mineralization age for the superlarge Furong tin deposit, Hunan Province, Southern China

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Cassiterite is an important tin mineral in the W-Sn deposit. Furthermore, it is also a common accessory in a variety of deposits, and the successful use of cassiterite as a geochronometer would resolve many genetic questions. The direct dating of cassiterite with U–Pb and Pb–Pb methods was initially attempted by Gulson and Jones. In recent years, the U–Pb isotope data on cassiterite from tin deposits using TIMS were reported and the potential of cassiterite as a geochronometer for directly dating hydrothermal mineralization was evaluated. This study aims to directly date the U-Pb age on cassiterites from the Furong tin deposit using LA-MC-ICPMS techniques, to validate the utilization of cassiterites for precise dating of ore formation.

The Furong deposit is a newly-discovered superlarge tin deposit in the central Nanling district, South China. In this study, cassiterite from the Furong tin deposit has been successfully dated by LA-MC-ICPMS and it is the first report of the U–Pb isotope dates on cassiterite using LA-MC-ICPMS. In situ analysis of two cassiterites (WCP2-1 and WCP2-2), yield U–Pb isochron age of 155.8±1.6Ma (MSWD=20). This U–Pb age from the cassiterites in skarn type ores which is the main type ore in Furong tin deposit, yielded indistinguishable mineralization ages with U–Pb isochron age of 160.0±5.5Ma (MSWD=1.74) by TIMS and published Ar–Ar dating on hydrothermal muscovite, hornblende and phlogopite from greisen type tin ore and skarn-type ores, reveal the main stage age of Furong tin mineralization was around 155Ma. The dates obtained in this study indicated that the cassiterites with high content U are the potential directly dating minerals.

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Investigation of atmospheric nitrate and ammonium and their impact on air quality and climate in GMI

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The capability to simulate nitrate and ammonium aerosols has been developed in NASA GMI model by implementing a thermodynamic equilibrium model that treats gas and aerosol multiphase chemical equilibrium reactions in a SO_4-NO_3-NH_4-H_2O system. Nitrate and ammonium can influence air quality and ecosystems substantially, and their importance will be increasing in the future due to the predicted increase of nitrogen emissions. An immediate outcome from the work is the possibility to improve tropospheric O_3 simulation. Currently, the model treats HNO_3 solely as a gas phase tracer. This semi-volatile species now partitions between gas and aerosol phases, and the tracer in each phase is subject to different chemical and physical processes. A preliminary analysis has been conducted by comparing results simulated with and without new nitrate package and by comparing model results with the ground station observations from CASTNET and EMEP.