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MICROTEKTITES FROM THE SØR RONDANE MOUNTAINS, EAST ANTARCTICA: TOWARDS AN EXTENSION OF THE AUSTRALASIAN STREWN FIELD?

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Introduction: The Australasian (micro)tektites constitute one of the four major strewn fields currently known on Earth, next to the North-American, Ivory Coast and Central-European tektite fields. While the Australasian strewn field (ASF) is the most recent (ca. 0.78 Ma) of these large asteroid/cometary impacts on Earth, the location of its impact crater currently remains elusive. Based on the distribution of (micro)tektites, their respective sizes and compositions, several studies have suggested that the hypothetical source crater is located on the northern or central parts of the Indochina peninsula [1-6]. A detailed investigation of their moderately (e.g., Ni, Co, Cr) and highly siderophile elements (e.g., PGEs) clearly indicates that their geochemistry is consistent with mixed contributions from upper continental crust and chondrite-like material [7-9]. More recently, Australasian microtektites have been discovered in sediment traps on nunataks and glacial moraines in the Transantarctic Mountains (TAM) [10-12]. Major and trace element geochemistry of the TAM microtektites are consistent with the ASF. Volatile element contents, which record a strong degree of vaporization, are compatible with large-scale translation from the source crater [5,12]. Fission track dating has reported similar ages (ca. 0.85 ± 0.17 Ma) that match the Australasian impact event [13], extending the central lobe of the AST approximately 3000 km southward. Here we report the discovery of ca. 30 microtektite-like particles from sediment traps in the Sør Rondane Mountains (SRM - Dronning Maud Land, East Antarctica), located 2500 km from the TAM at the opposite side of the Antarctic continent. We present preliminary major and trace element concentrations to demonstrate their similarity with a subpopulation of Australasian microtektites from the TAM.

Methodology: Potential microtektites were extracted from non-magnetic sediment fractions (i.e., 800-400 µm and 400-200 µm) in the Widerøfjellet 18 Mt #01 deposit. Seven microtektite candidates ranging between 400-250 µm were embedded in epoxy resin and polished for SEM-EDS at the Vrije Universiteit Brussel. Major and trace elements were subsequently determined using a Teledyne Cetac Technologies Analyte G2 excimer-based laser ablation system coupled to a Thermo Scientific Element XR double-focusing sector field ICP-mass spectrometer at the Department of Chemistry (Ghent University). Three replicate analyses with a beam size of 35 µm were performed on each sample.

Results and Discussion: The newly discovered microtektite-like particles display a characteristic yellow and transparent appearance similar to 'normal-type' Australasian microtektites found in e.g., ODP cores from the Indian Ocean and the TAM. The abundance of potential microtektites from the SRM is relatively low (<1-2 per 100 g sediment) in comparison with the TAM (<1-30 per 100 g sediment). Particles do not display chemical alteration, but are often slightly abraded at the surface. Their major element chemistry is identical to that of the 'normal-type' microtektites reported in the TAM [10-11]. Surprisingly, no Mg-, Ni- or Al- rich varieties have been recovered from the SRM so far. Volatile element contents are consistent with large-scale atmospheric transportation and vaporization, intermediate between the values observed at Miller Butte and Larkman Nunatak in the TAM, but are systematically higher compared to the TAM microtektites. Trace element concentrations and patterns largely resemble those of the upper continental crust, except for the aforementioned volatile element components. Furthermore, trace element concentrations fall within the range defined by the 'normal-type' TAM microtektites and therefore strongly support the microtektite nature of the particles discovered in the SRM, and their relationship to the AST. These observations suggest that the SRM microtektites represent an individual cluster that possibly extends the western-most lobe of the AST approximately 4000-4500 km southwestward.

Conclusions: About thirty microtektite-like particles were discovered in sediment traps from the SRM and strongly resemble the appearance, size and geochemistry of 'normal-type' microtektites from the TAM. Their pristine condition, along with their relatively low abundance, lack of other Australasian microtektite types, and slight but systematic enrichment in volatile element components in comparison with the TAM microtektites, indicate that the SRM microtektites likely extend the western-most lobe of the AST ca. 4000-4500 km southwestward. These preliminary conclusions will be further investigated using Sr and Nd isotope systematics and ^{40}Ar-^{39}Ar dating.

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