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Possible Proof for genetic Link between the mafic Ferrar LIP and the silicic Antarctic Peninsula Volcanic Group identified in the Transantarctic Mountains

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The Mid-Jurassic Ferrar Large Igneous Province (LIP) extends along the cratonic margin of East Antarctica. The effusive section is underlain by fluvial and lacustrine sediments, known as Beacon Group throughout the Transantarctic Mountains, which itself covers crystalline basement. In Northern Victoria Land, Antarctica, the sediment succession consists of (1) a lower formation of approximately 250m thickness, dominated by medium to coarse grained, trough cross-bedded quartz sandstones (known as Section Peak Formation, SPF) grading into (2) an upper, about 50m thick newly defined formation of ripple cross-laminated, fine grained sandstones to siltstones consisting almost exclusively of a reworked, well sorted, rhyolitic, distal fall-out assemblage of shards, angular quartz, and feldspar (informally called Shafer Peak Formation, SHF). The biostratigraphic ages given by a *Dicroidium*-flora in the SPF, and a flora dominanted by cycadophytes and dipterid ferns (lacking *Dicroidium*) in the SHF, can preliminarily be deduced as Rhätoliassic (most likely Late Triassic) and Lower Jurassic, respectively. On lithological grounds we propose that the SHF can be correlated stratigraphically with the Hanson Formation in the Beardmore Glacier Region, Central Transantarctic Mountains.

The succession of both formations, SPF and SHF, is intruded by sills that are several 10m to a few hundred meters in thickness and of andesitic Low-Ti Ferrar magma type composition. While the quartz sandstones of the SPF behaved brittle during sill

intrusion, the younger tuffaceous sandstones (SHF) exhibit soft sediment deformation, fluidization and peperite formation, indicating that the sills intruded these rhyolitic ashes in still unconsolidated wet conditions. The sills must thus be considered to be coeval with the SHF.

The formation of SHF-type distal fall-out ashes can be traced for over 1000 km without major differences in grain size, from Northern Victoria Land to the Beardmore Glacier Region, Central Transantarctic Mountains. This excludes a proximal origin for the rhyolitic ashes and favors a generation by distal large volume (ultra-plinian), caldera-type eruptions. The closest exposed rhyolitic volcanic province of Lower Jurassic age is the Mt. Poster Formation (MPF), Ellsworth Mountain Volcanic Group, in the southern Antarctic Peninsula, today 3000 km away from Northern Victoria Land. A reduction by only 400km is given if the Cenozoic spreading between E- and W- Antarctica is considered.

Whole rock geochemical analyses indicate comparable chemical compositions with respect to incompatible immobile elements for the S-type rhyolitic low-Ti ignimbrites of the MPF and the reworked ashes of the SHF. This could imply a common origin. As would be expected, the distal fall out ashes are Si-enriched compared to tephra closer to the eruption center. The apparently coeval emplacement of rhyolitic SHF/MPF magmas and the first shallow intrusive phase of mafic Ferrar LIP magmatism may indicate a possible genetic link between both. The genesis of the S-type crustal melts being generated in a back-arc environment by underplating of large volumes of Ferrar LIP magmas uprising from the enriched subcontinental lithospheric mantle along the cratonic margin of E-Antarctica will be discussed.