

Deciphering lithological contact of granophyre dikes with bedrock granites at Vredefort dome, South Africa

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Introduction: The Vredefort impact structure contains a suite of granophyric dykes, referred to as the Vredefort Granophyre, occurring within and at the edge of the Archaean basement core. This unique melt rock occurs as vertical ring dikes along the contact between sedimentary collar and core of Archaean granites, and as vertical dikes extending northwest-southeast and northeast-southwest in the granitic core. It has known that the granophyre rocks have an unusual composition and high content of recrystallized sedimentary inclusions compared to common intrusive igneous rocks with similar SiO₂ content (61 to 70 percent by weight) [1]. Although there have been a lot of mineralogical and isotopic studies, the lithological contact has not been studied due to the lack of the outcrop. During the field survey, we found the lithological contact of the Vredefort granophyre with bedrock granites near the Kopjeskraal Country Lodge, Vredefort, South Africa. Here we report the petrological and magnetic studies of the contact.

Geological background: The Vredefort Granophyre is an impact melt that was injected downward into fractures in the heavily shocked and metamorphosed granite. This unit contains inclusions that are predominantly composed of quartzite, feldspathic quartzite, arkose, and granitic material with minor proportions of shale and epidiorite. Despite the granitic materials, the granophyre represents a stable paleomagnetic remanence [2].

Result and Discussion: Figure 1 represents surface stray magnetic field over the contact in the thin section by using scanning magneto-impedance magnetic microscope [3]. White color is an upward stray field and black is a downward field from the thin section surface. Granite shows a heterogeneous distribution of coarse-grained magnetite, instead granophyre shows a highly magnetic stray field. This highly magnetic portion agrees well with a ballen texture of mafic minerals. Also the contact is not discontinuous boundary such as faulting, but is the solid-state. Therefore, we can explore the thermal history of the contact from the petrological observations. In this presentation, we will give a cooperative studies of petrology and paleomagnetism.

References: [1] Therriault, A. M., Reimold, W. U. and Reid, A. M. (2004) *South African Journal of Ge-*

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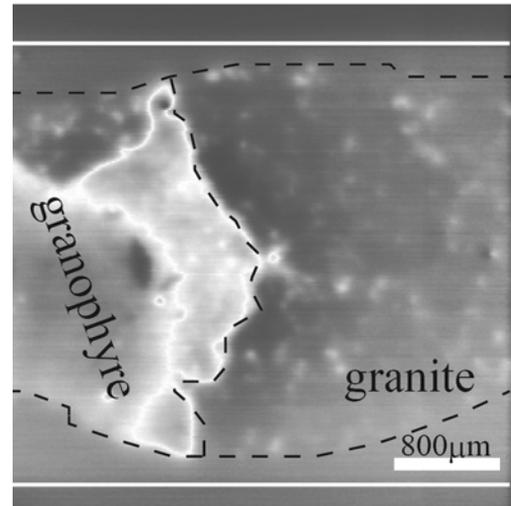


Figure 1: Stray magnetic field image of the Vredefort Granophyre and bedrock granite. The contact is a solid state and shows a distinct lithological difference. Highly magnetic portion near contact represents ballen-like texture within a cryptocrystalline texture.