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Room:Convention Hall

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Paleointensity study of the 570Ma Grenville dike, Canada: a preliminary result

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Recent numerical simulation for the long-term evolution of the geodynamo revealed that high heat flux at the core-mantle boundary (CMB) generates a continuous high virtual dipole moment of $6 \times 10^{22} \text{Am}^2$ throughout an Earth's history (nearly 3.8Ga~present) and that low heat flux at CMB shows secular weakening of the moment to less than $2 \times 10^{22} \text{Am}^2$. The Pre-Cambrian paleointensity study can solve this enigmatic result but is still lack of reliable data due to heavy alteration and metamorphism. Although a single silicate grain paleointensity method is a best way for the study, more primitive but basic test to reveal a reliable primary thermal remanent magnetization is a full paleomagnetic field test such as full baked contact test with hybrid zones. The Grenville dike is of the Ediacaran Grenville dike swarm intruding tonalitic gneiss (1Ga) of the Grenville Structural Province (Ontario, Canada). Hyodo and Dunlop (1993) reported a successful result of full baked contact test with hybrid zone. Here we report a preliminary result of Thellier-Thellier type paleointensity measurement for the chilled margin samples of the 570Ma (⁴⁰Ar/³⁹Ar age) Grenville dike. The characteristic component of the Grenville dike yields a virtual geomagnetic pole position at 51N and 145W, being different from the compiled VGP positions of the other Grenville dike (Murthy 1971). We obtained paleointensity results of nearly $0.5 \times 10^{22} \text{Am}^2$ from three samples of chilled margin (quality factor of 17.00~74.67), being much lower than low heat flux model at CMB. Although the number of our successful samples is limited, it seems that the Grenville dike samples possess a potential to reveal reliable ancient paleointensity data.