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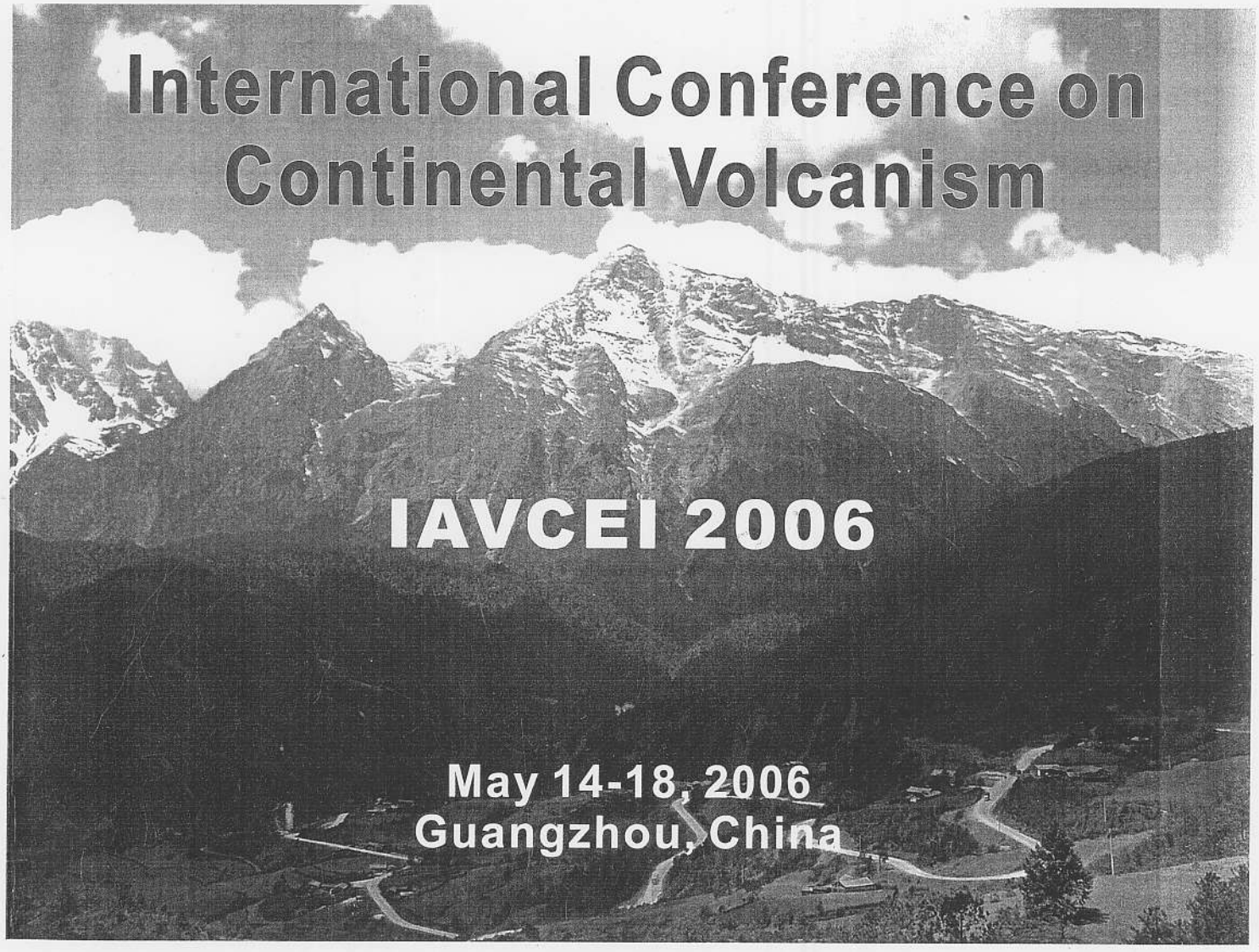
Abstracts & Program



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Dyke swarms and associated lava formations in the northern Lebombo monocline, Karoo Large Igneous Province, South Africa

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As one of the early classical examples of plume-generated Large Igneous Provinces (LIPs), the Karoo is characterized by a bulls-eye distribution of High-Ti basalts, picrites, and earliest nephelinites onto a conspicuous triple rift junction (i.e., Okavango dyke swarm and the two Mwenezi- and Lebombo monoclines), surrounded by Low-Ti basalts. It is noted that this regional distribution between high- and low-Ti basalts within the Jurassic Karoo LIP differs from that of the Permian Emeishan LIP; thereby undermining the use of this particular feature as evidence for mantle plume involvement. Another intriguing geochemical feature of the Karoo LIP is a stratigraphical change from high-Zr/Nb (HZN) and high-Zr/Y (HZY) to low-Zr/Nb (LZN) and low-Zr/Y (LZY), across a short interval with HZN and LZY lavas. Because of its regional consistency across the high-Ti central part of the Karoo LIP, this geochemical stratigraphy is tentatively related to different degrees of mixing between asthenospheric and (metasomatized) lithospheric mantle. However, as for many other regional geochemical LIP-models, we see a need for further detailed studies of carefully selected key localities.

The >700 km-long Lebombo monocline (Watkeys, 2002) is conspicuously similar to the East Greenland Volcanic Rifted Margin (Klausen and Larsen, 2002), suggesting that southern Mozambique is made up of anomalously thick oceanic crust. Detailed geochemical studies have been made along its southern (i.e., Rooi Rand Dyke Swarm; Armstrong et al., 1984) and central segment (Sweeney et al., 1994). Our structural and geochemical study moves >120 km farther northwards and into high-Ti lavas along the northern segment - to within ~240 km of the triple rift centre - where a magnificent basalt-rhyolite lava transect and associated dense dyke swarm was mapped and sampled along Olifants River. The 32 km-long transect across the eastward-verging monocline expose (1) tephritic base flows (Mashakiri nephelinites), (2) lower basalts, (3) an overlying basaltic sequence with inter-bedded rhyolites and plagioclase-phyric flows, (4) a rhyolite sequence with inter-bedded basaltic flows, and (5) an uppermost rhyolitic sequence mapped to the Mozambique border. Five conspicuous generations within the margin-parallel (i.e., N-S) dyke swarm are furthermore correlated as feeders to overlying characteristic lava formations, on the basis of both structure and geochemistry.

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