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Genesis and evolution of the magmatism in the northern sector of Main Ethiopian Rift by geological - stratigraphic, geochemical and isotopic studies in the volcanic area of Gedemsa and Fantale.

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The Main Ethiopian Rift is the site of an intense magmatism since Eocene-Oligocene. The earlier NW-SE direction of extension of the Rift, which generated NE-SW trending faults, in Quaternary times rotated around E-W and produced the still active N to N-NE Wonji Fault System.

Recent stratigrafic and structural investigations have led us to a re-interpretation of the volcanological and stuctural evolution of the Gedemsa caldera and Fantale volcano, and to a definition of the relationships among tectonism, magmatism, volcanism, and volcano – tectonics.

The Gedemsa volcano is located in the central part of the Ethiopian Rift, about 100 km SE of Addis Abeba. Its maximum elevation is 300 m above rift floor and is characterised by a wide central caldera, about 8 km in diameter. The general stratigrafic sequence in the area includes, from base upwards, rift-floor ignimbrites (1.7 Ma), basaltic rocks, pantelleritic and subordinate trachytic pyroclastic deposits and lava flows and domes, and widespread basaltic deposits.

The Fantale volcanic complex is located in the northern part of the Main Ethiopian Rift, where Afar depression begins. Its maximum elevation is1644 m above rift floor and the volcanic structure is characterised by a summit central caldera whose diameter is about 4 km. The eruptive activity of this volcano is represented by trachytic and rhyolitic lavas, while the most diffuse unit is an ignimbrite related to the caldera collapse.

Explosive activity has occurred inside and outside the caldera, forming tuff cones and thick pumice fall out deposits. The only mafic unit is represented by a basaltic eruption occurred in 1870 AD. Historical eruptions and intense fumarolic activity are evidence of the persistence activity of the Fantale in this part of the Main Ethiopian Rift.

Products of the two volcanoes show a typical mafic-felsic bimodal distribution with few intermediate terms, testifying the Daly Gap, as observed at regional scale along the Main Ethiopian Rift.

New geochemical and isotopic data of selected products of the Gedemsa and Fantale volcanoes will be presented and used todiscuss the genesis of the silicic and basaltic magmas, their probable interaction with the crust and the relationships between magmatism and tectonism.