Radiolarian and geochemical studies of the Middle Permian Gufeng Formation, South China

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Gufeng Formation were special deep-water Middle Permian deposits in South China. Numerous radiolarians, but few geochemical studies have been reported from these well-preserved strata during the past decades. In this study, we focus on the geobiological processes of both radiolarian and oceanic environments, which can be explored by geochemical data.Twenty-one radiolarian species and six undetermined species belonging to ten genera were recovered from the Gufeng Formation of the Maocaojie section, Jianshi area, West Hubei Provinces, China, which is located in the northern margin of the Yangtze platform. Three radiolarian Zones, *Pseudoalbaillella globosa*, *Follicucullus monacanthus*, *Follicucullus scholasticus zones* (in ascending order), were established and can be correlated well to the radiolarian fauna from other area. The assemblages of radiolarians together with other organisms (e.g., sponge spicule) suggest that the depositional depth of the section varies between 150–500 m.

The depositional settings of the Gufeng Formation were various in different basins base on the geochemical analysis; the northern marginal basins (South Qinling Basin and Lower Yangtze Basin) were marginal environment, but the southern margin basin (Nanpangjiang Basin) was ridge environment. Corresponding, the origin of the chert were biological source and hydrothermal source in northern and southern marginal basins respectively. The redox condition varied from oxic-euxinic-suboxic from the Lower to the Upper Units of the Gufeng Formation in this study. These changes of ocenaic conditions results in the distributions of different radiolarian orders: Both deep-water and shallow-water orders were bloom under oxic condition. However, under reducing condition, shallow-water order of radiolarian were abundance, the deep-water orders went disappear for the catastrophic condition in the water coloum.

Higher correlations between abuncance of Spherical radiolarian and the values of geochemical productivity indicators indicate Spherical radiolarian could be used as an indicator of primary productivity in Gufeng Formation as in other peroids.