

EGU2020-13041

<https://doi.org/10.5194/egusphere-egu2020-13041>

EGU General Assembly 2020

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Sill-related seafloor domes in the Zhongjiannan Basin, western South China Sea

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The magmatism activities exert significant impact in sedimentary basins as the Zhongjiannan Basin (ZJNB), western South China Sea (SCS). We have evaluated multibeam bathymetric and multichannel seismic reflection data acquired by the Guangzhou Marine Geological Survey in recent years, in order to investigate the distribution, the characteristics and the subsurface structures related to the seafloor domes found in the northeastern ZJNB. Data reveal that there are forty two domes occurring in water depths between 2312 m and 2870 m, clustered around volcanic mounds and seamounts in the study area. These domes generally show circular to elongated or irregular plan views, can reach up to 26080 m in perimeters, and the vertical reliefs are tens to hundreds of meters. They have gentler flanks with average slope values of 1.46°–7.73° and basal areas between 0.85 km² and 42.06 km². The seismic reflection sections reveal that domes' formation and development are attributed to igneous intrusion events in the strata. The igneous intrusions heat surrounding organic-rich sediments and release hydrocarbons and fluids, which accumulate and uplift the overlying strata immediately above the sills and form forced folds, manifesting as domes on the seafloor. These sill-folds-dome structures provide possibility for hydrocarbon generation, migration and accumulation and have important implications for petroleum prospectivity in the ZJNB.