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The record of gravity flow deposits in the down reach of Pearl River Canyon over the last 400 ky

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Pearl River Canyon is an important pathway of gravity flow transports terrestrial materials into the deep-sea of northern South China Sea. In 2017, International Ocean Discovery Program (IODP) retrieved sediment cores from site U1499 at the northern South China Sea during expeditions 367. Hole U1499A is located in the down reach of Pearl River Canyon with 3760.2 m water depth. Plenty of gravity flow deposits were identified by core image, core description and multi-sensor core logger which measured on board, especially thick gravity flow deposits (>5cm) are cyclical and may be closely related to climate change. During glacial periods, lower sea level caused more terrestrial materials deposited in the northern South China Sea. The mouth of Pearl River was closer to the Pearl River Canyon and lead to frequent gravity flows transported terrestrial materials into deep-sea. In the meantime, carbonate compensation depth (CCD) were at least 400 m deeper than interglacial periods in the northern South China Sea. Deeper CCD contributed to preserve carbonate below 3500 m water depth (Thunell et al., 1992). It seems that different climatic conditions have affected the sediment transported mechanism in the northern South China Sea. In this study, the variation of carbon and nitrogen concentrations in the cores collected from the upper 50 meters of IODP Hole U1499A were analyzed to reconstruct the paleoenvironmental changes in the northern South China Sea, and decipher the relation between climate and gravity flow frequency. Our results indicate the high total inorganic carbon (TIC) and high total organic carbon/total nitrogen (C/N) ratios are consistent with the glacial periods. In addition, the high TIC, C/N ratio sections and low bulk density correspond to the distribution of thick gravity flow deposits. In this study, large amounts of thick gravity flow deposits were recorded in core sections with glacial signals, indicating that gravity flows were more frequently occurred during glacial periods.