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Gas hydrate identification near seafloor based on geological and geophysical methods in the eastern Pearl River Mouth Basin of South China Sea

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According to the sedimentary environment and tectonic setting of the eastern Pearl River Mouth Basin in South China Sea (SCS), combining a high-resolution seismic dataset and samples from Oceanic Drilling Program (ODP), International Oceanic Drilling Program (IODP), GuangZhou Marine Geological Survey (GMGS) and GMGS 2, the occurrence of BSR near seafloor at the passive continental margin were analyzed. Studies have shown that the presence of BSR near seafloor in this region has symbiotic relationship with fault/gas chimney/diaper, composing a seepage gas hydrate system [1]. Based on high-frequency attenuation caused by free gas under BSR, the gas reservoir is detected directly and thus demonstrate the hydrate indirectly. After observing BSR on seismic profiles, time-frequency analysis of the seismic dataset with discrete Fourier transform and continuous wavelet transform in this area were conducted. Comparing with discrete Fourier transform, frequency volume acquired by continuous wavelet transform has higher resolution in time domain. The attenuation of high frequency component of seismic data caused by free gas under hydrate was identified based on the amplitude variation of different frequency volumes in which dominant frequency of seismic data at the gas layer will reduce approximately 10Hz, further proving the existence of free gas under BSR. Then one seismic signal was extracted from the dataset in the BSR area and analyzed using time-frequency tools in Matlab.

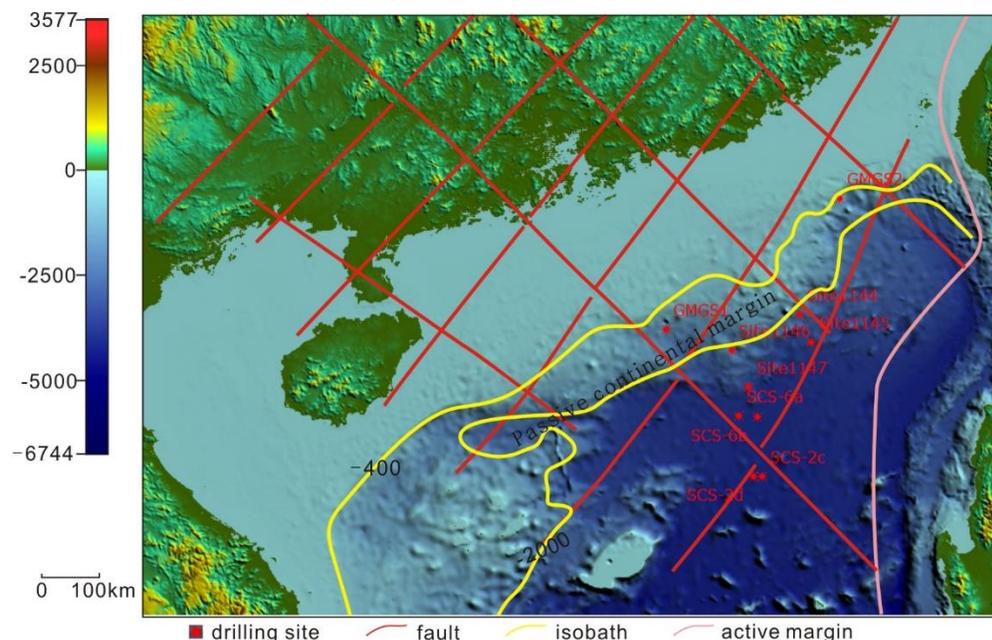


Figure 1: Bathymetric map showing the seafloor of South China Sea. ODP and IODP data were from <http://www-odp.tamu.edu/>. Faults were after Hui G.G et al.

References:

- [1] Sha, Z.B et al. (2015) *Marine Geology*. 366 (2015) 69–78
- [2] Hui G.G et al. (2015) *Marine and Petroleum Geology* 69 (2016) 127-145

