Geophysical Research Abstracts
Vol. 15, EGU2013-12171, 2013
EGU General Assembly 2013

Paleogene Rift Basins along East China Sea: Tectonic Evolution of Penghu Basin

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Prior to the orogeny, Taiwan is located at the passive continental margin. Two extensional events in Tertiary resulted in Paleogene and Neogene basins. The Paleogene rift basins along East China Sea and Taiwan Straight – Tungyintao, Nanjihtao, Penghu basins, from north to south, respectively, comprise a left-lateral and en echelon array rift system. Previous wellbore data revealed that these basins are filled with Paleocene and Eocence sediments, which were controlled by the NE-SW trending growth normal faults. Moreover, Penghu basin is composed of two sub-basins separated by lateral fault which induced a regional volcanic uplift. The seismic profiles indicate that it represents a typical half-graben basin with wedge-shaped synrift deposits thickening toward the main boundary fault.

Five wells in the Penghu basin show that Penghu basin began to form during the Late Pliocene with shallow marine deposition. The mid-Eocene shale sequences in northwestern side are interbedded with some layers of basic lava flow, which indicate that the normal faults induced the volcanism.
Data used in this study consist of: (1) multi-channel seismic data, (2) seven wellbore data acquired by CPC, Taiwan (Chinese Petroleum Corporation, Taiwan). Seismic profiles were interpreted by Kingdom Suite. Afterwards, integrate synthetic seismogram to generate depth-converted profiles, and import them to 2Dmove for cross-section restoration.

Three regional unconformities and four sequence units are delineated in this area. Seismic profile interpretations also infer that the main faults dominantly oriented NE-SW, and the formation of Penghu basin is mostly due to the normal fault in the southeastern side, which is NE-SW trending in the north, and gradually changes to nearly E-W trending. These normal faults are separated by some lateral faults. Restoration of representive cross sections suggest three phases of basin development in the Penghu basin. Regarding to the stratigraphy framework according to wellbore data, the sub-basin in the north deposited shallow marine sediments; however, the sub-basin in the south between volcanic uplift and the NE-SW trending boundary fault in the southeastern deposited semi-closed half-graben lacustrine sediments.