

SCG088-19

Room: 302

Time: May 28 15:30-15:45

Structure of the Niigata rift-basin, central Japan: insights from oil and gas exploration

Misturu Inaba^{1*}, Hiroshi Sato²

¹JAPEX, ²ERI

Basin inversion of rift-parallel normal faults in the Niigata basin has been clearly recognized by recent subsurface geology and deep seismic profiling. Seismic activities, such as the 2003 Chuetsu and 2007 Chuetsu-oki earthquakes, manifested the significance of transfer zones, trending oblique to perpendicular to the rift-parallel fault system. Based on the information of oil and gas exploration and surface geology, we introduce several examples of the tectonic control of the transfer faults formed in the rifting stage on basin development and seismic activity in the Niigata basin.

Onshore-offshore 3D seismic survey in the eastern part of the Niigata city demonstrates the group of normal faults (Tsusengawa faults), trending NW-SE. These faults displaced the upper most Pleistocene sediments. In April 1, 1995, a M6.0 earthquake occurred in the southeastward extension of the Tsusengawa faults. The axis of the focal area shows a NW-SE trend. In the Echigo Mts. at the southeastern extension of the faults, a NW-trending Miocene fault, bounding the syn-rift sediments can be identified. Thus, the NW-SE trending, Miocene Tsusengawa fault system generated active faulting and earthquakes, suggesting reactivation of the transfer zone, formed in the rifting stage.

NW-SE-trending transfer zones are identified, such as along the Shiunji-Kajikawa- southern tip of the Kishigata range. The line is marked by fissure eruptions of felsic rocks dated at 15 Ma and faults bounding early Miocene minor rift basins. Such Miocene felsic volcanisms are also found in the Shiunji oil field. The transfer zones in the northern part of the Niigata basin are clearly identified by surface and subsurface geology.

Transfer zones in the southern part of the Niigata sedimentary basin are obscure due to thick sediments cover. However, termination of fold axis and fold geometry suggests the existence of NW-NE trending transfer faults, such as Kashiwazaki-Urasa line. It is evidenced by the 2004 Chuetsu and 2007 Chuetsu-oki earthquakes that southern end of both focal areas coincidence with this line.

The felsic volcanic rocks play important role for oil and gas exploration as suitable reservoirs. The felsic volcanic rocks commonly produced by fissure eruption along the NW-SE trending transfer faults. Obviously such transfer faults behaves as possible barriers of rupturing of rift-parallel fault system. Thus, to explore the rift-parallel structure in the Niigata basin is significant for better understanding of segmentation as well as oil and gas exploration.

Keywords: fold-and-thrust belt, transfer zone, segmentation, oil and gas exploration, Niigata basin