

Relationship between trends in Miocene basin development and outcrop-based depositional cycles and geological structures

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During the Late Oligocene-Middle Miocene, the Japanese archipelago was formed under control of extensional tectonics. At that time, a series of extensional basins developed in the back arc side of Honshu Island. The development of the Niigata basin, which is the largest basin in the coast of the Japan sea, has been argued in various ways. The Tsugawa-Aizu province (Shimadu, 1973) is important for the good understanding of the early stages of development of the Niigata basin. According to Toyoshima (2014), Miocene and later geological structures of Northeast Japan were formed by combination of multiple trends such as NNE-SSW (Niigata trend), NW-SE to WNW-ESE (transverse trend) and NNW-SSE to N-S (Tanagura trend). Relationship of the structural trends and basin development, especially such as field-scale sedimentary and structural processes, has not been considered in detail in the Niigata basin which includes the Tsugawa-Aizu province.

This outcrop-based study discusses basin development in Northeast Japan by sedimentary facies and structural analysis, considering cyclicity and basin geometry of the Mikawa and Tsugawa basins in the Tsugawa-Aizu province. The study area, the Tsugawa area in Aga, Niigata, has various scale basins which include the Mikawa basin in the west and the Tsugawa basin in the east. We estimate vertical changes of depositional environments by field work on Miocene deposits from the Tsugawa Formation to the Nomura Formation in the Yagiyama area, eastern part of the Tsugawa basin.

Comparison between the Mikawa basin and the Tsugawa basin show that the cyclicity of these basins is similar to each other. This study considers basin development also from fault trends by fault analysis. In general, geological structures in the Mikawa area show NNW-SSE to N-S trends, while those in the Yagiyama area have an obvious NW-SE trend.

Keywords: Miocene, back arc, Northeast Japan, sedimentary facies, fault