Tectonic Evolution of an Intra-Arc Basin in Central Japan Based on Physical Analogue Modeling Methods and Seismic Reflection Profiles

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In this work using scaled physical modeling techniques, we simulated the Northern Fossa Magna (NFM), which is a Miocene intra-arc in Central Japan. Results from analogue models demonstrate for the first time the role of certain normal faults during the opening and the fill in of the basin. Growth normal faults, which were observed in physical models, validate the structural geology data. This clarified the sedimentary lack of certain members in the western part that of the study area and the remarkable strata thickening from east to the west. It suggests that the NFM basin has been largely controlled by an extensive tectonic regime from Early Middle Miocene to Late Miocene period, and relatively during the Pliocene. During the tectonic inversion, a popup structure of the basin was observed. This structure was guided by reactivation for shortly of the pre-existed normal faults at the end of the Pliocene then by the new created—in and out of the basin—reverse and thrust faults in Pleistocene, which continued to slip during the Holocene. Some of them are still active nowadays, namely the Itoigawa-Shizuoka Tectonic Line as thrust fault developed within the basin, the West Nagano Basin fault and probably some other reverse and thrust faults developed in the basement, to which the active seismicity recorded out the NFM basin is probably related.

Keywords: Analogue Modeling, Northern Fossa Magna, Itoigawa- Shizuoka Tectonic Line, Japan.