博 士 論 文 の 要 約

島根大学大学院総合理工学研究科博士後期課程
マテリアル創成工学 特別プログラム地球・地球環境　専攻
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September, 2015

Organic geochemical study on the Jurassic to Quaternary sediments of onshore and offshore basins, Western Sri Lanka

（スリランカ西部の陸域および海域堆積盆地におけるジュラ系～第四系堆積物に関する有機地球化学的研究）

Sri Lanka records on of the longest and complete tectonic evolution from the mid-latitude in the southern hemisphere (during the Jurassic) to the equatorial northern hemisphere. Onshore and offshore sedimentary basins in Sri Lanka provide the natural laboratory to reconstruct paleoenvironmental and paleoclimatic during its northward voyage from Gondwana to Asia. The Jurassic Gondwana sediments were collected from the onshore Andigama and the Tabbowa Basins. The drillcore cutting samples from the Late Cretaceous to Miocene were obtained from the two exploration wells (the Barracuda and Dorado North) in the offshore Mannar Basin. The Late Quaternary sediment samples were collected from the coastal Bolgoda Lake in the southwest of Sri Lanka. CHNS elemental analysis (n = 1279) and gas chromatography and mass spectrometer (GC-MS) analysis (n = 177) were performed for sediment samples. The standard burial history, thermal maturity, and kinetic models were prepared for the Mannar Basin using petroleum system modeling software (BasinMod 1-D). The ^{14}C radiometric dating was carried out using accelerated mass spectrometry for the Late Quaternary Bolgoda Lake samples.

[The Jurassic Andigama and Tabbowa Basins] Total organic carbon (TOC) contents are high (3.05-5.10%) in the Jurassic Andigama Basin. The Andigama mudstones are thermally immature. Terrestrial organic matter (OM) were deposited in the freshwater swamp under oxic condition. The OMs were mainly originated from gymnosperm with fungi.

[The pericratonic Mannar Basin] At the end of the Late Paleocene, sedimentary facies were drastically changed from calcareous mudstone to argillaceous marl/ marlstone. These facies variations have an apparent relation with the sedimentation rates in the basin. This shift is interpreted as the continuous subsidence of the basin and changes of an arid climate into warm and humid tropical conditions. The lowest sedimentation rate was recorded during the Eocene suggesting that the timing of collision between Indian and Asian plates. Burial history indicates rapid subsidence from the Late Cretaceous to the Paleocene during the rift transition stage. Subsidence rate was decreased during the Eocene. The deposition of $CaCO_3$ rich sediments could indicate movement of Indian plate into northward warmer tropical latitudes since the Late Paleocene. It is correlated with the Cenozoic global cooling towards the present glaciated Earth. TOC contents are relatively low (< 1%) in the lower most Early Campanian sediments. However, the Early Campanian to Late Maastrichtian, the Late Campanian to Late Maastrichtian and Middle

Oligocene to Early Miocene sediments can be recognized as OM rich source rock beds in this basin. The kinetic model of the representative Cretaceous sediments can indicate natural gas generation since the Early Eocene. The natural gas generation was gradually increased and reached peak conditions during the Miocene.

[The coastal Bolgoda Lake] The history of the Bolgoda Lake can be divided into two major chronostratigraphic divisions that are quasi-steady state (from ~7.5 ky B.P. to ~2.5 ky B.P.) and non-steady state (from ~2.5 ky B.P. to the Recent). The major environmental change was characterized by enhancement of TOC (%) and accumulation of reworking terrestrial OM in the semi-closed aquatic system after the sea-level regression (~2.5 ky B.P.). Accumulations of petroleum residues and pyrogenic polycyclic aromatic hydrocarbons (PAHs) in modern sediments identified anthropogenic activity after the European settlement (15^{th} century).

The results show in the Jurassic to Quaternary onshore and offshore basins of Western Sri Lanka that (1) organic carbon burial is significantly controlled by terrestrial OM sources, (2) evaluation of OM type is essential to reconstruct paleoenvironment characteristics, and (3) nutrient availability is normally enhanced in terrestrial OM rich sediments in these basins.

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