[EJ] Evening Poster | S (Solid Earth Sciences) | S-RD Resources, Mineral Deposit & Resource Exploration

[S-RD33]Resource Geology

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Ore deposits consisting of supracrustal concentrated valuable elements and minerals result from the Earth's dynamics including magmatism, hydrothermal activity, metamorphism, and weathering. The formation of ore deposits is also closely associated with global environmental changes and biological evolution in the Earth's history. Involvement of different academic fields in Earth Science including Geology, Petrology, Mineralogy, and Microbiology is required to understand the genesis of ore deposits. The filed of Resource Geology is essential not only for efficient exploration and development of ore deposits but also for better understanding and assessment of hazardous elements that may be caused by resources development. This session widely covers various topics of field investigation and observation, laboratory experiments, theoretical calculation, development of analytical methods and others related to the supracrustal migration and concentration of elements.

[SRD33-P12]Geological and geochemical studies on Miocene diatomaceous sedimentary rocks at Akita and Aomori in Japan; role of sulfur in maturation of organic matter and petroleum formation

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Major oil and gas fields in Japan are located in the northeast of Honshu island. Most productive areas are found in the middle Miocene Onagawa Formation and its equivalent formations [1]. These formations are composed mainly of diatomaceous sediment including sulfur-rich organic matter (OM).

The role of sulfur in maturation of organic matter and petroleum formation is controversy. Petroleum is mostly formed through the partial decomposition of kerogen in response to thermal stress during diagenetic stage [2]. For example, kerogen contain significant amounts of sulfur (8–14 wt %) at Miocene Monterey oil field in California. The Monterey oil field generated many of the early products of OM such as low gravity oils [3], suggesting the possibility that the existence of sulfur in OM could accelerate petroleum formation. This phenomenon has been explained by the early cleavage of C–S and S–S bonds, which are relatively weaker than C–C bond, in the sulfur-rich kerogen in the previous studies [2, 4]. However, previous investigators also questioned for oil generation model promoted by presence of sulfur.

Therefore, in order to constrain the role of sulfur in petroleum formation, EOM and kerogen in sulfur-rich Miocene sedimentary rocks were analyzed in the present study. Geological surveys were conducted in Takanosu (Akita) and Ajigasawa (Aomori) areas. Examined rocks in both areas are equivalent in age to Onnagawa Formation. We found petroleum-like matter on the outcrop during the geological survey. Kerogen

was isolated by the HCl/HF acid treatment from the collected samples. The sulfur concentrations of kerogen samples were 2 to 9 wt %, after pyrite separation, indicating sulfur-rich organic matter are certainly present in examined samples.

The Soxhlet extraction of EOM was performed on collected samples. The EOM were analyzed for biomarker compounds and sulfur isotopic composition. Organic sulfur compounds such as highly branched isoprenoid (HBI) thiophenes and alkylthiophenes were detected by gas chromatography / mass spectrometry analysis. Based on C_{31} hopanes 22S/(22S + 22R) ratios and C_{29} steranes 20S/(20S + 20R) ratios, maturation grade of organic matter in these rocks was too low to generate petroleum. This is enigmatic to explain the oil generation in this area.

Most likely oil generation was happening in distal areas from the sample collections, through various sulfur-organic compounds with help of heat energy addition by local volcanisms. These results would suggest that the presence of sulfur in organic matter accelerates decomposition of OM, and petroleum generation even in a younger sediments.

[1]Aoyagi and Omokawa, Jour. Petrol. Sci. Engi., 1992, [2]Lewan, Nature, 1998, [3]Baskin and Peters, Ame. Asso. Petro. Geol., 1992, [4]Orr, Org. Geoch., 1986