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Variations of the depositional environment in coal beds offshore Shimokita (Japan)

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The purpose of IODP Expedition 337, Deep Coal Biosphere off Shimokita (Japan), aboard the drilling vessel *Chikyu* in summer 2012 was to identify and characterize the biosphere of deep coal beds and hydrocarbon system in the region. Investigation on the different characteristics of coal beds is of great importance to achieve this aim.

Ten Cenozoic coaly layers, four of them with thicknesses of at least 1m, were cored by riser-drilling between 1820 and 2450 mbsf. Bulk parameters (C/S, Rock Eval pyrolysis) as well as moisture and ash content were determined. In addition, organic petrographic investigations and vitrinite reflectance (%Rr) measurements were applied following established procedures.

Maturity of coal beds increases slightly with depth from 0.35 to 0.49%Rr (sub-bituminous coal). The properties of the coal beds differ considerably. Ash yields are relative high (10 - 25%) except coal beds from 1957, 1993, 2000 mbsf and the lower part of the lowermost coal bed at 2448 mbsf (< 10%). The sulfur content ranges between 1 and 5% above 1993 mbsf, but is lower than 1% in coal beds below 1993 mbsf except one sample (6%). Hydrogen index (HI) changes from 150 mgHC/gTOC in the lowermost part of the well to a maximum of 300 mgHC/gTOC, suggesting a depth related trend to higher abundance of kerogen type II within shallower coal beds. This is supported by an increase of liptinite (especially resinite and sporinite) inversely related to burial depth. Vitrinite, the main constituent of the studied coal beds, shows high abundance of detro- and telovitrinite macerals. The main liptinite macerals are sporinite, resinite, fluorinite and minor amounts of alginite, whereas funginite is the only inertinite maceral occurring in a countable amount in all coaly layers.

Relative high ash yields may indicate that all coal beds were deposited in a low-lying mire. Elevated sulfur contents in the upper coal beds suggest marine/brackish influence.