

MIS005-07

Room: Function Room B

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Methane flux from the methane plume over the gas hydrate field of the Umitaka Spur, Japan Sea

Kazuhiro Tsuchinaga¹, Ryo Matsumoto^{1*}

¹Dept of Earth & Planet Sci Univ of Tokyo

The Umitaka Spur, off Joetsu, off Joestu, eastern margin of Japan Sea is characterized by the pockmarks and mounds. A number of large methane plumes and massive gas hydrate have been observed on the seafloor, indicating very active methane venting and sub-seafloor migration. Ongoing processes induced by the methane emission from the seafloor to the seawater, and from the sea surface to the atmosphere, that is, the environmental impacts of methane venting, have not been fully understood as yet. High methane concentration are often observed at about 200 m below sea level (mbsl). Observation of methane plumes, which are composed of gas hydrate bubbles and gas hydrate coated methane bubbles, and consideration on the behavior of ascending gas hydrate in cold-water column are likely to suggest a CHIMNEY MODEL. A 200 m long chimney with lots of small holes stands over methane seep site. Large amount of methane is transported to the end of the chimney at around 200 mbsl where gas hydrate starts to dissociate due to low P and high T, whereas small amount of methane is supplied to the intermediate water levels. Thus methane is effectively conveyed to shallow levels. According to this model, methane concentration of seawaters at 100m to 200m levels should be extremely high, while, as a matter of fact, the concentration is only twice as much as those below and above water masses. This is well explained by high velocity surface waters. Assuming a steady state model, total amount of methane emitted to the seawaters over the methane plume is estimated from the velocity of seawaters as measured by LADCP, and methane concentration of the respective waters. Total amount is about 4.5 mol/s, which is equivalent to an expulsion of 1 L of methane gas per 1 second. The methane flux from the seawater into the atmosphere has been estimated to be 242 nmol per second in the same area as calculated from the relation between the atmospheric methane and dissolved methane concentration. This amount corresponds to 330 mL methane per day, which is less than 1 % of total flux from the seafloor.

Keywords: methane flux, Umitaka Spur, gas hydrate, methane plume