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Carbon isotope concentration as a key of methane origin, Yamal Peninsula.

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Yamal Peninsula is located in northwest part of Siberia in Russia. The central part is limited by the Yuribei River in the south and the Nadui-Yakha River in the north, including areas of active gas extraction and transportation. The region is in the zone of continuous permafrost and contains a substantial amount of hydrocarbons in the depths from about 20 m to about 130 m (Rivkina et al., 2006; Rivkin, 1997; Chuvilin, 2007; Bondarev et al., 2008; Lein et al., 2003; Leibman et al., 2003; 2011; Streletskaya et al., 2014). The depth of the Yamal hole is within this interval. Gas is enclosed in the ground ice and dissolved in unfrozen water.

The crater in Central Yamal is a unique place and no similar landform has been reported previously (Hovland and Judd, 1988; 1992; Hovland et al., 2002; Mironyuk and Otto, 2014). Similar to gas-hydrate behavior and subsea processes in gas-bearing provinces Yamal crater possibly originated from warmer ground temperatures and an increase in unfrozen water content, leading to an increase in pressure from gas emissions from permafrost and ground ice (Leibman et al, 2014).

Methane concentration range from 2.8–0.3 % outside the hole to 9.6–9.8 % inside the crater (Leibman et al, 2014). The main object of this study is to understand the details of the origins of methane. Mantle origin of methane is not supported by the observed variations of d13C in Yamal crater.