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Active seepage and water infiltration in Lake Baikal sediments: new thermal data from TTR-Baikal 2014 (Class@Baikal)

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New thermal data from the sediments of Lake Baikal were collected in July 2014 during the first Training-Through-Research cruise on Lake Baikal (Class@Baikal) organized by MGU and LIN. TTR-Baikal is a comprehensive multidisciplinary program to train students on the field on pertinent scientific topics. The cruise program focused on seafloor sampling, acoustic investigations and heat flow measurements of gas seeps, flares, mud volcanoes, slumps and debris flows, canyons and channels in the coastal proximity.
The thermal data were acquired using autonomous temperature sensors on a 3 meter long gravity corer that allowed analysis at the same spot of sediments, pore fluids, hydrates and microbiology. A total of eight thermal measurements were performed in five structures located on the lake floor of the Central Baikal Basin at 333-1530 meter water depths: 3 mud volcanoes (Novosibirsk, Unshuy and Krest), 1 seep site (Seep 13), and one fault outcrop in the Selenga transfer zone. All studied structures show signals of active seepage, water infiltration and/or hydrate dynamics. The strongest thermal gradient has been measured in Seep 13, suggesting a strong upflow of warm fluids similar to the Gorevoy Utes seep. At the three mud volcanoes, hydrate presence have been evidenced and both enhanced and reduced thermal gradients have been observed. This is similar to the hydrate-bearing K-2 mud volcano in Baikal (Poort et al., 2012). A strongly reduced thermal gradient was observed in the Krest mud volcano where the presence of oxidized channels at 30-40 cm under the sediment surface indicate an infiltration of cold lake water. The water infiltration process at hydrate bearing seep sites will be discussed and compared with other seep areas in the world.