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Interactive comment on "Turbulence in the stratified boundary layer under ice: observations from Lake Baikal and a new similarity model" *by* Georgiy Kirillin et al.

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We sincerely thank Dr. Huang for the valuable contribution to the discussion on our study. Indeed, the recently appeared study of Huang et al. (2019) on heat budget of a Tibetan ice-covered pond represents a great evidence of the large importance of the water-ice heat flux for the ice cover growth and melt: The absolute values of the flux in a thermokarst alpine lake are comparable or even larger than those found in Lake Baikal that makes the heat balance of two systems similar. Both in our study and in the study of Huang et al. (2019), the water-ice heat flux was estimated from the heat balance at the ice-water interface, using similar measurement setup with frozen ther-

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mistor chains. In that way, the results are inter-comparable, and we add in Discussion a reference to the study of Huang et al. The possible way of parameterization of the ice-water heat flux in thermokarst Tibetan lakes remains to be an intriguing question. The D-O scaling proposed in our study can only be used used if information is available on the TKE production or dissipation rates, with subsequent parameterizations of the turbulence intensity based on the large-scale forcing. The latter is apparently different in thermokarst lakes than in Lake Baikal or other large lakes and seas. In deep Lake Baikal, in turn, the water column remains relatively cold throughout the ice season, but the strong upward heat flux is conditioned by the strong turbulent mixing due to large-scale under-ice currents. The upward heat release in the rather shallow (< 2 m mean depth) thermokarst lake is produced mainly by the heating of the water column due to the solar radiation, which is very strong over the Tibetan Plateau. As a result, the water temperatures under ice achieve values of up to 9 ^{o}C, creating a strong gradient at the ice-water interface. The apparent source of turbulence is in this case free convection due to the negative buoyancy flux. In the typical conditions during the ice cover melt in Tibetan lakes, the mean water column temperature is above the maximum density values of $\approx 3.98^o$C. In this case, the convection is very non-stationary (see e.g. Kirillin and Terzhevik 2011), so that its parameterization is non-trivial. As rightly mentioned by Huang et al. in their discussion, direct measurements of turbulence under ice could provide the necessary quantitative information on the turbulence mixing in these quite specific conditions.

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