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ABSTRACT BOOK

INTER-SEASONAL CARBON DYNAMICS OF OLIGOTROPHIC, SUBALPINE LAKE LUNZ, AUSTRIA

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Within lake catchments, organic matter (OM) is transported to lakes by inflowing water, retained in biota and sediments, respired, and also discharged into outflowing streams. In this multiannual field study (2013-2016), we investigate the quantity and biochemical quality of OM in Lake Lunz, Austria, as well as its CO2 emissions. We hypothesized that inflowing water and settling particles contain mostly recalcitrant particular OM (POM), whereas outflowing lake water is mainly composed of more labile, algae-derived OM. We collected OM at a monthly basis from lake in- and outflow, and as settling POM and in lake sediments. In addition, we assessed annual sedimentation rates (~1.1 mm a-1) and time integrated loads of settling particles to Lake Lunz (~50 t C a-1), analyzed stable isotopes to track changes in carbon sources and trophic compositions, and used source-specific fatty acids as indicators of allochthonous, bacterial, and algal-derived OM. Preliminary results indicate that inflowing POM is rich in terrestrial markers with little contribution of more labile autochthonous stream POM. However, POM in outflowing water contains clearly higher algae-derived fatty acids. The annual load of settling particles includes high contents of algae-derived OM, suggesting low degradation of such labile OM within the water column. Phosphorous concentrations remained stable throughout the sediment cores, implying that past changes in climatic forcing did not alter the load of this limiting nutrient in lakes. Ongoing research investigates how CO2 emissions from Lake Lunz compare with the seasonal flows of OM quantity and its biochemical quality.

UNDER-ICE DYNAMICS OF DISSOLVED OXYGEN FROM LAKE TOVEL (ITALY) BASED ON HIGH FREQUENCY DATA FROM THREE WINTERS

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In dimictic oligotrophic lakes, under-ice metabolism, dissolved oxygen (DO) dynamics and depletion are poorly understood. Here, we present high frequency (HF) data of under-ice DO dynamics measured at two depths (5 and 25 m) for three winters (January to March 2014, 2015, and 2016) in Lake Tovel, a small, montane lake (1178 m above sea level; area 38 ha; maximum depth 39 m). We assessed i) metabolic rates at a daily scale based on HF data for DO and light for winter 2016, and ii) DO depletion rates at a seasonal scale for all three winters. We applied different methods to estimate lake metabolism (i.e. book keeping and inverse modelling); in metabolic calculations, many days with low DO signals, zero light, and a nighttime DO increase had to be considered. We applied rigorous criteria of data management for lake metabolism calculations that resulted in many days with no metabolic rates. In agreement with its oligotrophic state and low dissolved organic carbon content, Lake Tovel was net heterotrophic. At a seasonal scale, DO concentrations at 5 m declined in 2014, remained stable in 2015 and increased in 2016, and these differences were linked to radiatively driven convective mixing. We hypothesise that coupling physical processes with lake metabolism will bring new insights to DO dynamics in ice covered systems.