Freshwater ostracods from ice-wedge polygon ponds in Adventdalen, Svalbard

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Ice-wedge polygon ponds in Adventdalen, Svalbard, differ in hydrochemical parameters according to pond type. We report the first finding of the freshwater ostracod species Tonnacypris glacialis from Adventdalen.

Background and method

Polygon ponds and freshwater ostracods
Ice-wedge polygons form due to thermal contraction cracking in the ground. On the ground surface, depressions or trenches appear if water-filled, those ponds are the most abundant aquatic ecosystem type in the Arctic. Ostracods are 1-2 mm long crustaceans. They often inhabit polygon rims and serve as proxies in paleo-environmental studies. However, environmental conditions in periglacial waters are rarely studied.

Pond characteristics

Dimensions Circular intrapolygon ponds (diameter 15-15m) and V-shaped interpolygon ponds (20-30m long, up to 1m wide) were 9-30cm deep.

Hydrochemistry Hydrochemical characteristics reveal differences between interpolygon and intrapolygon ponds (Figs. 5, 6). Overall electrical conductivity (EC), water hardness and alkalinity are elevated in interpolygon ponds, while temperature and pH are decreased. In contrast, we found higher relative abundances of HCO₃⁻, Na and K in intrapolygon ponds.

Ostracod assemblage

We found exclusively female Tonnacypris glacialis (Figs. 7, 8) with dark olive-green valves in pond AD-01. The species commonly occurs north of latitude 65°N, reproducing parthenogenetically with overwintering eggs (Griffith et al. 1998). We collected 13 ponds (8 intrapolygon, 5 interpolygon ponds) in July 2013. Polygon rims with frost cracks. We collected a data-set as from the other ponds. From Griffith et al. 1998. Wepa Island. We collected 13 ponds (8 intrapolygon, 5 interpolygon ponds) a data-set was collected comprising:

- general characteristics (coordinates, water and thaw depth),
- air and water temperature,
- water sampling (standard parameters, ion composition),
- freshwater ostracods.

Precipitation and river water was also sampled.

Field observations

During August, the water level in all ponds rose and formerly dry intrapolygon depressions turned into ponds. The newly formed neighbouring pond merged with AD-01, roughly doubling its size. At the last sampling day, September 25, 2013, the pond was covered with clear 2 cm thick ice with bubbles, while the ostracods were alive.

Acknowledgments

Anne Hømre, Stefanie Härtel, Hanne Christensen, Mathias Ulrich, Albert and Maria Bergströms Stiftelse
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References