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State of Arctic Sea Ice North of Svalbard during N-ICE2015

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The N-ICE2015 cruise, led by the Norwegian Polar Institute, was a drift experiment with the research vessel R/V Lance from January to June 2015, where the ship started the drift North of Svalbard at 83°14.45' N, 21°31.41' E. The drift was repeated as soon as the vessel drifted free. Altogether, 4 ice stations where installed and the complex ocean-sea ice-atmosphere system was studied with an interdisciplinary Approach. During the N-ICE2015 cruise, extensive ice thickness and snow depth measurements were performed during both, winter and summer conditions. Total ice and snow thickness was measured with ground-based and airborne electromagnetic instruments; snow depth was measured with a GPS snow depth probe. Additionally, ice mass balance and snow buoys were deployed. Snow and ice thickness measurements were performed on repeated transects to quantify the ice growth or loss as well as the snow accumulation and melt rate. Additionally, we collected independent values on surveys to determine the general ice thickness distribution. Average snow depths of 32 cm on first year ice, and 52 cm on multi-year ice were measured in January, the mean snow depth on all ice types even increased until end of March to 49 cm. The average total ice and snow thickness in winter conditions was 1.92 m. During winter we found a small growth rate on multi-year ice of about 15 cm in 2 months, due to above-average snow depths and some extraordinary storm events that came along with mild temperatures. In contrast thereto, we also were able to study new ice formation and thin ice on newly formed leads. In summer conditions an enormous melt rate, mainly driven by a warm Atlantic water inflow in the marginal ice zone, was observed during two ice stations with melt rates of up to 20 cm per 24 hours. To reinforce the local measurements around the ship and to confirm their significance on a larger scale, we compare them to airborne thickness measurements and classified SAR-satellite scenes. The here presented data set is important for understanding the ocean-ice-atmosphere interactions, for calculating energy fluxes, and biogeochemical processes.