

## Thema einer Masterarbeit

Thema	Role of ocean processes in Arctic amplification: Sensitivity to regional climate engineering
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Kurzbeschreibung:	<p>The magnitude of Arctic warming is twice that of global warming. This is partly attributable to the sea-ice/albedo feedback (Polyakov et al., 2012) and dynamical radiative feedbacks (Chylek et al., 2009, Yoo et al., 2011). Screen et al. (2012) reported that the Arctic warming is also characterized by the surface temperature (SST) changes outside the Arctic region. Negative trends in the North Atlantic Oscillation (NAO) induce SST change in the tropics which are strongly associated with recent warming in the Arctic through forcing the extra-tropical wave train (Ding et al., 2014).</p> <p>In the proposed Master's project, this is to be seen in the context of possible future climate interventions: Climate engineering (CE) by radiation management (RM) has been proposed an efficient tool to alleviate the global warming (Nicholson et al., 2018). Although CE would eventually cool the Earth (Jones et al., 2010, 2009), model based climate engineering studies have identified residual warming in the Arctic (Stjern et al., 2018; Aswathy et al., 2015). CE may potentially be applied regionally (Quaas et al., 2016). When RM is implemented to exert a negative radiative forcing over North America, preliminary studies showed a significant – warming – influence on the Arctic. This is associated with weakening of surface westerly winds, but also with ocean dynamics and thermodynamics. The proposed Master's thesis would investigate these mechanisms on the basis of existing simulations with a coupled climate model, by analyzing changes in SST, ocean temperature, ocean heat content and ocean circulation in the Northern oceans.</p>
Literatur:	<p>Polyakov, I., et al., Bull. Am. Meteorol. Soc. 93, 145–151 (2012).          Chylek, P., et al., Geophys. Res. Lett. 36, L14801 (2009).          Yoo, C., et al., Geophys. Res. Lett. 38, L24804 (2011).          Ding, Q., Nature, 509, 209–212 (2014).          IPCC, Climate change 2013: The physical science basis, Cambridge University Press, Cambridge, doi:10.1017/CBO9781107415324.          Jones, A., et al., J. Geophys. Res. D10106, (2009)          Aswathy, V. N., et al., Atmos. Chem. Phys., 15, 9593–9610, (2015).          Stjern, C. W., et al., Atmos. Chem. Phys., 18(2), 621–634, (2018).          Nicholson, S., Climate Policy, 18(3), 322–334 (2018).</p>