Data Description

1. PROJECT

Title: **Impact of internal wave drag on Arctic sea ice**

Funding organisation:

2. DATASET

Title: Simulations with the ocean - sea ice model NEMOv3.6 and CICEv5.1 to study the impact of internal wave drag

A parameterization of the impact of internal waves on momentum transfer at the sea ice-ocean interface based on previous work by McPhee, has been implemented in a sea ice model for the first time. The ice-ocean drag from internal waves is relevant for shallow mixed layer depth and the presence of a density jump at the pycnocline and is also a function of the strength of the stratification beneath the ocean mixed layer and geometry of the ice interface. We present results from a coupled sea ice-ocean model where the parameterization of internal wave drag has been implemented. A full description of model setup is provided in Flocco et al. (Annals of Glaciology, 2024).

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Organisation: University of Reading

Rights-holder: University of Reading

3. TERMS OF USE

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4. CONTENTS

Monthly means from the default NEMO-CICE simulation and the NEMO-CICE simulation with internal wave drag. The data is stored in netCDF format on the on our 1deg tripolar grid with the following variables:

-1 hi_m grid cell mean ice thickness [m]

-2 hs_m grid cell mean snow thickness [m]

-3 Tsfc_m snow/ice surface temperature [C]

-4 aice_m ice area (aggregate) [1]

-5 sice_m bulk ice salinity [ppt]

-6 fswdn_m down solar flux [W/m^2]

-7 flwdn_m down longwave flux [W/m^2]

-8 snow_ai_m snowfall rate [cm/day]

-9 rain_ai_m rainfall rate [cm/day]

-10 sst_m sea surface temperature [C]

-11 sss_m sea surface salinity [ppt]

-12 frzmlt_m freeze/melt potential [W/m^2]

-13 fswfac_m shortwave scaling factor [1]

-14 fswabs_ai_m snow/ice/ocn absorbed solar flux [W/m^2]

-15 albsni_m snow/ice broad band albedo [%]

-16 alvdf_m visible dihuse albedo [%]

-17 alidf_m near IR dihuse albedo [%]

-18 albice_m bare ice albedo [%]

-19 albsno_m snow albedo [%]

-20 albpnd_m melt pond albedo [%]

-21 flat_ai_m latent heat flux [W/m^2]

-22 fsens_ai_m sensible heat flux [W/m^2]

-23 flwup_ai_m upward longwave flux [W/m^2]

-24 evap_ai_m evaporative water flux [cm/day]

-25 Tair_m air temperature [C]

-26 congel_m congelation ice growth [cm/day]

-27 frazil_m frazil ice growth [cm/day]

-28 snoice_m snow-ice formation [cm/day]

-29 meltt_m top ice melt [cm/day]

-30 melts_m top snow melt [cm/day]

-31 meltb_m basal ice melt [cm/day]

-32 meltl_m lateral ice melt [cm/day]

-33 fresh_ai_m freshwtr flx ice to ocn [cm/day]

-34 fsalt_ai_m salt flux ice to ocean [kg/m^2/s]

-35 fhocn_ai_m heat flux ice to ocean [W/m^2]

-36 fswthru_ai_m SW flux thru ice to ocean [W/m^2]

-37 strength_m compressive ice strength [N/m]

-38 divu_m strain rate (divergence) [%/day]

-39 shear_m strain rate (shear) [%/day]

-40 dvidtt_m volume tendency thermo [cm/day]

-41 dvidtd_m volume tendency dynamics [cm/day]

-42 daidtt_m area tendency thermo [%/day]

-43 daidtd_m area tendency dynamics [%/day]

-44 dagedtt_m age tendency thermo [day/day]

-45 dagedtd_m age tendency dynamics [day/day]

-46 mlt_onset_m melt onset date [day of year]

-47 frz_onset_m freeze onset date [day of year]

-48 trsig_m internal stress tensor trace [N/m^2]

-49 ice_present_m fraction of time-avg interval that ice is present [1]

-50 iage_m sea ice age [years]

-51 FYarea_m first-year ice area

-52 alvl_m level ice area fraction [1]

-53 vlvl_m level ice volume [m]

-54 ardg_m ridged ice area fraction [1]

-55 vrdg_m ridged ice volume [m]

-56 dardg1dt_m ice area ridging rate [%/day]

-57 dardg2dt_m ridge area formation rate [%/day]

-58 dvirdgdt_m ice volume ridging rate [cm/day]

-59 opening_m lead area opening rate [%/day]

-60 apond_m melt pond fraction of sea ice [1]

-61 apond_ai_m melt pond fraction of grid cell [1]

-62 hpond_m mean melt pond depth over sea ice [m]

-63 hpond_ai_m mean melt pond depth over grid cell [m]

-64 ipond_m mean pond ice thickness over sea ice [m]

-65 ipond_ai_m mean pond ice thickness over grid cell [m]

-66 apeh_m radiation-ehective pond area fraction of sea ice [1]

-67 apeh_ai_m radiation-ehective pond area fraction over grid cell [1]

-68 hfreebd_m hfreebd: freeboard [m]

-69 hdraft_m hdraft: draught [m]

-70 hridge_m hridge: ridge height [m]

-71 distrdg_m distrdg: distance between ridges [m]

-72 hkeel_m hkeel: keel depth [m]

-73 dkeel_m dkeel: distance between keels [m]

-74 lfloe_m lfloe: floe length [m]

-75 dfloe_m dfloe: distance between floes [m]

-76 Cdn_atm_m Ca: total ice-atm drag coehicient [none]

-77 Cdn_ocn_m Cdn_ocn: total ice-ocn drag coehicient [none]

-78 Cdn_atm_skin_m Cdn_atm_skin: neutral skin ice-atm drag coehicient [none]

-79 Cdn_atm_floe_m Cdn_atm_floe: neutral floe edge ice-atm drag coehicien [none]

-80 Cdn_atm_pond_m Cdn_atm_pond: neutral pond edge ice-atm drag coehicien

[none]

-81 Cdn_atm_rdg_m Cdn_atm_rdg: neutral ridge ice-atm drag coehicient [none]

-82 Cdn_ocn_skin_m Cdn_ocn_skin: neutral skin ice-ocn drag coehicient [none]

-83 Cdn_ocn_floe_m Cdn_ocn_floe: neutral floe edge ice-ocn drag coehicien [none]

-84 Cdn_ocn_keel_m Cdn_ocn_keel: neutral keel ice-ocn drag coehicient [none]

-85 Cdn_atm_ratio_m Cdn_atm_ratio: ratio total drag / neutral drag (atm) [none]

-86 Cdn_iw_m Cdn_iw: neutral internal wave drag [none]

-87 gamma_m gamma: attenuation factor of internal wave drag [none]

-88 hmix_m hmix: mixed layer depth from NEMO [none]

-89 deltaB_m deltaB: reduced gravity [none]

-90 uocn_mix_dn_m uocn_mix_dn: current in ML [none]

-91 vocn_mix_dn_m vocn_mix_dn: current in ML [none]

-92 sigma_theta_m sigma_theta [none]

-93 sigma_theta_up_m sigma_theta_up [none]

-94 N2_m N2 [none]

-95 aicen_m ice area, categories [1]

-96 vicen_m ice volume, categories [m]

-97 ardgn_m ridged ice area fraction, category [1]

-98 vrdgn_m ridged ice volume, category [m]

-99 dardg1ndt_m ice area ridging rate, category [%/day]

-100 dardg2ndt_m ridge area formation rate, category [%/day]

-101 dvirdgndt_m ice volume ridging rate, category [cm/day]

-102 krdgn_m ridging thickness factor, category [1]

-103 aparticn_m ridging ice participation function, category [1]

-104 aredistn_m ridging ice area redistribution function, category [1]

-105 vredistn_m ridging ice volume redistribution function, category [1]

-106 araftn_m rafted ice area fraction, category [1]

-107 vraftn_m rafted ice volume, category [1]

-108 apondn_m melt pond fraction, category [1]

-109 hpondn_m melt pond depth, category [m]

-110 apehn_m ehective melt pond fraction, category [1]

-111 uvel_m ice velocity (x) [m/s]

-112 vvel_m ice velocity (y) [m/s]

-113 uatm_m atm velocity (x) [m/s]

-114 vatm_m atm velocity (y) [m/s]

-115 uocn_m ocean current (x) [m/s]

-116 vocn_m ocean current (y) [m/s]

-117 strairx_m atm/ice stress (x) [N/m^2]

-118 strairy_m atm/ice stress (y) [N/m^2]

-119 strocnx_m ocean/ice stress (x) [N/m^2]

-120 strocny_m ocean/ice stress (y) [N/m^2]

-121 strintx_m internal ice stress (x) [N/m^2]

-122 strinty_m internal ice stress (y) [N/m^2]

-123 sig1_m norm. principal stress 1 [1]

-124 sig2_m norm. principal stress 2 [1]