**WRF simulations for Norway (4NORWAY)**

**Required input data/variables for dynamical downscaling using WRF**

downscaling **NorESM2-MM** with **WRF v3.9.1.1**

**historical period: (**1984 as spinup**) 1985-2014** (30 years)**;**

**Scenario:** still to be decided: available are SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5

In the end, main surface fields (tas, pr, uas, vas, etc., see **Table 3**) should be published with an **DOI**. (Tyge should be main author)

We prioritize scenario **SSP3-7.0**

Updated CAMtr-table fshared with Tyge and Marie

**Historical period:** 1985-2014

**Future periods:** 2041-2070 (1. priority) and 2071-2100 both based on SSP3-7.0.

Table 1: NorESM grid

|  |  |  |
| --- | --- | --- |
|  | **NorESM-LM** | **NorESM-MM** |
| **ocean** | 1 deg (360 x 384; 70 levels)) | 1 deg (360 x 384; 70 levels) |
| **atmosphere** | 2 deg (144 x 96; 32 levels) | 1 deg (288 x 192; 32 levels) |
| **grid** | 1.9 x 2.5 deg lat/lon | 0.9 x 1.25 deg lat/lon |
| **nominal resolution** | 250 km | 100 km |

NorESM data on NIRD: **/projects/NS9034K/CMIP6/ScenarioMIP/NCC/NorESM2-MM**/ssp370/r1i1p1f1/

Table 2:

|  |  |
| --- | --- |
| **Required static data/6-hourly variables** | **path to data** |
| Land mask | fx/sftlf/gn/v20191108/ |
| Surface height |  |
|  |  |
| SST |  |
| Snow depth or SWE |  |
| Sea-ice |  |
| Skin temperature |  |
|  |  |
| Soil moisture (4 layers) | missing |
| Soil temperature (4 layers) | missing |
|  |  |
| Relative or specific humidity (2m and Plev) |  |
| Temperature (2m and Plev) |  |
| U-wind (10m and Plev) | Missing uas |
| V-wind (10m and Plev) | Missing vas |
| Geopotential height |  |

Marie has intermediate files from **NorESM2-MM 1991-2016 (historical)** and 2076-2099 (SSP5-8.5)

Table 3: Required output fields

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **variable name in WRF with CORDEX extension (orig. Name in brackets)** | **units** | **descriptions** | **output frequency** | **required by** |
| tas (T2) | K | 2-m air temperature | hourly | LL, MS |
| huss (Q2) | kg/kg | 2-m specific humidity | hourly | LL, MS |
| ps (PSCF) | Pa | Surface pressure | hourly | LL, MS |
| uas (U10) | m/s | near-surface wind in the u-component | hourly | LL, MS |
| vas (V10) | m/s | near-surface wind in the v-component | hourly | LL, MS |
| pr (RAINC+RAINNC) | kg/m2/s | precipitation | hourly | LL, MS |
| prc (RAINC) | kg/m2/s | convective precipitation | hourly | Steffi |
| rsds (SWDOWN) | W/m2 | downward SW surface radiation | hourly | LL, MS |
| rlds (LWDOWN) | W/m2 | downward LW surface radiation | hourly | LL |
| clt (CLDFRA) | % (1) | total cloudiness | 3- or 6-hourly | MS |
| MSLP | Pa | Mean Sea Level Pressure | hourly | Priscilla |
| SWVISDIR | W/m2 | SWR VIS DIR component | hourly | Priscilla |
| SWVISDIF | W/m2 | SWR VIS DIF component | hourly | Priscilla |
| SWNIRDIR | W/m2 | SWR NIR DIR component | hourly | Priscilla |
| SWNIRDIF | W/m2 | SWR NIR DIF component | hourly | Priscilla |
| u-wind | m/s | 850, 500, 200 hPa | 6-hourly | Marie |
| v-wind | m/s | 850, 500, 200 hPa | 6-hourly | Marie |
| temp | K | 850, 500, 200 hPa | 6-hourly | Marie |

Hourly variables are required to run WRF-Hydro (contact: Lu Li (LL)).

HI needs the fields in 3-hourly or at least 6-hourly output frequency. These are required to run a physical-biological ocean model (contact: Morten Skogen (MS))

Are we interested in more 2-d and maybe 3-d variables? E.g. prhmax, etc...max wind (gusts)...?

Other thoughts?

Table 4: Table with greenhouse gases (to be saved as CAMtr\_volume\_mixing\_ratio.SSP3-7.0 in WRF directory).

--------------------------------------------------------------------------------------------------------------------------

## year[1] | co2 (ppmv) [2] | n2o (ppbv)[3] | ch4 (ppbv)[4] | cfc11 (pptv)[5] | cfc12 (pptv)[6]

## Non values are given by  -9999.999 values

1970  325.000 295.000   1420.000 50.000 109.000

1980  337.000 301.000   1570.000 164.000 290.000

1990  353.000 308.000   1700.000 258.000 467.000

2000  369.000 316.000   1760.000 267.000 535.000

2010  389.000 323.000   1767.000 237.000 525.000

2015  401.700 328.500   1899.700 231.500 518.000

2025  434.800 336.700   2055.400 204.400 471.600

2050  543.900 362.100   2524.200 138.500 365.100

2075  686.800 391.000   2989.500 88.000 280.600

2100  871.600 422.100   3430.700 53.000 214.000

-----------------------------------------------------------------------------------------------------------------------------