Seminar – Dynamik der mittleren Atmosphäre

27.11.2018

Running ICON Eperiments

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Plan for today

- Short recap: ICON-grid & start ICON
- Preparation of the experiments
- Start experiments runs
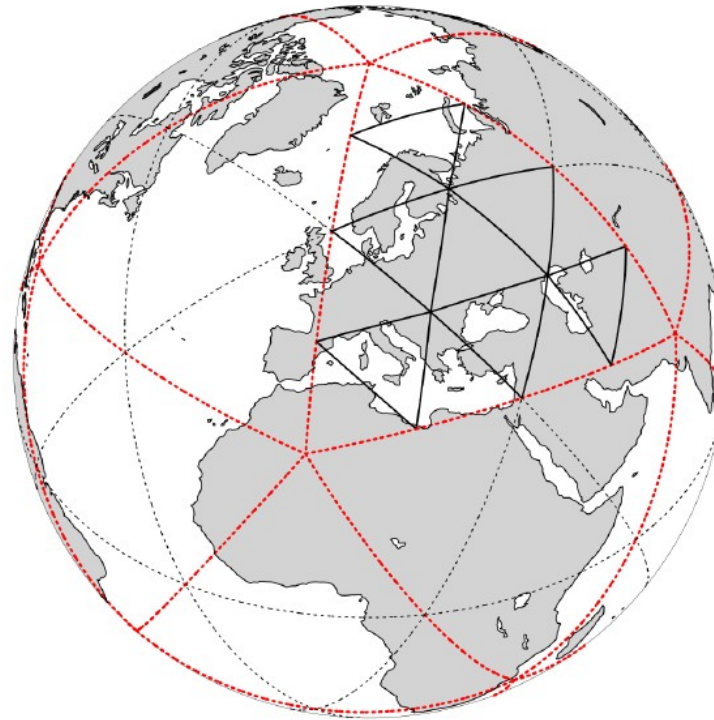
Example grid refinement

Figure 2.1.: Illustration of the grid construction procedure. The original spherical icosahedron is shown in red, denoted as $R1B00$ following the nomenclature described in the text. In this example, the initial division ($n=2$; black dotted), followed by one subsequent edge bisection ($k=1$) yields an $R2B01$ grid (solid lines).

Recap - How to run the ICON?

- Configuration and compiling of the model code

- Starting ICON using a shell script, so called 'run script'

- Run scripts contain:

  - links to all input-data files

  - namelist-settings

  - commands to execute binary model code

Recap - ICON at LIM

– Experiments shall be run at institute's computing clusters (kusi,sarma)

– Account for LIM's system is necessary

– Remote acces is recommended (Uni-VPN/Cisco Client)

– SSH connection is required
  – for windows users: MobaXterm recommended
    (IPs within the University network (VPN):
      sarma: 192.168.154.3
      kusi: 192.168.154.2

Recap **- ICO**sahedra **N**onhydrostatic model – How to run it

→ Create a directory in projekt5

→ Navigate with the linux console to created dierectory

   then procede with the following commands:

```
~$ git clone /projek1/hochatm/dmewes/ICON/icon-aes_midatm

~$ cd icon-aes_midatm

~$ ./configure

~$ make -j8

~$ ./make_runscripts atm_amip_test_midatm

~$ cd run

~$ ./exp.atm_amip_test_midatm.run
```

<u>**ICO**sahedra **N**onhydrostatic model – How to run it</u>

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then procede with the following commands:

~$ git clone /projek1/hochatm/dmewes/ICON/icon-aes_midatm

→ will copy the model code into directory

ICOsahedra **N**onhydrostatic model – How to run it

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```

ICOsahedra **N**onhydrostatic model – How to run it

```
~$ ./configure
```

   → makes sure that all libraries are correctly loaded

```
~$ make -j8
```

   → compiles code with 8 CPU-cores

```
~$ ./make_runscripts atm_amip_test_midatm
```
   → creates runscript with current configuration

```
~$ cd run
```

```
~$ ./exp.atm_amip_test_midatm.run
```

   → enters the directory with the run-scripts and start respective run-script

      → runscripts starts model

<u>**ICO**sahedra **N**onhydrostatic model – How to run it</u>

- exp.atm_amip_midatm

  → should contain running file which runs model for one year without any perturbations

General remarks for model set-up

– 5 years of simulation + **1 year of spin up** has to be performed

   → Spin-up time: time for model to stabilize
      01.01.1979 – 31.12.1979
   → Main analysis time frame 01.01.1980 – 01.01.1985

– 600 seconds time step

– Model Resolution R02B04

– Comparison with provided reference run

Influence of Surface Albedo increase in Siberia on middle atmosphere circulation

Technical description:
- change boundary condition in boundary condition fields
  - use cdo for change value within selected field

- change linking of boundary condition fields in run-script

Conceptual hints:
- find location of boundary condition data
- make a copy of the data
- change albedo with help of cdo

Influence of sea surface temperature increase at the north coast of Eurasia on middle atmosphare cirulation

Technical description:
- ▶ change boundary condition in boundary condition fields
  - ▶ use cdo for change value within selected field

- ▶ change linking of boundary condition fields in runscript

Conceptual hints:
- ▶ find location of boundary condition data
- ▶ make a copy of the data
- ▶ change SST with help of cdo

Influence of non-orographic graivty waves on middle atmosphere*

Technical description:
- ▶ change call frequency of non-orographic gravity wave routine

- ▶ change respective namelist parameter

Experiment	Name	E-mail
Albedo	Anja Adler	
SST	Anna Martin	
GW*	Johanna Seidel	

Get the base runscript for the experiments

▶ Copy the base-runscript for the experiments from
`/projekt5/hochatm/dmewes/ICON/working_runscripts/`
`exp.atm_amip_5year_midatm`
into your ICONs run directory.

▶ create the final runscript with
`./make_runscripts atm_amip_5year_midatm`

▶ change in the resulting file `exp.atm_amip_5year_midatm.run`
`line 40: mpi_procs_pernode=16`
`line 970:`
`EXPDIR=/projekt4/hochatm/dmewes/icon_output/<name>`

Where to change base-runscript?

▸ Find the place within the runscript where you need to change something so that you can solve your problem?

▸ Conceptualize what needs to be changed how and why?

▸ usefull command-line tools:
  ▸ grep   : looking for strings in directories
  ▸ ncdump -h   : gives informations about netCDF File

Where to get the changed boundary conditions?

▶ For the experiments that needs to change the respective boundary condition data
   ▶ Pre-changed data can be found in:
     `/projekt5/hochatm/dmewes/input_data/icon/`
     `changed_bc/done_cdo/`

   ▶ `Data is provided on R02B04 grid aswell as a`
     `regular lat-lon grid (to see what has changed)`

Make your changes
and rund the Model

▶ After you are sure that your changes are correctly implemented in the
`exp.atm_amip_5year_midatm.run`

▶ `~$ rm nohup.out`
(to remove old files)

▶ run the model as following:
  ▶ `nohup nice -10 ./exp.atm_amip_5year_midatm.run &`
    − nohup provide that the terminal output will be written to nohup.out file
    − nice will free ressources for others if needed