WRF4G training session

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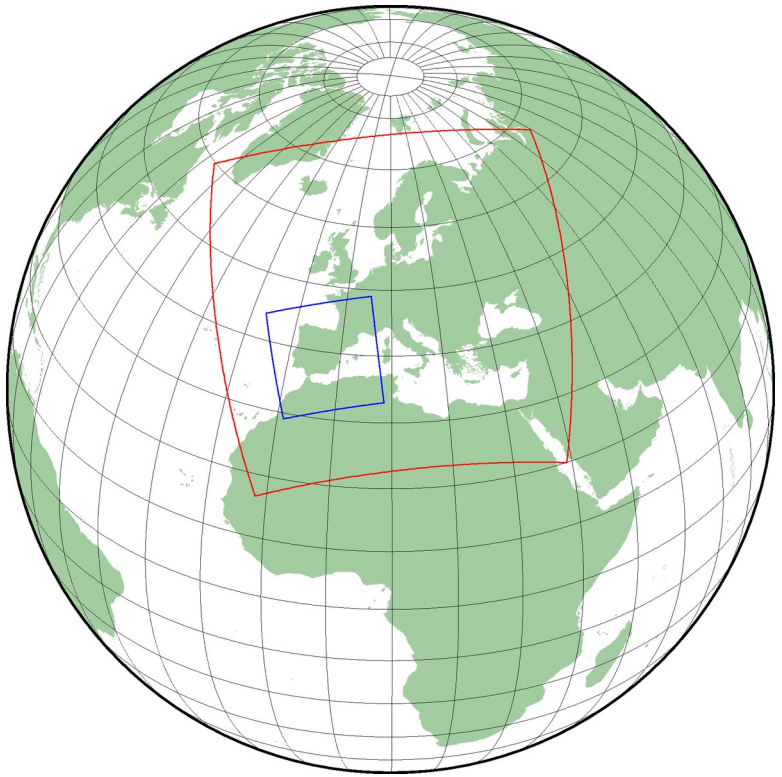
Goals of this session:

- **Part 1**: Configure and run a new experiment in WRF4G, using the EUROCORDEX domain (0.44º) and ERA-40 data.

- **Part 2**: Produce a new domain of 0.11º nested into the previously used domain. Set up a new experiment to run with this domain.



https://dl.dropbox.com/u/23392388/2012_Garcia-Diez_VALUE_WRF4G_training.pdf

To do this, please **divide in 6 groups**:

- In **step one**, each group is going to run a with a different WRF configuration (we need one control)

- In **step two**, each group is going to prepare and run the same simulation, but with a second domain of 0.11º nested over an area of interest.

- It's a good idea having at least 1 person that already knows R in each group.

Due to resource limitations, we are only going to run one chunk of 14 days.

```
start_date          = "2001-01-01_00:00:00"
end_date            = "2001-01-14_00:00:00"
```

Configure the new experiment directly from the templates can be a bit painful. Thus, an example experiments.wrf4g is available at:

```
/home_grid/course/DATA/WRF4G_training/experiment.wrf4g
```

There are still some things to be changed from this file (e.g. it is set up to run with ERA-INTERIM) so **don't directly copy all of it**.

Each group must decide one set of parametrizations, differing in only one parameter from control. Criteria for naming the experiments: ecdx044_ [realization]

e.g. → CTRL, HVRS, LSRU, CUBM

CTRL

```
NIN_e_vert                = 30
NIN_mp_physics            = 6
NIN_radt                  = 48
NIN_cu_physics            = 1
NIN_ra_lw_physics         = 3
NIN_ra_sw_physics         = 3
NIN_sf_surface_physics    = 2
NIN_sf_sfclay_physics     = 1
NIN_bl_pbl_physics        = 1
```

User guide http://www.mmm.ucar.edu/wrf/users/docs/user_guide_V3/ARWUsersGuideV3.pdf

A folder called **wrf4g_files** can be created in the same location as experiment.wrf4g. All the structure inside this folder is copied to wherever WRF is going to run. It can be used to introduce modified configuration files, preprocessor, postprocessor, etc.

```
mkdir -p wrf4g_files/WRFV3/run
```

Copy there **postprocessor.EUROCORDEX** from

/home_grid/course/DATA/WRF4G_training

WRF4G is set up by default to run the previously seen examples.

But, in this case, you must change **resources.wrf4g** so the paths point to the folders with ERA-40 data and the EUROCORDEX domain.

In this case, one month of ERA-40 data is available in:

```
/home_grid/course/DATA/ECMWF/ERA40/escena
```

EUROCORDEX domain is prepared in:

```
/home_grid/course/DATA/WRF/domains
```

Once you have set up your experiment, you must configure it to be sent to the cluster with this specifications:

queue: course
number of processes: 8

And submit it. Now, you are probably going to find some errors...

Once finished, check that the output files are present. Now we are ready to deal with them. But first, it's very convenient to **postprocess** this files.

With this purpose, we are going to use a program called **WRFnc Extract and Join**. You can download it from:

http://www.meteo.unican.es/wiki/cordexwrf/SoftwareTools/WrfncXnj

WRF NetCDF Extract & Join (wrfncxnj) is a tool written in python that allows the user to generate CF compliant NetCDF files from the WRF raw files.

It has been originally developed at the University of Cantabria by Markel García-Díez, Jesús Fernández and Lluís Fita, and is released under GNU license.

Download this program and untar it. Make a new folder in your home called, for example, “data”, and then inside another one called “post”. Then type “**use python2.7.2**”.

The command for post-processing the 2m temperature would be

```
python ${path_to_wrfncxnj}/wrfncxnj.py \
-o $HOME/data/post/tas_eurocordex044_CTRL.nc \
-g ${path_to_domain} -v,T2 \
${path_to_files}/wrfout_d01_200101*.nc
```

This produces a **CF compliant file equivalent to those of ENSEMBLES project that we opened with R**. ¡So we are ready now to analyse our simulation using the tools we learned! :)

Second part: Create the nested domain over your country or area of interest.

• There exists a tool (WRF domain wizard) to create domains more easily, but it is does not support this kind of projection (rotated lon lat)

• The procedure we must follow then is trial and error. But don't worry, it does not take a long time.

First we need to create a folder for the new domain, you can use, for instance the folder with the sample domains:

```
${WRF4G_LOCATION}/repository/domains
```

Now copy the EUROCORDEX domain to our local folder, renaming it including the region that you chose and go there:

```
cp /home_grid/course/DATA/domains/CORDEX_Euro044 \
${WRF4G_LOCATION}/repository/domains/CORDEX_Euro044_Spain
```

We must now set up max_dom = 2 and play with the following parameters in namelist.wps:

```
&geogrid
parent_id           = 1,1
parent_grid_ratio = 1,2
i_parent_start = 1,1
j_parent_start = 1,1
e_we = 127,213
e_sn = 124,207
```

```
&geogrid
parent_id           = 1,1
parent_grid_ratio = 1,2
i_parent_start = 1,1
j_parent_start = 1,1
e_we = 127,213
e_sn = 124,207
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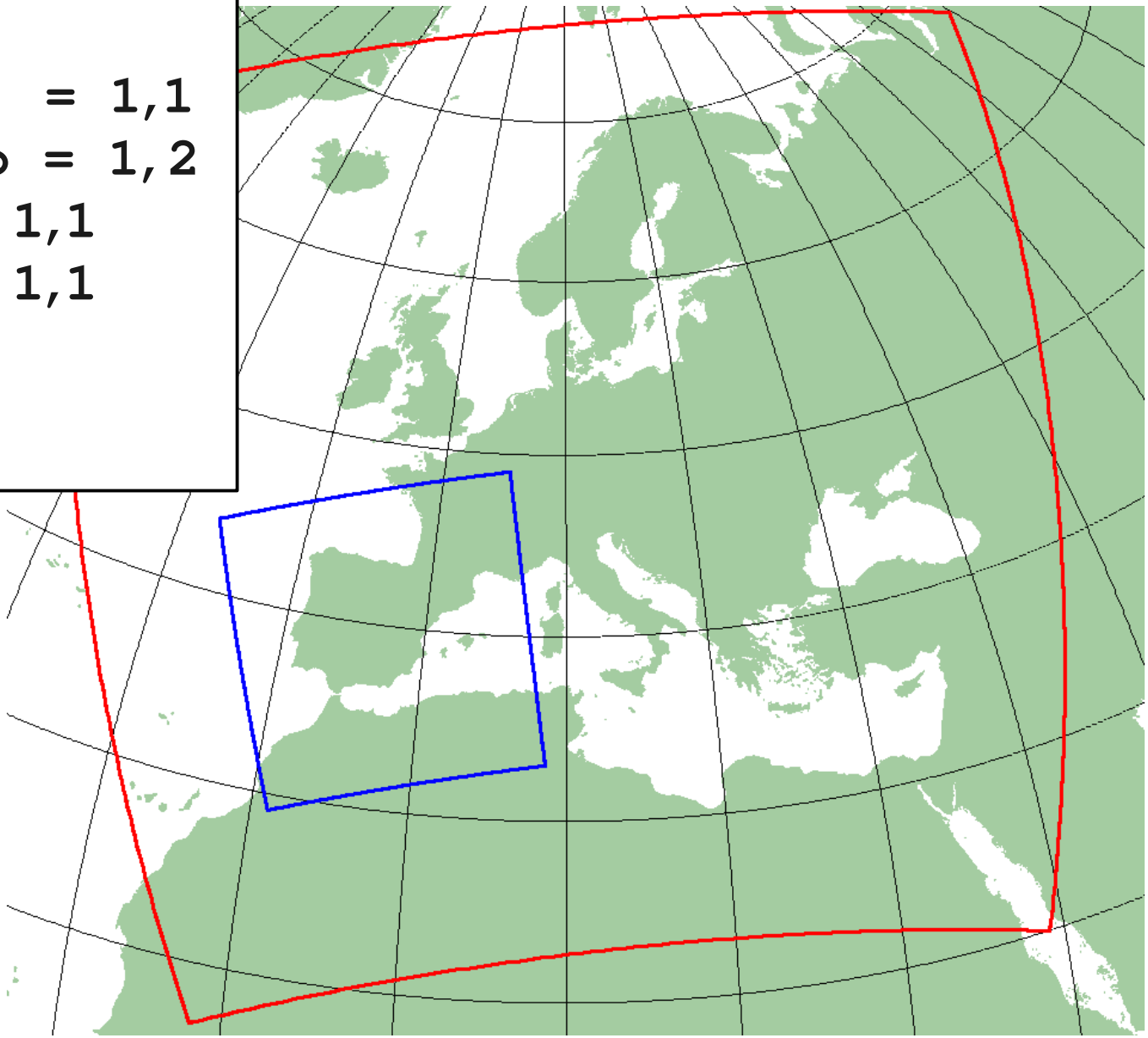
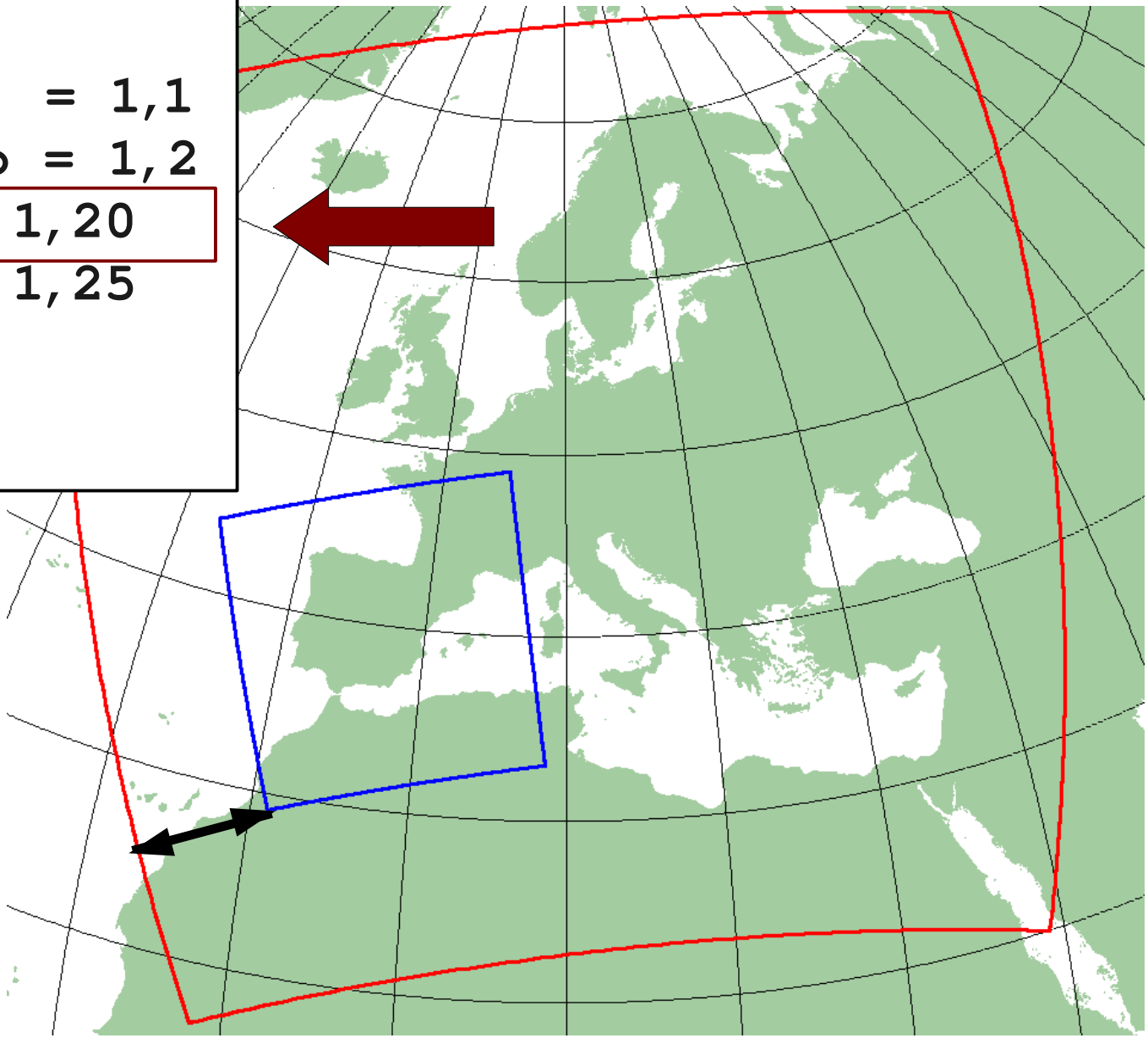


```
&geogrid
parent_id             = 1,1
parent_grid_ratio = 1,2
i_parent_start = 1,20
j_parent_start = 1,25
e_we = 127,213
e_sn = 124,207
```



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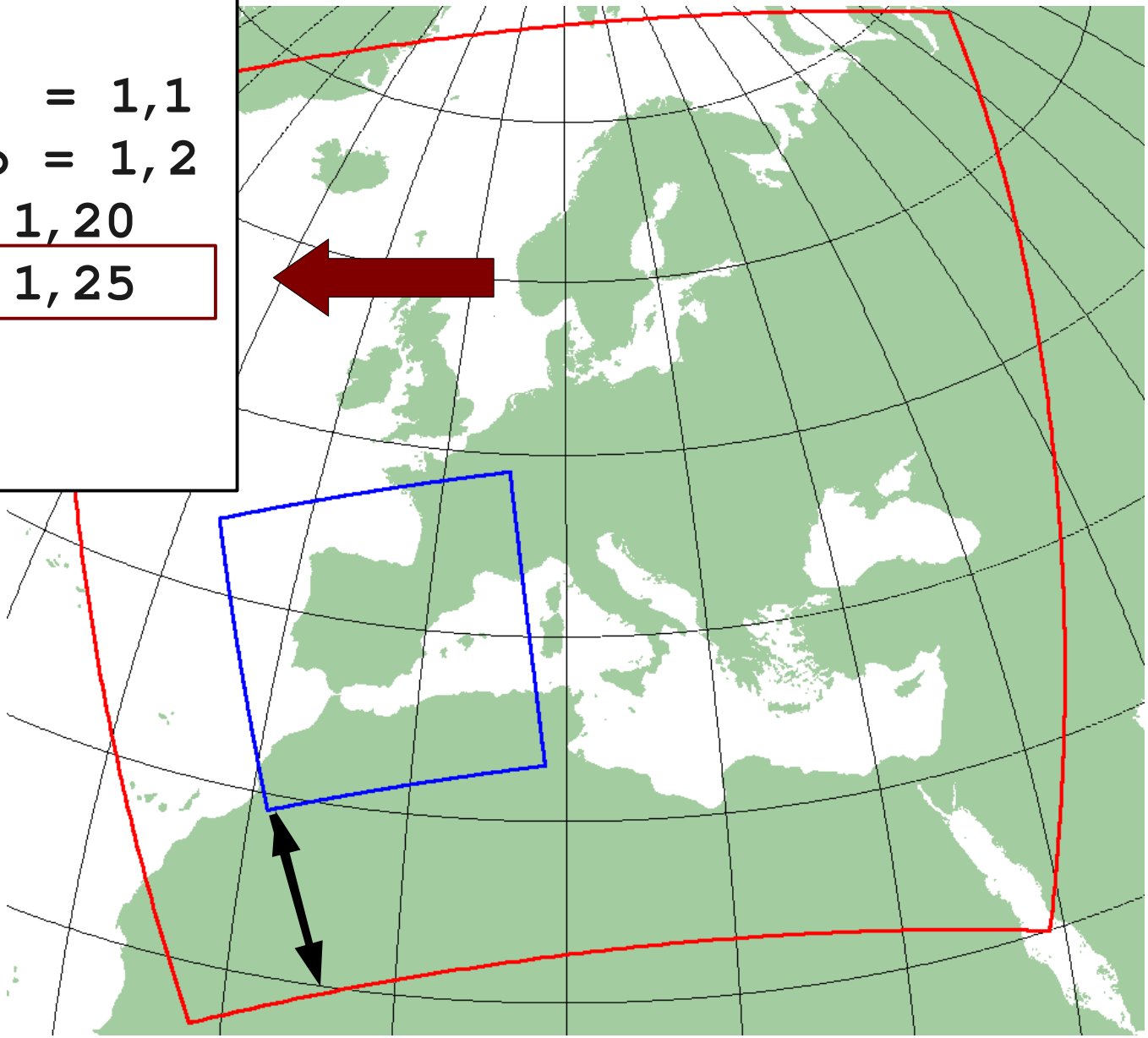

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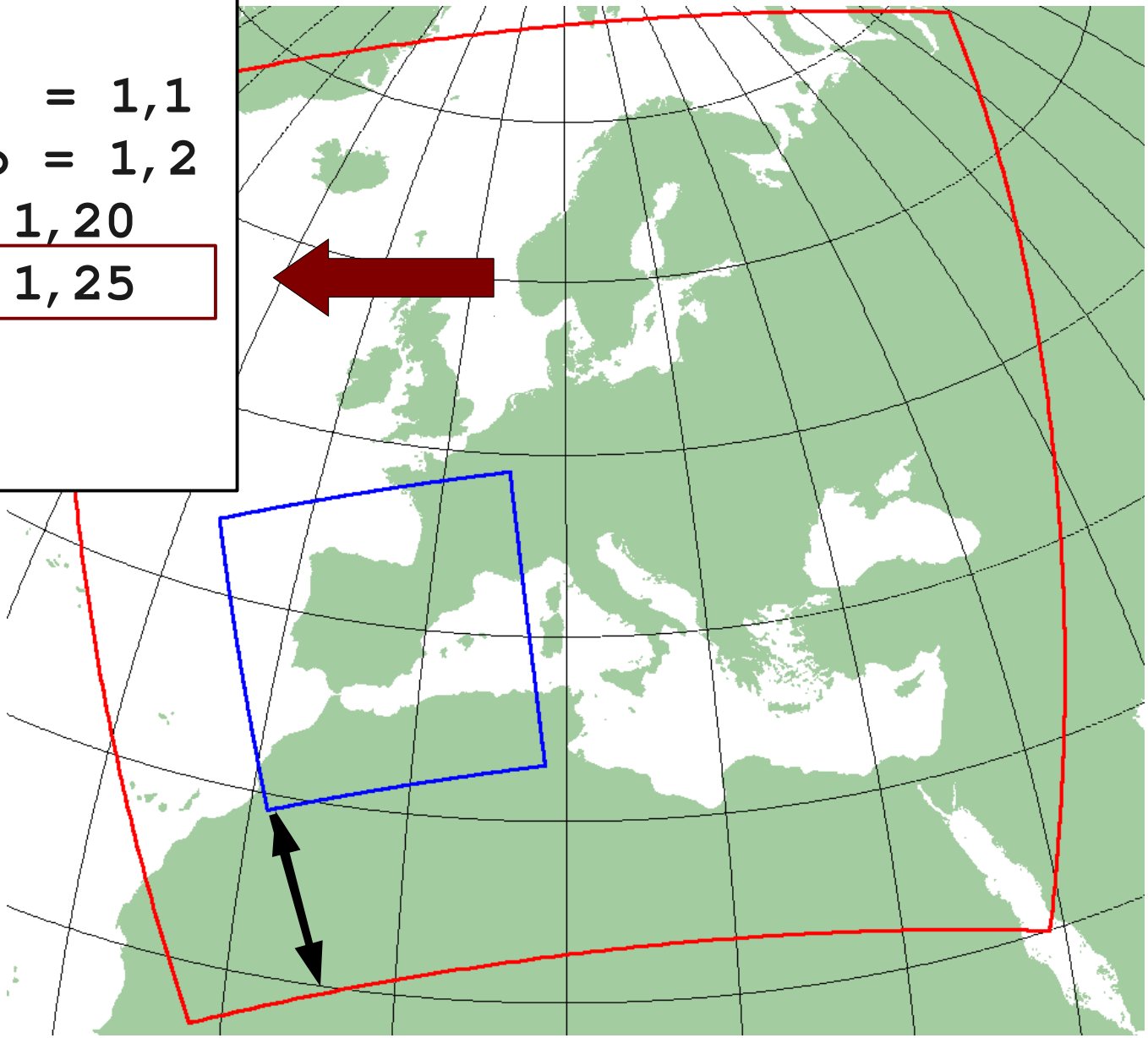

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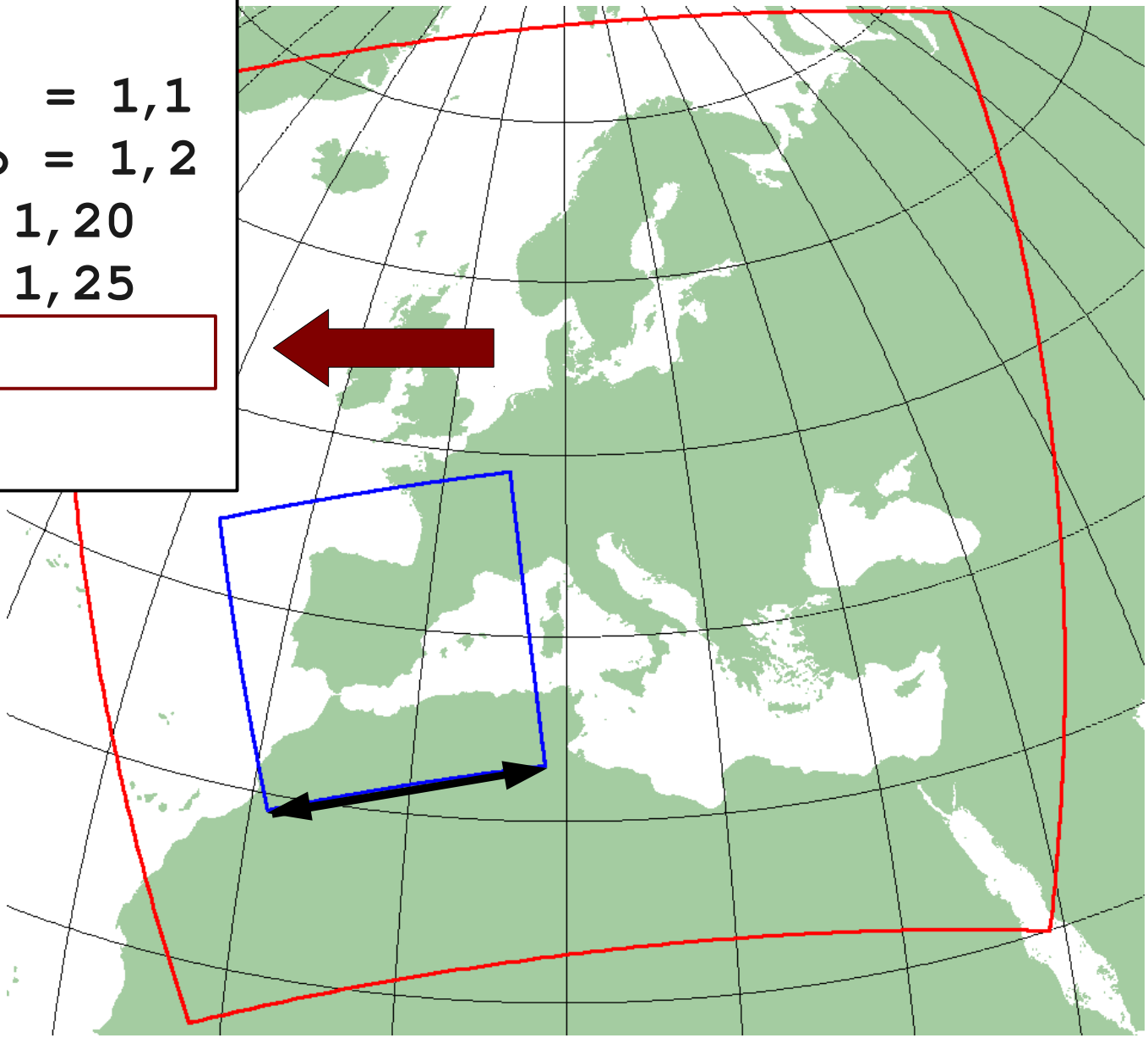

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e_sn = 124,207
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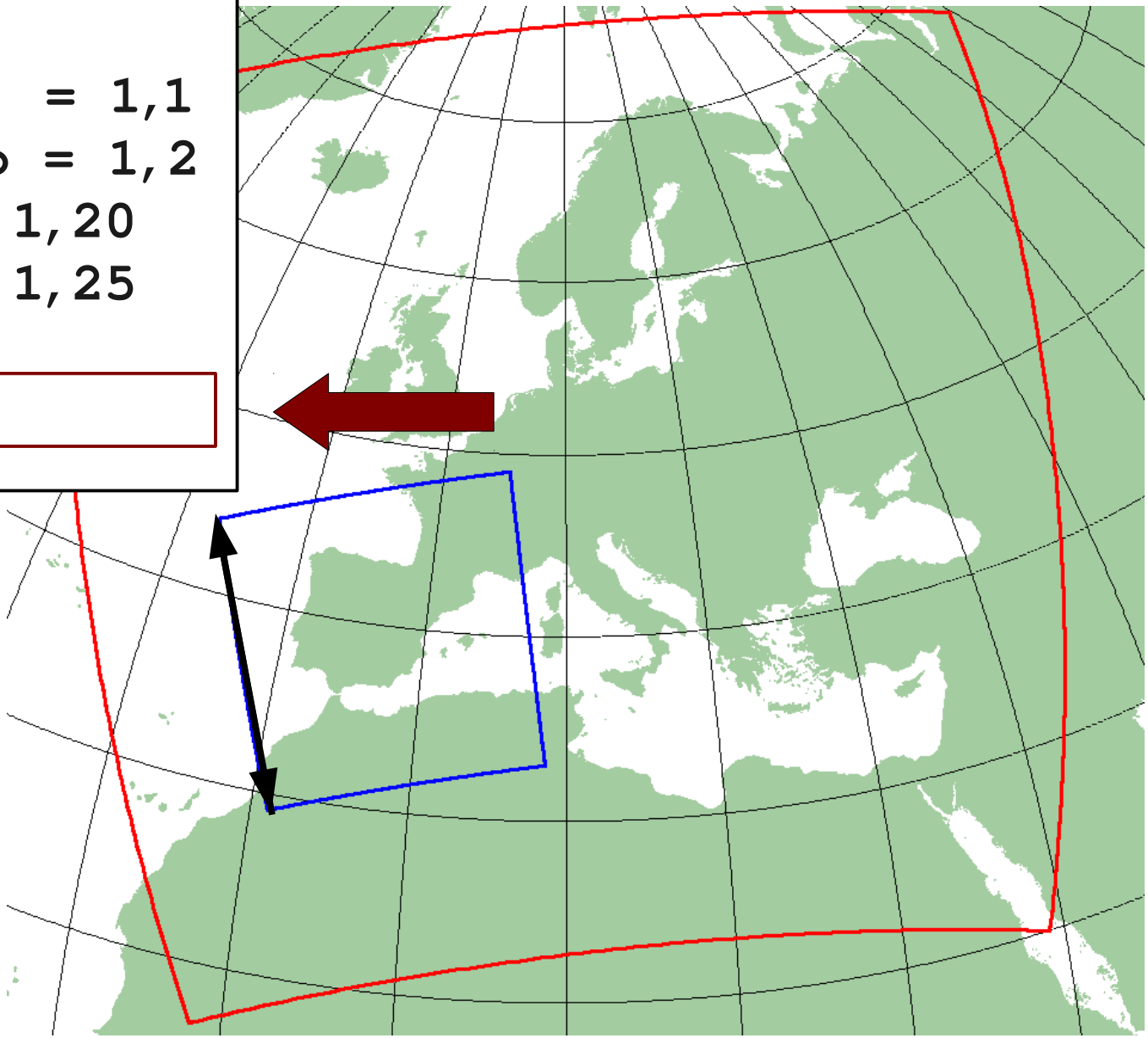

• After setting up these parameters you can run geogrid.exe (use the binary that we used in the WRF tutorial)

• You can use ncview or wrf_domain_on_the_globe.gmt.sh script to check how it is going.

• When your domain is ready, you are ready to run with the same configuration that we used for the EUROCORDEX domain alone, changing the **max_dom** parameter to 2 in the experiments.wrf4g.

• You must check that all the (NIM_) variables of the namelist have a value for each domain.

• Once you run, you can postprocess and plot the data as we previously did.