

## Check Output

Once a model run is completed, it is good practice to check a couple of things quickly.

If you have run the model on multiple processors using MPI, you should have a number of `rsl.out.*` and `rsl.error.*` files. Type `'tail rsl.out.0000'` to see if you get `'SUCCESS COMPLETE WRF'`. This is a good indication that the model has run successfully.

The namelist options are written to a separate file: `namelist.output`.

Check the output times written to the `wrfout*` file by using the netCDF command:

```
ncdump -v Times wrfout_d01_YYYY-mm-dd_hh:00:00
```

Take a look at either the `rsl.out.0000` file or other standard-out files. This file logs the times taken to compute for one model time step, and to write one history and restart output file:

```
Timing for main: time 2006-01-21_23:55:00 on domain 2: 4.91110 elapsed seconds.
Timing for main: time 2006-01-21_23:56:00 on domain 2: 4.73350 elapsed seconds.
Timing for main: time 2006-01-21_23:57:00 on domain 2: 4.72360 elapsed seconds.
Timing for main: time 2006-01-21_23:57:00 on domain 1: 19.55880 elapsed seconds.
```

and

```
Timing for Writing wrfout_d02_2006-01-22_00:00:00 for domain 2: 1.17970 elapsed seconds.
Timing for main: time 2006-01-22_00:00:00 on domain 1: 27.66230 elapsed seconds.
Timing for Writing wrfout_d01_2006-01-22_00:00:00 for domain 1: 0.60250 elapsed seconds.
```

## Trouble Shooting

- If the model aborts very quickly, it is likely that either the computer memory is not large enough to run the specific configuration, or the input data have some serious problems. For the first potential issue, try to type `'unlimit'` or `'ulimit -s unlimited'` to see if more memory and/or stack size can be obtained.
- For OpenMP (smpar-compiled code), the stack size needs to be set large, but not unlimited. Unlimited stack size may crash the computer.
- To check if the input data are the problem, use `ncview` or another netCDF file browser to check the fields in the `wrfinput` files.
- Another frequent error seen is `'module_configure: initial_config: error reading namelist'`. This is an error message

from the model complaining about errors and typos in the `namelist.input` file. Edit the `namelist.input` file with caution. If unsure, always start with an available template. A namelist record where the namelist read error occurs is provided in the V3 error message, and it should help with identifying the error.

- If the model did not run to completion, one possibility is that the model may have become numerically unstable, which means the time step used for advancing the model in time is too large for a stable solution. Even if one observes the standard rule for setting the model time step (to be  $\sim 6 \cdot DX$  in kilometers in physical space), other configurations of the model domain may affect the outcome. For example, if one has thin model layers, or if one uses a very large domain and the corners of the domain may have a very large map-scale factor that reduces the equivalent earth distance to be a lot smaller than the model grid size. One can find out whether this is the case by searching for CFL prints in the standard output/error files (e.g. the `rsl` files):

```
grep cfl rsl.error.* or grep cfl wrf.out
```

you might see something like these:

```
5 points exceeded cfl=2 in domain          1 at time    4.200000
  MAX AT i,j,k:           123           48           3 cfl,w,d(eta)= 4.165821
21 points exceeded cfl=2 in domain          1 at time    4.200000
  MAX AT i,j,k:           123           49           4 cfl,w,d(eta)= 10.66290
```

When this happens, consider using the namelist option `w_damping`, and/or reducing the time step.