

Instruction for setting up Noah-MP docker container

This document includes instructions for:

1. Download the Docker container for running offline HRLDAS/Noah-MP to your local computer (~5GB; this container includes all the software and linux environment configuration as well as raw test ERA-5 forcing data to run offline HRLDAS/NoahMP. Please follow AMS Noah-MP short course tutorial).
2. Download the Docker container for running NOAA UFS/Noah-MP component model to your local computer (~35 GB; this container includes all the software and linux environment configuration as well as test data. Please follow AMS Noah-MP short course tutorial)
3. Set up your local computer for visualization function (used for neview during tutorial).

See detailed instructions below for these three steps in Macbook and Windows computers.

For linux system users, you can directly run Noah-MP on your local computer or supercomputer after you install the netcdf, fortran compiler, and jasper softwares.

If you have any questions, please contact us:

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===== **For Macbook or Apple computer systems** =====

1. Download free Docker Desktop for Mac: <https://docs.docker.com/desktop/install/mac-install/>

Install Docker Desktop on Mac

This page contains download URLs, information about system requirements, and instructions on how to install Docker Desktop for Mac.

Docker Desktop for Mac with Apple silicon

Docker Desktop for Mac with Intel chip

2. Install Docker Desktop on Mac:

Follow the steps to install Docker App:

<https://docs.docker.com/desktop/install/mac-install/#install-and-run-docker-desktop-on-mac>

3. Increase allowed maximum container size in Docker Desktop:

“settings” -> “Resources” -> “Advanced” -> change “Virtual disk limit” to “100GB” or larger.

Settings [Give feedback](#)

Resources **Advanced**

Resource Allocation

CPU limit: 10

Memory limit: 7.9 GB

Swap: 1 GB

Virtual disk limit: 160 GB
Due to filesystem overhead, the real available space might be less.

8 GB 248.67 GB 497.33 GB 746 GB 994.66 GB

4. Open a terminal window on Mac:

Test with this command: `which docker`

It should show something like: `/usr/local/bin/docker`

5. Download HRLDAS/Noah-MP Docker container:

Type with the following command in terminal command line:

```
docker run --platform linux/amd64 -e DISPLAY=host.docker.internal:0 --net host -it
cenlinhe/noahmp_container:AMS_course
```

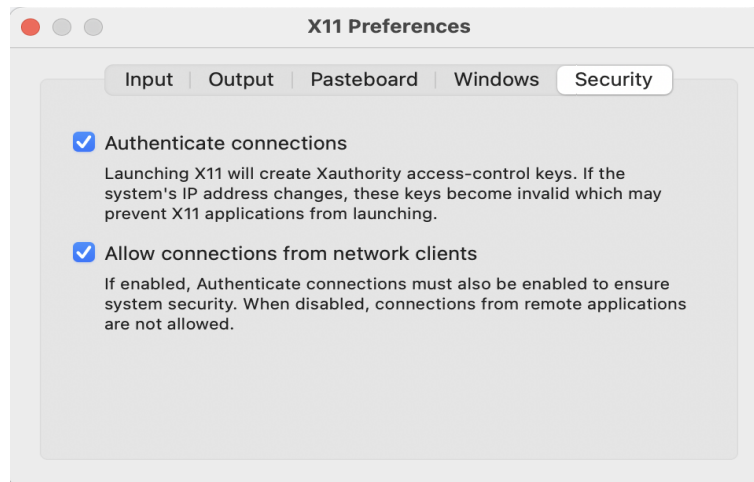
This will begin pulling the docker from our AMS short course setup:

```
supernova:noahmp_container cenlinhe$ docker run --platform linux/amd64 -e DISPLAY=host.docker.intern
al:0 --net host -it cenlinhe/noahmp_container:AMS_course
Unable to find image 'cenlinhe/noahmp_container:AMS_course' locally
AMS_course: Pulling from cenlinhe/noahmp_container
3dd181f9be59: Pull complete
ecabcb2f16d1: Pull complete
6ccae9e8fd04: Pull complete
9d4e95d71e32: Pull complete
2b3d3f1a0145: Pull complete
f21d5f85782d: Pull complete
2cb5bca93703: Pull complete
4f4fb700ef54: Pull complete
Digest: sha256:75e106a05a81d976dd5c2bd0c3df45f0408b56a335f6e458efe374f50abelb4e
Status: Downloaded newer image for cenlinhe/noahmp_container:AMS_course
ams@docker-desktop:~$ ls
AMS_shortcourse
ams@docker-desktop:~$ pwd
/home/ams
```

After the above command, you will be inside the Noah-MP Docker container environment.

6. Set up visualization to enable ncview:

- (1) Download and install XQuartz (if you have not done this before)
- (2) From the XQuartz preferences, in the security tab, make sure “Allow connections from network clients” is enabled. Restart XQuartz.



(3) Issue the following command on a new terminal window: *xhost +localhost*

7. Then test ncview inside docker container:

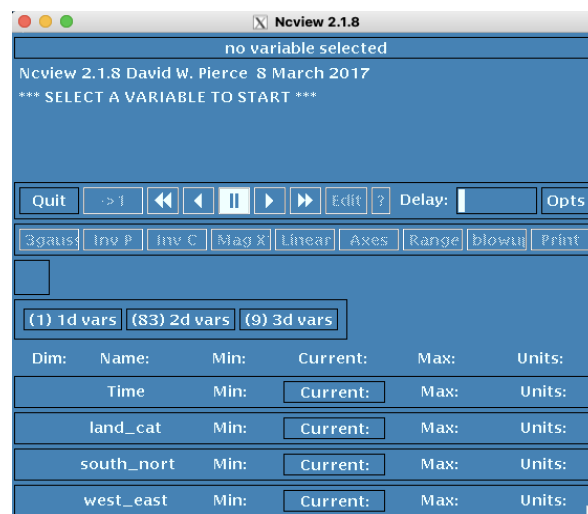
Type: *which ncview* in the container terminal command window:

It should show something like: ``usr/bin/ncview``

Then type: *cd /home/ams/AMS_shortcourse/ERA5-Land/*

You should see this file under the ERA5-Land folder: ``geo_em.d01.nc``

Then open the file by typing: *ncview geo_em.d01.nc*, which shows following window:



8. Download and test UFS/Noah-MP Component Model:

(1) Exit the HRLDAS/Noah-MP docker container by typing “exit” in terminal command window;

(2) The UFS/Noah-MP Component Model container requires at least 6 cores available to the container. The available core can be changed from Docker Desktop.

“settings” -> “Resources” -> “Advanced” -> change “CPU limit” to “6” or larger.

(3) Download UFS/Noah-MP docker container by typing with the following one command in terminal command window:

docker run --rm --platform linux/amd64 --hostname=linux -it turuncu/ams_ufs:latest bash

(4) Get UFS Weather Model including the Noah-MP source code by typing with the following one command in terminal command window:

```
git clone -b feature/ams_course --recursive https://github.com/uturuncoglu/ufs-weather-  
model.git
```

(5) Run UFS DATM-Noah-MP configuration using regression test framework (RT) by typing the following two commands in terminal command window:

```
cd ufs-weather-model/tests  
./rt.sh -a debug -k -n datm_cdeps_lnd_era5_gnu
```

This will take around 10 min (this may vary based on different computers, it may take as long as 30min for some computers) to complete for all the testing case runs (incl. compiling). If it takes longer than that there might be an issue with the container.

After that, you could go to /opt/scratch/root/FV3_RT/rt_* directory and see the actual run and its output. The actual directory can be seen in the output of the test command.

NOTE: The RT could fail on some host systems while checking the results with baseline due to underlying CPU type difference. This is totally normal since the reproducibility is not guaranteed under different processor and/or compiler versions. The existing baseline is created on Mac OS with M2 processor and stored under /opt/RT/NEMSfv3gfs/develop-20231003/datm_cdeps_lnd_era5_gnu/

NOTE: The RT could fail on some host Linux systems under certain conditions. The Docker container is mainly tested on both Mac OS and Windows successfully. Please use the most recent version of Docker under Linux before testing.

===== **For Windows computer systems** =====

1. Download Docker Desktop for Windows:

<https://docs.docker.com/desktop/install/windows-install/>

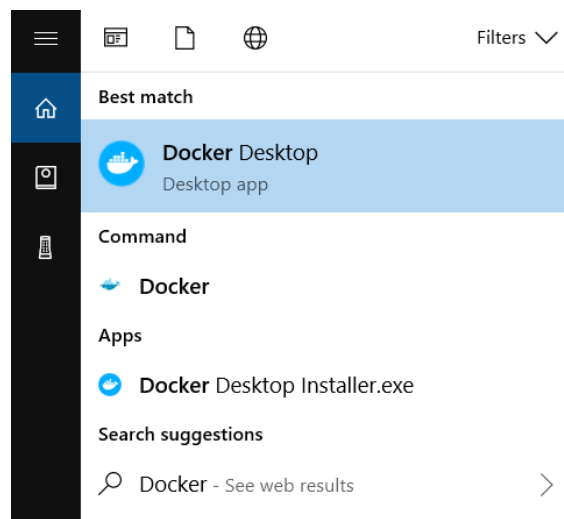


2. [Install Docker Desktop on Windows:](#)

Follow instructions: <https://docs.docker.com/desktop/install/windows-install/#install-docker-desktop-on-windows>

3. [Start Docker Desktop:](#)

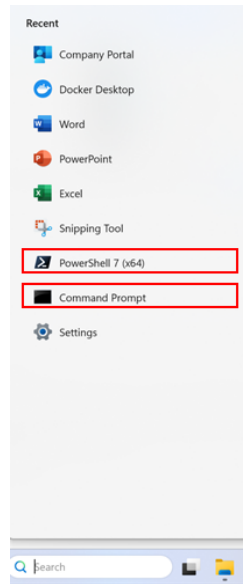
<https://docs.docker.com/desktop/install/windows-install/#start-docker-desktop>



4. Increase allowed maximum container size in Docker Desktop:

“settings” -> “Resources” -> “Advanced” -> change “Virtual disk limit” to “100GB” or larger.

5. Open PowerShell (if not available, please [install](#)) or Command Prompt:



6. Download HRLDAS/Noah-MP Docker container:

Type with the following command in either PowerShell or Command Prompt:

```
docker run --platform linux/amd64 -e DISPLAY=host.docker.internal:0 --net host -it  
cenlinhe/noahmp_container:AMS_course
```

```
root@ral-climate: /
Microsoft Windows [Version 10.0.22621.2861]
(c) Microsoft Corporation. All rights reserved.

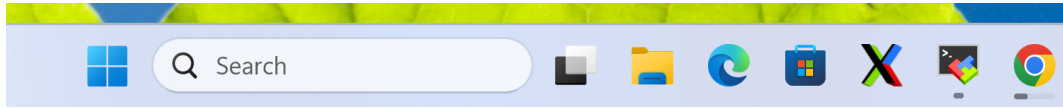
C:\Users\tslin2>docker run --platform linux/amd64 -e DISPLAY=host.docker.internal:0 --net host -it turuncu/ams_shortcour
se:latest
root@ral-climate:/# ls
bin boot dev etc home lib lib32 lib64 libx32 media mnt opt proc root run sbin srv sys tmp usr var
root@ral-climate:/#
```

After the above command, you will be inside the Noah-MP Docker container environment.

7. Set up visualization:

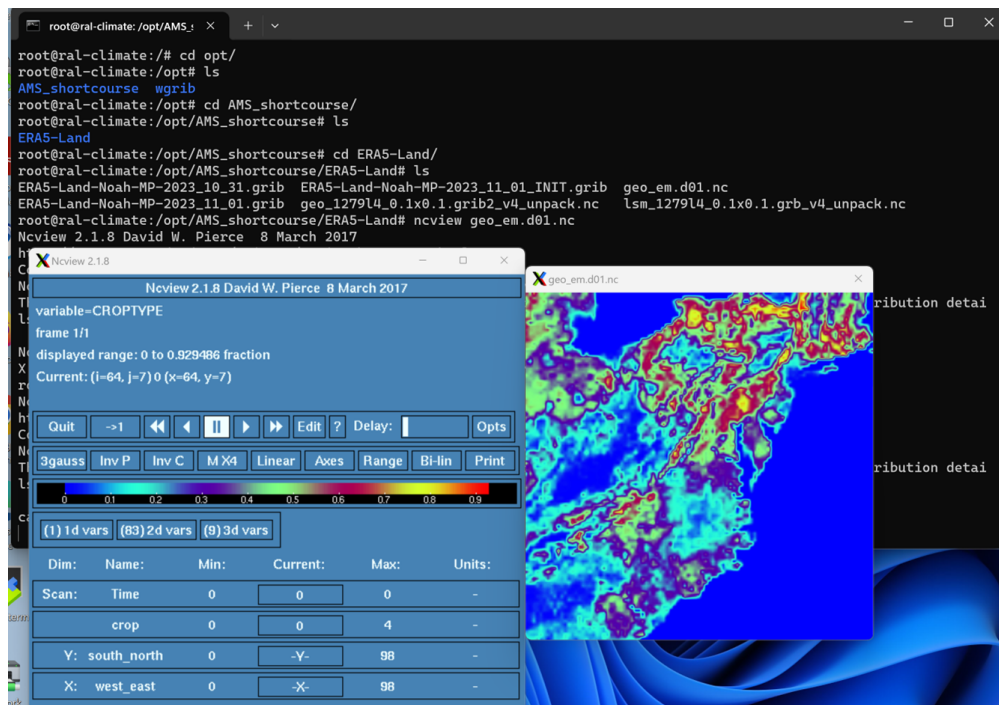
(1) For Xwindow, X server comes from MobaXterm, so download [MobaXterm](#) and install it.

(2) Click the X in the taskbar (see below figure) to start the X server window.



(3) Type with the following command in either PowerShell or Command Prompt:

```
cd /home/ams/AMS_shortcourse/ERA5-Land/  
ncview geo_em.d01.nc
```



8. Download and test UFS/Noah-MP Component Model:

(1) Exit the HRLDAS/Noah-MP docker container by typing “exit” in PowerShell or Command Prompt;

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