

Analysis Methods in Atmospheric and Oceanic Science

AOSC 652

- Mon: Intro to Diff Eqs
- Wed: Numerical Solution to ODEs
- Today: **Compression & Disk Usage & HW #11**
- Next Mon: PDEs

Week 12, Day 3

18 Nov 2016

AOSC 652: Analysis Methods in AOSC

File Compression

- Raw OMI data files for March 2016 are in `~rjs/aosc652/week_11/omi_data_ascii`
- How much size do these files occupy?

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```
metosrv8{rjs}: cd ~rjs/aosc652/week_11
```

```
metosrv8{rjs}: du omi_data_ascii
```

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File Compression

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metosrv8{rjs}: cd ~rjs/aosc652/week_11
```

```
metosrv8{rjs}: du omi_data_ascii
```

What does this number mean ?

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```
metosrv8{rjs}: cd ~rjs/aosc652/week_11
```

```
metosrv8{rjs}: du omi_data_ascii
```

Let's try:

```
metosrv8{rjs}: du -h omi_data_ascii
```

Is this number more understandable?

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```
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Can reduce size by:

```
metosrv8{rjs}: cd omi_data_ascii
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```
metosrv8{rjs}: gzip L3*.txt
```

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How much storage space have we saved?

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```

How much storage space have we saved?

What has happened to our files?

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Can reduce size by:

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```
metosrv8{rjs}: gzip L3*.txt
```

What happens if we issue command:

```
metosrv8{rjs}: more L3_ozone_omi_20160301.txt.gz ???
```

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What happens if we issue command:

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metosrv8{rjs}: more L3_ozone_omi_20160301.txt.gz ???
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Yikes!!!

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metosrv8{rjs}: gzip L3*.txt
```

What happens if we issue command:

```
metosrv8{rjs}: more L3_ozone_omi_20160301.txt.gz ???
```

Select Terminal / Reset or Terminal / Reset Clear to fix

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Can reduce size by:

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metosrv8{rjs}: cd omi_data_ascii
```

```
metosrv8{rjs}: gzip L3*.txt
```

What happens if we issue command:

```
metosrv8{rjs}: zmore L3_ozone_omi_20160301.txt.gz ???
```

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Can reduce size by:

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```

How do we restore the un-compressed files ?

```
metosrv8{rjs}:
```

AOSC 652: Analysis Methods in AOSC

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Can reduce size by:

```
metosrv8{rjs}: cd omi_data_ascii
```

```
metosrv8{rjs}: gzip L3*txt
```

How do we restore the un-compressed files ?

```
metosrv8{rjs}: gunzip L3*txt.Z
```

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Dave Yanuk wrote:

“An even better compression utility, `bzip2`, is also on the system.”

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How small does this directory become if we compress using bzip2 ?

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```
metosrv8{rjs}: gzip L3*.txt
```

Dave Yanuk wrote:

“An even better compression utility, `bzip2`, is also on the system.”

How small does this directory become if we compress using `bzip2` ?

Command:

```
metosrv8{rjs}: bunzip2 L3*
```

must be issued to restore un-compressed files

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File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf`

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File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf_single`
- How much size does this file occupy ?

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File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf_single`
- How much size does this file occupy ? How does this compare to our ASCII file?

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File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf_single`
- How much size does this file occupy ? How does this compare to our ASCII file?

Let's reduce size by:

```
metosrv8{rjs}: gzip OMI*
```

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File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf_single`
- How much size does this file occupy ? How does this compare to our ASCII file?

Let's reduce size by:

```
metosrv8{rjs}: gzip OMI*
```

How much storage savings did we get ?

AOSC 652: Analysis Methods in AOSC

File Compression

- A single OMI HDF file is in `~rjs/aosc652/week_11/omi_data_hdf_single`
- How much size does this file occupy ? How does this compare to our ASCII file?

Let's reduce size by:

```
metosrv8{rjs}: gzip OMI*
```

How much storage savings did we get ?

Is bzip2 any better?

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File Compression

- A single netCDF file containing Whole Atmosphere Community Climate Model (WACCM) output is in `~rjs/aosc652/week_11/waccm_output_netcdf`
- How much size does this file occupy ?

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File Compression

- A single netCDF file containing Whole Atmosphere Community Climate Model (WACCM) output is in `~rjs/aosc652/week_11/waccm_output_netcdf`
- How much size does this file occupy ?

This is a respectable filesize!

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File Compression

- A single netCDF file containing Whole Atmosphere Community Climate Model (WACCM) output is in `~rjs/aosc652/week_11/waccm_output_netcdf`
- How much size does this file occupy ?

Let's reduce size by:

`metosrv8{rjs}: gzip CCM*`

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File Compression

- A single netCDF file containing Whole Atmosphere Community Climate Model (WACCM) output is in `~rjs/aosc652/week_11/waccm_output_netcdf`
- How much size does this file occupy ?

Let's reduce size by:

`metosrv8{rjs}: gzip CCM*`

How much space savings did we get?

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File Compression

- A single netCDF file containing Whole Atmosphere Community Climate Model (WACCM) output is in `~rjs/aosc652/week_11/waccm_output_netcdf`
- How much size does this file occupy ?

Let's reduce size by:

`metosrv8{rjs}: gzip CCM*`

How much space savings did we get?

Care to speculate about difference of the inner workings of netCDF files versus HDF files ?

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File Compression

- Now I will login to ozone, and go to /storage/data/climate/cmip5/rcp8.5
- To see all of the r1i1p1 files, enter:

```
ozone{rjs} dir *r1i1p1*.nc
```

What file format are these?

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ozone{rjs} dir *r1i1p1*.nc
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What file format are these?

What command do I enter to see the files, rank ordered in terms of size?

```
ozone{rjs}
```

AOSC 652: Analysis Methods in AOSC

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```
ozone{rjs} ls -alSh *r1i1p1*.nc | more
```

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```
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```

2nd largest file tas_Amon_CESM1-CAM5_rcp85_r1i1p1_200601-210012.nc

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2nd largest file `tas_Amon_CESM1-CAM5_rcp85_r1i1p1_200601-210012.nc`

Atmospheric data. monthly time step

Temperature at surface

Community Earth System Model
Community Atmosphere Model
From NCAR (Boulder, Co)

RCP8.5

realisation 1
initialization 1
physics 1

Jan 2006
to
Dec 2010

<https://verc.enes.org/data/data-metadata-service/search-and-download-1/access>

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```

2nd largest file tas_Amon_CESM1-CAM5_rcp85_r1i1p1_200601-210012.nc

241 MBytes

Entire directory size found by going up one directory and issuing command

```
ozone{rjs} du -h rcp8.5
```

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File Compression

- Now I will login to ozone, and go to /storage/data/climate/cmip5/rcp8.5
- To see all of the r1i1p1 files, enter:

```
ozone{rjs} dir *r1i1p1*.nc
```

What file format are these?

What command do I enter to see the files, rank ordered in terms of size?

```
ozone{rjs} ls -alSh *r1i1p1*.nc | more
```

2nd largest file tas_Amon_CESM1-CAM5_rcp85_r1i1p1_200601-210012.nc

241 MBytes

If we compress this file using gzip, it becomes **183** Mbytes

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What file format are these?

What command do I enter to see the files, rank ordered in terms of size?

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ozone{rjs} ls -alSh *r1i1p1*.nc | more
```

2nd largest file tas_Amon_CESM1-CAM5_rcp85_r1i1p1_200601-210012.nc

241 MBytes

For our research, we extract annual & monthly mean, global avg surface T

```
ozone{rjs} ls -alsFh *CESM1-CAM5_rcp85*r1i1p1*
```

Annual: 3.3 kilobytes

Monthly: 37 kilobytes

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File Compression

- Our system allows 40 Gb of storage in your home directory, but some latitude is given to faculty
- To ascertain your storage, go to your home directory and enter:

```
metosrv8{rjs}: cd
```

```
metosrv8{rjs}: cd . .
```

```
metosrv8{rjs}: du -h -s user_id
```

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File Compression

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- To ascertain your storage, go to your home directory and enter:

```
metosrv8{rjs}: cd  
metosrv8{rjs}: cd . .  
metosrv8{rjs}: du -h -s user_id
```

Does anyone have me beat ?

AOSC 652: Analysis Methods in AOSC

File Compression

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- To ascertain your storage, go to your home directory and enter:

```
metosrv8{rjs}: cd  
metosrv8{rjs}: cd . .  
metosrv8{rjs}: du -h -s user_id
```

If you'd like to know where your storage is concentrated, go to your home directory and enter:

```
metosrv8{rjs}: du -h > du.161118
```

then examine contents of du.161118