

AERMOD/AERMET/AERMAP 2021

For Mac/Linux

- Bolded entries are individual commands to be placed on the command line; they should be written and entered as a single line in the terminal
- Ensure you have gfortran installed
 - **which gfortran**
- Main AERMOD site:
<https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models>

Installing AERMOD

- Full AERMOD user's guide:
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_userguide.pdf
- Make a new directory and enter the directory
 - **mkdir AERMOD**
 - **cd AERMOD**
- Download the source code from the website:
<https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod>
 - **wget --no-check-certificate**
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/preferred/aermod/aermod_source.zip
- Unzip the source
 - **unzip aermod_source.zip**

- Enter the newly unzipped directory and list out its contents
 - `cd aermod_source_code_21112`
 - `ls`
- You should see a whole bunch of source Fortran files (.f) and several batch (.bat) files, as well as .TMP and .txt files
- .bat files are for Windows (DOS) users to instantly compile the needed code; but .bat files won't work for Linux and Mac users, so we'll have to make some edits
- Create write and execute permissions for gfortran-aermod.bat, then make a copy of it suffixed as .sh
 - `chmod 755 gfortran-aermod.bat`
 - `cp gfortran-aermod.bat gfortran-aermod.sh`
- Use vim to edit the gfortran-aermod.sh to look like the following, or copy from the following; for mass-editing %COMPILE_FLAGS% to \$COMPILE_FLAGS, use:
 - Mac: `sed -i ''`
`s/"%COMPILE_FLAGS%"/'$COMPILE_FLAGS'/g`
`gfortran-aermod.sh`
 - Linux: `sed -i`
`s/"%COMPILE_FLAGS%"/'$COMPILE_FLAGS'/g`
`gfortran-aermod.sh`

```

1 #!/bin/bash
2
3 export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"
4 export LINK_FLAGS="-O2"
5
6 gfortran -c $COMPILE_FLAGS modules.f
7 gfortran -c $COMPILE_FLAGS grsm.f
8 gfortran -c $COMPILE_FLAGS aermod.f
9 gfortran -c $COMPILE_FLAGS setup.f
10 gfortran -c $COMPILE_FLAGS coset.f
11 gfortran -c $COMPILE_FLAGS soset.f
12 gfortran -c $COMPILE_FLAGS reset.f
13 gfortran -c $COMPILE_FLAGS meset.f
14 gfortran -c $COMPILE_FLAGS ouset.f
15 gfortran -c $COMPILE_FLAGS inpsum.f
16 gfortran -c $COMPILE_FLAGS metext.f
17 gfortran -c $COMPILE_FLAGS iblval.f
18 gfortran -c $COMPILE_FLAGS siggrid.f
19 gfortran -c $COMPILE_FLAGS tempgrid.f
20 gfortran -c $COMPILE_FLAGS windgrid.f
21 gfortran -c $COMPILE_FLAGS calc1.f
22 gfortran -c $COMPILE_FLAGS calc2.f
23 gfortran -c $COMPILE_FLAGS prise.f
24 gfortran -c $COMPILE_FLAGS prime.f
25 gfortran -c $COMPILE_FLAGS sigmas.f
26 gfortran -c $COMPILE_FLAGS pitarea.f
27 gfortran -c $COMPILE_FLAGS uninam.f
28 gfortran -c $COMPILE_FLAGS output.f
29 gfortran -c $COMPILE_FLAGS evset.f
30 gfortran -c $COMPILE_FLAGS evcalc.f
31 gfortran -c $COMPILE_FLAGS evoutput.f
32 gfortran -c $COMPILE_FLAGS rline.f
33 gfortran -c $COMPILE_FLAGS bline.f
34
35 gfortran -o aermod.exe $LINK_FLAGS MODULES.o GRSM.o AERMOD.o SETUP.o COSET.o SOSET.o RESET.o MESET.o OUSET.o INPSUM.o METEXT.o IBLVAL.o SIGGRID.o
TEMPGRID.o WINDGRID.o CALC1.o CALC2.o PRISE.o PRIME.o SIGMAS.o PITAREA.o UNINAM.o OUTPUT.o EVSET.o EVCALC.o EVOUTPUT.o RLINE.o BLINE.o
36
37 rm -f *.o
38 rm -f *.mod

```

#!/bin/bash

```

export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"
export LINK_FLAGS="-O2"

```

```

gfortran -c $COMPILE_FLAGS modules.f
gfortran -c $COMPILE_FLAGS grsm.f
gfortran -c $COMPILE_FLAGS aermod.f
gfortran -c $COMPILE_FLAGS setup.f
gfortran -c $COMPILE_FLAGS coset.f
gfortran -c $COMPILE_FLAGS soset.f
gfortran -c $COMPILE_FLAGS reset.f
gfortran -c $COMPILE_FLAGS meset.f
gfortran -c $COMPILE_FLAGS ouset.f
gfortran -c $COMPILE_FLAGS inpsum.f

```

```

gfortran -c $COMPILE_FLAGS metext.f
gfortran -c $COMPILE_FLAGS iblval.f
gfortran -c $COMPILE_FLAGS siggrid.f
gfortran -c $COMPILE_FLAGS tempgrid.f
gfortran -c $COMPILE_FLAGS windgrid.f
gfortran -c $COMPILE_FLAGS calc1.f
gfortran -c $COMPILE_FLAGS calc2.f
gfortran -c $COMPILE_FLAGS prise.f
gfortran -c $COMPILE_FLAGS prime.f
gfortran -c $COMPILE_FLAGS sigmas.f
gfortran -c $COMPILE_FLAGS pitarea.f
gfortran -c $COMPILE_FLAGS uninam.f
gfortran -c $COMPILE_FLAGS output.f
gfortran -c $COMPILE_FLAGS evset.f
gfortran -c $COMPILE_FLAGS evcalc.f
gfortran -c $COMPILE_FLAGS evoutput.f
gfortran -c $COMPILE_FLAGS rline.f
gfortran -c $COMPILE_FLAGS bline.f

```

```

gfortran -o aermod.exe $LINK_FLAGS MODULES.o GRSM.o AERMOD.o \
SETUP.o COSET.o SOSET.o RESET.o MESET.o OUSET.o INPSUM.o \
METEXT.o IBLVAL.o SIGGRID.o TEMPGRID.o WINDGRID.o CALC1.o \
CALC2.o PRISE.o PRIME.o SIGMAS.o PITAREA.o UNINAM.o OUTPUT.o \
EVSET.o EVCALC.o EVOUTPUT.o RLINE.o BLINE.o

```

```

rm -f *.o
rm -f *.mod

```

- Note that the final gfortran command (the big one) must be all on one line when the script is viewed unwrapped (or use \ to escape new lines, as copied above)

- In Vim, convert the file format from DOS to Unix; see <https://unix.stackexchange.com/questions/32001/what-is-m-and-how-do-i-get-rid-of-it>
 - `:set ff=unix`
 - `:wq`
 - For some this works instead: `dos2unix`
`./gfortran-aermap-64bit.sh` (need to install it with brew).
- If that's all worked out, run the script
 - `./gfortran-aermod.sh`
- Once it's finished running, you should see aermod.exe with `ls`
 - `./aermod.exe`
 - You should get the error: +Error Opening Runstream Input File! Aborting.

Running AERMOD TEST CASE

- Make a tutorial directory
 - `mkdir tutorial`
 - `cd tutorial`
- Grab the sample run, unzip, and create a new folder
 - `wget --no-check-certificate`
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aerplot/Sample_AERPLOT_Run.zip
 - `unzip Sample_AERPLOT_Run.zip`
 - `mkdir mySampleRun`
 - `cd mySampleRun`

- From ../SampleRun, copy over aermod.inp (contains data and I/O info), aermet2.sfc (aermet-processed surface data), aermet2.pfl (aermet-processed profile data), aertest_evt.inp (event data)
 - `cp ../SampleRun/aermod.inp .`
 - `cp ../SampleRun/aermet2.sfc .`
 - `cp ../SampleRun/aermet2.pfl .`
 - `cp ../SampleRun/aertest_evt.inp .`
- Copy over your own version of aermod.exe
 - `cp ~/AERMOD/aermod_source_code_21112/aermod.exe .`
- You should have the following 5 files

```
aermet2.pfl    aermet2.sfc    aermod.exe*    aermod.inp    aertest_evt.inp
```

- Run aermod
 - `./aermod.exe`
- The output can be found in aermod.out; if you run `cat aermod.out`, you should see


```
*****
*** AERMOD Finishes Successfully ***
*****
```

Installing AERMET

- Full AERMET user's guide:
 - https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet_userguide.pdf
- Go back home; make a new directory and enter the directory
 - `cd ~`
 - `mkdir AERMET`
 - `cd AERMET`

- Download the source code from the website:
<https://www.epa.gov/scram/meteorological-processors-and-accessory-programs#aermet>
 - `wget --no-check-certificate https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet_source.zip`
- Unzip the source
 - `unzip aermet_source.zip`
- Create write and execute permissions for `gfortran-aermet-64bit.bat`, then make a copy of it suffixed as `.sh`
 - `chmod 755 gfortran-aermet-64bit.bat`
 - `cp gfortran-aermet-64bit.bat gfortran-aermet-64bit.sh`
- Use vim to edit the `gfortran-aermet-64bit.sh` to look like the following, or copy from the following (hint: sed is your friend)

Top couple of lines

```

1 #!/bin/bash
2
3 export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"
4 export LINK_FLAGS="-O2"
5
6 gfortran -m64 -c $COMPILE_FLAGS mod_AsosCommDates.for
7 gfortran -m64 -c $COMPILE_FLAGS AERMET.FOR
8 gfortran -m64 -c $COMPILE_FLAGS AERSURF.FOR
9 gfortran -m64 -c $COMPILE_FLAGS AERSURF2.FOR
10 gfortran -m64 -c $COMPILE_FLAGS ASOSREC.FOR
11 gfortran -m64 -c $COMPILE_FLAGS AUDIT.FOR
12 gfortran -m64 -c $COMPILE_FLAGS AUTCHK.FOR
13 gfortran -m64 -c $COMPILE_FLAGS AVGCRD.FOR
14 gfortran -m64 -c $COMPILE_FLAGS BANNER.FOR
15 gfortran -m64 -c $COMPILE_FLAGS BULKRI.FOR
16 gfortran -m64 -c $COMPILE_FLAGS CALMS.FOR
17 gfortran -m64 -c $COMPILE_FLAGS CBLHT.FOR
18 gfortran -m64 -c $COMPILE_FLAGS CHRCRD.FOR
19 gfortran -m64 -c $COMPILE_FLAGS CHRCRD2.FOR
20 gfortran -m64 -c $COMPILE_FLAGS CHROND.FOR
21 gfortran -m64 -c $COMPILE_FLAGS CLHT.FOR
22 gfortran -m64 -c $COMPILE_FLAGS CLMCRD.FOR
23 gfortran -m64 -c $COMPILE_FLAGS CLOUDS.FOR
24 gfortran -m64 -c $COMPILE_FLAGS COMPDT.FOR
25 gfortran -m64 -c $COMPILE_FLAGS CUBIC.FOR
26 gfortran -m64 -c $COMPILE_FLAGS CVG.FOR
27 gfortran -m64 -c $COMPILE_FLAGS D028LV.FOR
28 gfortran -m64 -c $COMPILE_FLAGS D144HD.FOR
29 gfortran -m64 -c $COMPILE_FLAGS D144LV.FOR
30 gfortran -m64 -c $COMPILE_FLAGS D3280H.FOR

```

Bottom couple of lines (note the need for \ to escape newlines on lines 193-206)

```

187 gfortran -m64 -c $COMPILE_FLAGS WRTCRD.FOR
188 gfortran -m64 -c $COMPILE_FLAGS YR2TOYR4.FOR
189 gfortran -m64 -c $COMPILE_FLAGS YR4TOYR2.FOR
190 gfortran -m64 -c $COMPILE_FLAGS XDCRD.FOR
191 gfortran -m64 -c $COMPILE_FLAGS XTNDUA.FOR
192
193 gfortran -m64 -o aermex.exe $LINK_FLAGS mod_AsosCommDates.o AERMET.o AERSURF.o AERSURF2.o ASOSREC.o AUDIT.o AUTCHK.o AVGCRD.o BANNER.o BULKRI.o CALMS.o CBLHT.o CHRCRD.o \
194 CHRCRD2.o CHROND.o CLHT.o CLMCRD.o CLOUDS.o COMPDT.o CUBIC.o CVG.o D028LV.o D144HD.o D144LV.o D3280H.o \
195 D3280L.o D6201H.o D6201L.o DATCRD.o DATER.o DEF256.o DEFINE.o DOCLDS.o DTCRD.o EQ_CCVR.o ERHDL.o FDKEY.o \
196 FDPATH.o FETCH.o FLINK1.o FLINK2.o FLOPEN.o FLOS.o FLSDG.o FLSFC.o FLWRK1.o FLWRK2.o FNDCOMDT.o FMTCRD.o \
197 GEO.o GET620.o GETASOS.o GETCCVR.o GETFIL.o GETFLD.o GETFSL.o GETSFC.o GETTEMP.o GETWRD.o GMTLST.o GREG.o HDPROC.o HEADER.o HEAT.o \
198 HGTCRD.o HR0024.o HTCALC.o HTKEY.o HUMID.o HUSWX.o ICHRD.o INCRAD.o INTEQA.o INTHF.o ISHWX.o JBCARD.o \
199 LATLON.o LOCCRD.o LWRUPR.o MANDEL.o MDCARD.o MERGE.o MIDNITE.o MODEL.o MPCARD.o MPFIN.o MPHEAD.o MPMET.o \
200 MPOUT.o MPPBL.o MPPROC.o MPTEST.o MRCARD.o MRHDR.o MRPATH.o NETRAD.o NR_ANG.o NWSHGT.o OAUDIT.o OSCARD.o \
201 OSCHK.o OSDTCD.o OSDUMP.o OSFILL.o OSFILL2.o OSHRAV.o OSNEXT.o OSPATH.o OSPRNT.o OSQACK.o OSQAST.o OSRANGE.o OSREAD.o OSSMRY.o \
202 OSSUMS.o OSSWAP.o OSTEST.o OSTRA.o OSWRITE.o OTHHDR.o P2MSUB.o PRESET.o PTAREA.o PTGRAD.o RDHUSW.o RDISHD.o RDLREC.o \
203 RDSAMS.o READRL.o REALQA.o RHOCAL.o RNGCRD.o SAMWX.o SAUDIT.o SBLHT.o SCNGEN.o SECCRD.o SECCRD2.o SETHUS.o \
204 SETSAM.o SETUP.o SFCARD.o SFCCH.o SFCCH2.o SFCCRD.o SFCCRD2.o SFCHK.o SFCWXX.o SFEXST.o SFEXT.o SFPATH.o \
205 SFQASM.o SFQAST.o SFQATM.o SFTRA.o SMTHZ1.o STONUM.o SUBST.o SUMHF.o SUMRY1.o SUMRY2.o SUNDAT.o TPEST.o \
206 TEST.o THRESHMIN.o UACARD.o UACHK.o UAEXT.o UAXST.o UAMOVE.o UAPATH.o UAQASM.o UQAST.o UATRA.o UAUDIT.o UAWNDW.o \
207 UALCO.o UALST.o VALCRD.o VARCRD.o VRCARD.o WRTCRD.o YR2TOYR4.o YR4TOYR2.o XDCRD.o XTNDUA.o
208
209 rm *.o
210 rm *.mod

```

#!/bin/bash

export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"

export LINK_FLAGS="-O2"

gfortran -m64 -c \$COMPILE_FLAGS mod_AsosCommDates.for

gfortran -m64 -c \$COMPILE_FLAGS AERMET.FOR

gfortran -m64 -c \$COMPILE_FLAGS AERSURF.FOR

gfortran -m64 -c \$COMPILE_FLAGS AERSURF2.FOR

gfortran -m64 -c \$COMPILE_FLAGS ASOSREC.FOR

gfortran -m64 -c \$COMPILE_FLAGS AUDIT.FOR

gfortran -m64 -c \$COMPILE_FLAGS AUTCHK.FOR

gfortran -m64 -c \$COMPILE_FLAGS AVGCRD.FOR

gfortran -m64 -c \$COMPILE_FLAGS BANNER.FOR

gfortran -m64 -c \$COMPILE_FLAGS BULKRI.FOR

gfortran -m64 -c \$COMPILE_FLAGS CALMS.FOR

gfortran -m64 -c \$COMPILE_FLAGS CBLHT.FOR

gfortran -m64 -c \$COMPILE_FLAGS CHRCRD.FOR

gfortran -m64 -c \$COMPILE_FLAGS CHRCRD2.FOR

gfortran -m64 -c \$COMPILE_FLAGS CHROND.FOR

gfortran -m64 -c \$COMPILE_FLAGS CLHT.FOR

gfortran -m64 -c \$COMPILE_FLAGS CLMCRD.FOR

gfortran -m64 -c \$COMPILE_FLAGS CLOUDS.FOR

gfortran -m64 -c \$COMPILE_FLAGS COMPDT.FOR

gfortran -m64 -c \$COMPILE_FLAGS CUBIC.FOR


```
gfortran -m64 -c $COMPILE_FLAGS CVG.FOR
gfortran -m64 -c $COMPILE_FLAGS D028LV.FOR
gfortran -m64 -c $COMPILE_FLAGS D144HD.FOR
gfortran -m64 -c $COMPILE_FLAGS D144LV.FOR
gfortran -m64 -c $COMPILE_FLAGS D3280H.FOR
gfortran -m64 -c $COMPILE_FLAGS D3280L.FOR
gfortran -m64 -c $COMPILE_FLAGS D6201H.FOR
gfortran -m64 -c $COMPILE_FLAGS D6201L.FOR
gfortran -m64 -c $COMPILE_FLAGS DATCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS DATER.FOR
gfortran -m64 -c $COMPILE_FLAGS DEF256.FOR
gfortran -m64 -c $COMPILE_FLAGS DEFINE.FOR
gfortran -m64 -c $COMPILE_FLAGS DOCLDS.FOR
gfortran -m64 -c $COMPILE_FLAGS DTCDRD.FOR
gfortran -m64 -c $COMPILE_FLAGS EQ_CCVR.FOR
gfortran -m64 -c $COMPILE_FLAGS ERRHDL.FOR
gfortran -m64 -c $COMPILE_FLAGS FDKEY.FOR
gfortran -m64 -c $COMPILE_FLAGS FDPATH.FOR
gfortran -m64 -c $COMPILE_FLAGS FETCH.FOR
gfortran -m64 -c $COMPILE_FLAGS FLIWK1.FOR
gfortran -m64 -c $COMPILE_FLAGS FLIWK2.FOR
gfortran -m64 -c $COMPILE_FLAGS FLOPEN.FOR
gfortran -m64 -c $COMPILE_FLAGS FLOS.FOR
gfortran -m64 -c $COMPILE_FLAGS FLSDG.FOR
gfortran -m64 -c $COMPILE_FLAGS FLSFC.FOR
gfortran -m64 -c $COMPILE_FLAGS FLWRK1.FOR
gfortran -m64 -c $COMPILE_FLAGS FLWRK2.FOR
gfortran -m64 -c $COMPILE_FLAGS FMTCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS FNDCOMDT.FOR
gfortran -m64 -c $COMPILE_FLAGS GEO.FOR
gfortran -m64 -c $COMPILE_FLAGS GET620.FOR
gfortran -m64 -c $COMPILE_FLAGS GETASOS.FOR
gfortran -m64 -c $COMPILE_FLAGS GETCCVR.FOR
gfortran -m64 -c $COMPILE_FLAGS GETFIL.FOR
gfortran -m64 -c $COMPILE_FLAGS GETFLD.FOR
```

gfortran -m64 -c \$COMPILE_FLAGS GETFSL.FOR
gfortran -m64 -c \$COMPILE_FLAGS GETSFC.FOR
gfortran -m64 -c \$COMPILE_FLAGS GETTEMP.FOR
gfortran -m64 -c \$COMPILE_FLAGS GETWRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS GMTLST.FOR
gfortran -m64 -c \$COMPILE_FLAGS GREG.FOR
gfortran -m64 -c \$COMPILE_FLAGS HDPROC.FOR
gfortran -m64 -c \$COMPILE_FLAGS HEADER.FOR
gfortran -m64 -c \$COMPILE_FLAGS HEAT.FOR
gfortran -m64 -c \$COMPILE_FLAGS HGTCRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS HR0024.FOR
gfortran -m64 -c \$COMPILE_FLAGS HTCALC.FOR
gfortran -m64 -c \$COMPILE_FLAGS HTKEY.FOR
gfortran -m64 -c \$COMPILE_FLAGS HUMID.FOR
gfortran -m64 -c \$COMPILE_FLAGS HUSWX.FOR
gfortran -m64 -c \$COMPILE_FLAGS ICHRND.FOR
gfortran -m64 -c \$COMPILE_FLAGS INCRAD.FOR
gfortran -m64 -c \$COMPILE_FLAGS INTEQA.FOR
gfortran -m64 -c \$COMPILE_FLAGS INTHF.FOR
gfortran -m64 -c \$COMPILE_FLAGS ISHWX.FOR
gfortran -m64 -c \$COMPILE_FLAGS JBCARD.FOR
gfortran -m64 -c \$COMPILE_FLAGS LATLON.FOR
gfortran -m64 -c \$COMPILE_FLAGS LOCCRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS LWRUPR.FOR
gfortran -m64 -c \$COMPILE_FLAGS MANDEL.FOR
gfortran -m64 -c \$COMPILE_FLAGS MDCARD.FOR
gfortran -m64 -c \$COMPILE_FLAGS MERGE.FOR
gfortran -m64 -c \$COMPILE_FLAGS MIDNITE.FOR
gfortran -m64 -c \$COMPILE_FLAGS MODEL.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPCARD.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPFIN.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPHEAD.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPMET.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPOUT.FOR
gfortran -m64 -c \$COMPILE_FLAGS MPPBL.FOR

```
gfortran -m64 -c $COMPILE_FLAGS MPPROC.FOR
gfortran -m64 -c $COMPILE_FLAGS MPTEST.FOR
gfortran -m64 -c $COMPILE_FLAGS MRCARD.FOR
gfortran -m64 -c $COMPILE_FLAGS MRHDR.FOR
gfortran -m64 -c $COMPILE_FLAGS MRPATH.FOR
gfortran -m64 -c $COMPILE_FLAGS NETRAD.FOR
gfortran -m64 -c $COMPILE_FLAGS NR_ANG.FOR
gfortran -m64 -c $COMPILE_FLAGS NWSHGT.FOR
gfortran -m64 -c $COMPILE_FLAGS OAUDIT.FOR
gfortran -m64 -c $COMPILE_FLAGS OSCARD.FOR
gfortran -m64 -c $COMPILE_FLAGS OSCHK.FOR
gfortran -m64 -c $COMPILE_FLAGS OSDTCD.FOR
gfortran -m64 -c $COMPILE_FLAGS OSDUMP.FOR
gfortran -m64 -c $COMPILE_FLAGS OSFILL.FOR
gfortran -m64 -c $COMPILE_FLAGS OSFILL2.FOR
gfortran -m64 -c $COMPILE_FLAGS OSHRAV.FOR
gfortran -m64 -c $COMPILE_FLAGS OSNEXT.FOR
gfortran -m64 -c $COMPILE_FLAGS OSPATH.FOR
gfortran -m64 -c $COMPILE_FLAGS OSPRNT.FOR
gfortran -m64 -c $COMPILE_FLAGS OSQACK.FOR
gfortran -m64 -c $COMPILE_FLAGS OSQAST.FOR
gfortran -m64 -c $COMPILE_FLAGS OSRANGE.FOR
gfortran -m64 -c $COMPILE_FLAGS OSREAD.FOR
gfortran -m64 -c $COMPILE_FLAGS OSSMRY.FOR
gfortran -m64 -c $COMPILE_FLAGS OSSUMS.FOR
gfortran -m64 -c $COMPILE_FLAGS OSSWAP.FOR
gfortran -m64 -c $COMPILE_FLAGS OSTEST.FOR
gfortran -m64 -c $COMPILE_FLAGS OSTR.A.FOR
gfortran -m64 -c $COMPILE_FLAGS OSWRTE.FOR
gfortran -m64 -c $COMPILE_FLAGS OTHHDR.FOR
gfortran -m64 -c $COMPILE_FLAGS P2MSUB.FOR
gfortran -m64 -c $COMPILE_FLAGS PRESET.FOR
gfortran -m64 -c $COMPILE_FLAGS PTAREA.FOR
gfortran -m64 -c $COMPILE_FLAGS PTGRAD.FOR
gfortran -m64 -c $COMPILE_FLAGS RDHUSW.FOR
```

gfortran -m64 -c \$COMPILE_FLAGS RDISHD.FOR
gfortran -m64 -c \$COMPILE_FLAGS RDLREC.FOR
gfortran -m64 -c \$COMPILE_FLAGS RDSAMS.FOR
gfortran -m64 -c \$COMPILE_FLAGS READRL.FOR
gfortran -m64 -c \$COMPILE_FLAGS REALQA.FOR
gfortran -m64 -c \$COMPILE_FLAGS RHOCAL.FOR
gfortran -m64 -c \$COMPILE_FLAGS RNGCRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS SAMWX.FOR
gfortran -m64 -c \$COMPILE_FLAGS SAUDIT.FOR
gfortran -m64 -c \$COMPILE_FLAGS SBLHT.FOR
gfortran -m64 -c \$COMPILE_FLAGS SCNGEN.FOR
gfortran -m64 -c \$COMPILE_FLAGS SECCRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS SECCRD2.FOR
gfortran -m64 -c \$COMPILE_FLAGS SETHUS.FOR
gfortran -m64 -c \$COMPILE_FLAGS SETSAM.FOR
gfortran -m64 -c \$COMPILE_FLAGS SETUP.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCARD.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCCH.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCCH2.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCCRD.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCCRD2.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCHK.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFCWXX.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFEXST.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFEXT.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFPATH.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFQASM.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFQAST.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFQATM.FOR
gfortran -m64 -c \$COMPILE_FLAGS SFTRA.FOR
gfortran -m64 -c \$COMPILE_FLAGS SMTHZI.FOR
gfortran -m64 -c \$COMPILE_FLAGS STONUM.FOR
gfortran -m64 -c \$COMPILE_FLAGS SUBST.FOR
gfortran -m64 -c \$COMPILE_FLAGS SUMHF.FOR
gfortran -m64 -c \$COMPILE_FLAGS SUMRY1.FOR

```

gfortran -m64 -c $COMPILE_FLAGS SUMRY2.FOR
gfortran -m64 -c $COMPILE_FLAGS SUNDAT.FOR
gfortran -m64 -c $COMPILE_FLAGS TDPEST.FOR
gfortran -m64 -c $COMPILE_FLAGS TEST.FOR
gfortran -m64 -c $COMPILE_FLAGS THRESH1MIN.FOR
gfortran -m64 -c $COMPILE_FLAGS UACARD.FOR
gfortran -m64 -c $COMPILE_FLAGS UACHK.FOR
gfortran -m64 -c $COMPILE_FLAGS UAEXST.FOR
gfortran -m64 -c $COMPILE_FLAGS UAEXT.FOR
gfortran -m64 -c $COMPILE_FLAGS UAMOVE.FOR
gfortran -m64 -c $COMPILE_FLAGS UAPATH.FOR
gfortran -m64 -c $COMPILE_FLAGS UAQASM.FOR
gfortran -m64 -c $COMPILE_FLAGS UAQAST.FOR
gfortran -m64 -c $COMPILE_FLAGS UATRA.FOR
gfortran -m64 -c $COMPILE_FLAGS UAUDIT.FOR
gfortran -m64 -c $COMPILE_FLAGS UAWNDW.FOR
gfortran -m64 -c $COMPILE_FLAGS UCALCO.FOR
gfortran -m64 -c $COMPILE_FLAGS UCALST.FOR
gfortran -m64 -c $COMPILE_FLAGS VALCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS VARCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS VRCARD.FOR
gfortran -m64 -c $COMPILE_FLAGS WRTCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS YR2TOYR4.FOR
gfortran -m64 -c $COMPILE_FLAGS YR4TOYR2.FOR
gfortran -m64 -c $COMPILE_FLAGS XDTCRD.FOR
gfortran -m64 -c $COMPILE_FLAGS XTNDUA.FOR

```

```

gfortran -m64 -o aernet.exe SLINK_FLAGS mod_AsosCommDates.o AERMET.o AERSURF.o AERSURF2.o ASOSREC.o AUDIT.o AUTCHK.o AVGCRD.o BANNER.o BULKRI.o CALMS.o CBLHT.o CHRCRD.o \
CHRCRD2.o CHROND.o CLHT.o CLMCRD.o CLOUDS.o COMPDT.o CUBIC.o CVG.o D028LV.o D144HD.o D144LV.o D3280H.o \
D3280L.o D6201H.o D6201L.o DATCRD.o DATER.o DEF25.o DEFINE.o DOCLDS.o DTCRD.o EQ_CCVR.o ERRHDL.o FDKEY.o \
FDPATH.o FETCH.o FLIWK1.o FLIWK2.o FLOPEN.o FLOS.o FLSDG.o FLSFC.o FLWRK1.o FLWRK2.o FNDCOMDT.o FMTCRD.o \
GEO.o GET620.o GETASOS.o GETCCVR.o GETFIL.o GETFLD.o GETFSL.o GETSFC.o GETTEMP.o GETWRD.o GMTLST.o GREG.o HDPROC.o HEADER.o HEAT.o \
HGTCRD.o HR0024.o HTCALC.o HTKEY.o HUMID.o HUSWX.o ICHNRD.o INCRAD.o INTEQA.o INTHE.o ISHWX.o JBCARD.o \
LATLON.o LOCCRD.o LWRUPR.o MANDEL.o MDCARD.o MERGE.o MIDNITE.o MODEL.o MPCARD.o MPFIN.o MPHEAD.o MPMET.o \
MPOUT.o MPPBL.o MPPROC.o MPTEST.o MRCARD.o MRHDR.o MRPATH.o NETRAD.o NR_ANG.o NWSHGT.o OAUDIT.o OSCARD.o \
OSCHK.o OSDTCD.o OSDUMP.o OSFILL.o OSFILL2.o OSHRAV.o OSNEXT.o OSPATH.o OSPRNT.o OSQACK.o OSQAST.o OSRANGE.o OSREAD.o OSSMRY.o \
OSSUMS.o OSSWAPO.o OSTEST.o OSTR.o OSWRITE.o OTHHDR.o P2MSUB.o PRESET.o PTAREA.o PTGRAD.o RDHUSW.o RDISHD.o RDLREC.o \
RDSAMS.o READRL.o REALQA.o RHOAL.o RNGCRD.o SAMWX.o SAUDIT.o SBLHT.o SCNGEN.o SECCRD.o SECCRD2.o SETHUS.o \
SETSAM.o SETUP.o SFCARD.o SFCCH.o SFCCH2.o SFCCH2.o SFCCH2.o SFCCHK.o SFCWXX.o SFEXST.o SFEXT.o SFPATH.o \
SFQASM.o SFQAST.o SFQATM.o SFTRA.o SMTHZL.o STONUM.o SUBST.o SUMHF.o SUMRY1.o SUMRY2.o SUNDAT.o TDPEST.o \
TEST.o THRESH1MIN.o UACARD.o UACHK.o UAEXST.o UAEXT.o UAMOVE.o UAPATH.o UAQASM.o UAQAST.o UATRA.o UAUDIT.o UAWNDW.o \
UCALCO.o UCALST.o VALCRD.o VARCRD.o VRCARD.o WRTCRD.o YR2TOYR4.o YR4TOYR2.o XDTCRD.o XTNDUA.o

```

```
rm -f *.o
```

```
rm -f *.mod
```

- Big gfortran block above was made small so that the escape \ are already in the right place for ease of copy-paste... you're welcome
- In Vim, convert the file format from DOS to Unix; see <https://unix.stackexchange.com/questions/32001/what-is-m-and-how-do-i-get-rid-of-it>
 - `:set ff=unix`
 - `:wq`
- If that's all worked out, run the script
 - `./gfortran-aermet-64bit.sh`
- Once it's finished running, you should see aermet.exe with `ls`
 - `./aermet.exe`
 - You should get the error: Error opening: aermet.inp

Running AERMET Test Case

- Make a tutorial directory
 - `mkdir tutorial`
 - `cd tutorial`
- Grab the sample run, unzip, and cd into the unzipped folder
 - `wget --no-check-certificate`
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/met/aermet/aermet_test_cases.zip
 - `unzip aermet_test_cases.zip`
 - `cd aermet_test_cases_21112`

- **ls**
- You should see a bunch of case studies and some R scripts; go into the default cases directory
 - **cd aermet_def_testcases_21112**
 - **ls**
- You'll now see a bunch of folders containing different experiments; create your own directory, myEX03
 - **mkdir myEX03**
 - **cd EX03**
- From ../EX03, copy over 1990_FSL.DAT (sounding profile), EX03_S1.INP (1st stage aermet), EX03_S2.INP (2nd stage aermet), EX03_S3.INP (3rd stage aermet), RDU-90ALL (surface weather data)
 - **cp ../EX03/1990_FSL.DAT .**
 - **cp ../EX03/EX03_S1.INP .**
 - **cp ../EX03/EX03_S2.INP .**
 - **cp ../EX03/EX03_S3.INP .**
 - **cp ../EX03/RDU-90ALL .**
- Then copy over aermet.exe
 - **cd ~/AERMET/aermet.exe .**
- You should now have 6 files in your directory

```
1990_FSL.DAT  EX03_S1.INP  EX03_S2.INP  EX03_S3.INP  RDU-90.ALL  aermet.exe*
```

- Then, run stage 1 (extraction of surface and sounding data, and quality assurance), by copying over the stage 1 .INP into the aermet.exe-recognized aermet.inp
 - **cp EX03_S1.INP aermet.inp**
 - **./aermet.exe**

- You should see:
 - + Stage 1: QA'ing surface data for month/day/year 12/27/90
 - + Stage 1: QA'ing surface data for month/day/year 12/28/90
 - + Stage 1: QA'ing surface data for month/day/year 12/29/90
 - + Stage 1: QA'ing surface data for month/day/year 12/30/90
 - + Stage 1: QA'ing surface data for month/day/year 12/31/90

Processing completed; writing summary files

```
*****
***  AERMET Data Processing Finished Successfully  ***
*****
```

The Summary Report Generated by AERMET Is In:
EX03_S1.RPT

- If you run **ls**, you should see EX03_SF.IQA, EX03_SF.OQA, EX03_UA.IQA, EX03_UA.OQA ---> these are used as input for stage 2
- Then, run stage 2 (merging of data into an intermediate file, MR)
 - **cp EX03_S2.INP aermet.inp**
 - **./aermet.exe**
- You should see:
 - + Stage 2: Merging month/day/year 12/26/90
 - + Stage 2: Merging month/day/year 12/27/90
 - + Stage 2: Merging month/day/year 12/28/90
 - + Stage 2: Merging month/day/year 12/29/90
 - + Stage 2: Merging month/day/year 12/30/90
 - + Stage 2: Merging month/day/year 12/31/90

Processing completed; writing summary files


```

*****
***  AERMET Data Processing Finished Successfully  ***
*****

```

The Summary Report Generated by AERMET Is In:
EX03_S2.RPT

- If you run **ls**, you should see EX03_MR.MET ---> this is a merged meteorology file that is used as input for stage 3
- Finally, run stage 3 (compute boundary layer parameters/apply surface layers scheme, output AERMOD-required .sfc and .pfl):
 - **cp EX03_S3.INP aermnet.inp**
 - **./aermnet.exe**
- You should see:
 - + Stage 3: Now processing month/day/year 12/27/90
 - + Stage 3: Now processing month/day/year 12/28/90
 - + Stage 3: Now processing month/day/year 12/29/90
 - + Stage 3: Now processing month/day/year 12/30/90
 - + Stage 3: Now processing month/day/year 12/31/90

Processing completed; writing summary files

```

*****
***  AERMET Data Processing Finished Successfully  ***
*****

```

The Summary Report Generated by AERMET Is In:
EX03_S3.RPT

- If you run **ls**, you should see EX03_MP.SFC and EX03_MP.PFL ---> these are the surface and profile fields used as input for AERMOD

Installing AERMAP

- Go back home; make a new directory and enter the directory
 - **cd ~**
 - **mkdir AERMAP**
 - **cd AERMAP**
- Download the source code from the website:
 - <https://www.epa.gov/scram/air-quality-dispersion-modeling-related-model-support-programs#aermap>
 - **wget --no-check-certificate**
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aermap/aermap_source.zip
- Unzip the source
 - **unzip aermap_source.zip**
- Create write and execute permissions for gfortran-aermap-64bit.bat, then make a copy of it suffixed as .sh
 - **chmod 755 gfortran-aermap-64bit.bat**
 - **cp gfortran-aermap-64bit.bat**
gfortran-aermap-64bit.sh
- ...You know the drill...don't forget **:set ff=unix**

```
#!/bin/bash
export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"
export LINK_FLAGS="-O2"

gfortran -m64 -c $COMPILE_FLAGS mod_main1.f
gfortran -m64 -c $COMPILE_FLAGS mod_tifftags.f
gfortran -m64 -c $COMPILE_FLAGS aermap.f
gfortran -m64 -c $COMPILE_FLAGS sub_calchc.f
gfortran -m64 -c $COMPILE_FLAGS sub_chkadj.f
gfortran -m64 -c $COMPILE_FLAGS sub_chkext.f
gfortran -m64 -c $COMPILE_FLAGS sub_demchk.f
gfortran -m64 -c $COMPILE_FLAGS sub_nedchk.f
gfortran -m64 -c $COMPILE_FLAGS sub_cnrcnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_demrec.f
gfortran -m64 -c $COMPILE_FLAGS sub_demsr.c.f
gfortran -m64 -c $COMPILE_FLAGS sub_domcnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_initer_dem.f
gfortran -m64 -c $COMPILE_FLAGS sub_initer_ned.f
gfortran -m64 -c $COMPILE_FLAGS sub_nadcon.f
gfortran -m64 -c $COMPILE_FLAGS sub_reccnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_recelv.f
gfortran -m64 -c $COMPILE_FLAGS sub_srccnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_srclv.f
gfortran -m64 -c $COMPILE_FLAGS sub_utmgeo.f
gfortran -m64 -c $COMPILE_FLAGS sub_read_tifftags.f

gfortran -m64 -o aermap.exe $LINK_FLAGS mod_main1.o mod_tifftags.o aermap.o sub_calchc.o sub_chkadj.o sub_chkext.o sub_demchk.o sub_nedchk.o s
rm -f *.o *.mod
```

```
#!/bin/bash
```

```
export COMPILE_FLAGS="-fbounds-check -Wuninitialized -O2"
export LINK_FLAGS="-O2"
```

```
gfortran -m64 -c $COMPILE_FLAGS mod_main1.f
gfortran -m64 -c $COMPILE_FLAGS mod_tifftags.f
gfortran -m64 -c $COMPILE_FLAGS aermap.f
gfortran -m64 -c $COMPILE_FLAGS sub_calchc.f
gfortran -m64 -c $COMPILE_FLAGS sub_chkadj.f
gfortran -m64 -c $COMPILE_FLAGS sub_chkext.f
gfortran -m64 -c $COMPILE_FLAGS sub_demchk.f
gfortran -m64 -c $COMPILE_FLAGS sub_nedchk.f
gfortran -m64 -c $COMPILE_FLAGS sub_cnrcnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_demrec.f
gfortran -m64 -c $COMPILE_FLAGS sub_demsr.c.f
gfortran -m64 -c $COMPILE_FLAGS sub_domcnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_initer_dem.f
gfortran -m64 -c $COMPILE_FLAGS sub_initer_ned.f
gfortran -m64 -c $COMPILE_FLAGS sub_nadcon.f
gfortran -m64 -c $COMPILE_FLAGS sub_reccnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_recelv.f
gfortran -m64 -c $COMPILE_FLAGS sub_srccnv.f
gfortran -m64 -c $COMPILE_FLAGS sub_srclv.f
gfortran -m64 -c $COMPILE_FLAGS sub_utmgeo.f
```

```
gfortran -m64 -c $COMPILE_FLAGS sub_read_tiff-tags.f
```

```
gfortran -m64 -o aermap.exe $LINK_FLAGS mod_main1.o mod_tiff-tags.o \
aermap.o sub_calchc.o sub_chkadj.o sub_chkext.o sub_demchk.o sub_nedchk.o \
sub_cnrcnv.o sub_demrec.o sub_demsrce.o sub_domcnv.o sub_initer_dem.o \
sub_initer_ned.o sub_nadcon.o sub_reccnv.o sub_recelv.o sub_srccnv.o \
sub_srcelv.o sub_utmgeo.o sub_read_tiff-tags.o
```

```
rm -f *.o *.mod
```

- ^big gfortran block above needs to be in one line or escaped (as copied) with \
- Run the **gfortran-aermap-64bit.sh** file
 - **./gfortran-aermap-64.bit.sh**
- Run aermap.exe
 - **./aermap.exe**
 - You should get the error: +Error Opening Input File: AERMAP.INP Aborting.

Running AERMAP Test Case

- Make a tutorial directory
 - **mkdir tutorial**
 - **cd tutorial**
- Grab the sample run, unzip, and cd into the unzipped folder
 - **wget --no-check-certificate**
https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/aermap/aermap_testcase.zip
 - **unzip aermap_testcase.zip**

- `cd aermap_testcase`
- `ls`
- Make a new directory myNAD_GAP
 - `mkdir myNAD_GAP`
 - `cd myNAD_GAP`
- Copy over (and rename) the .inp from ../NAD_GAP, alongside the .dem files
 - `cp ../NAD_GAP/aermap_NAD-GAP.inp ./aermap.inp`
 - `cp ../NAD_GAP/*dem .`
- Copy over the gridshift data (conus*) from the directory above
 - `cp ../conus* .`
- Finally, copy over your aermap.exe
 - `cp ~/AERMAP/aermap.exe .`
- You should see the following 6 files in your directory:

```
aermap.exe*  aermap.inp  brdgport.dem  conus.las  conus.los  marchook.dem
```

- In Vim, remove line 15 from aermap.inp: `NADGRIDS ..\ .`
- Run aermap.exe
 - `./aermap.exe`
 - `ls`
- You should see a bunch of .out files, alongside receptor file aermap_NAD-GAP_FILLGAPS.rec and source file aermap_NAD-GAP_FILLGAPS.src, that can be used as input into AERMOD

DOMDETAIL.OUT	aermap.inp	brdgport.dem	marchook.dem	src1dbg_NAD-GAP.out
MAPDETAIL.OUT	aermap.out	calchcdbg_NAD-GAP.out	rec1dbg_NAD-GAP.out	src2dbg_NAD-GAP.out
MAPPARAMS.OUT	aermap_NAD-GAP_FILLGAPS.rec	conus.las	rec2dbg_NAD-GAP.out	src3dbg_NAD-GAP.out
aermap.exe*	aermap_NAD-GAP_FILLGAPS.src	conus.los	rec3dbg_NAD-GAP.out	