**From:** Erik Neemann [erikneemann@gmail.com]
**Sent:** Wednesday, March 26, 2014 10:53 AM
**To:** Erik Crosman
**Subject:** Re: FW: Tracers in WRF

Okay, here are the steps I took.  Since I've been running from meso3, you'll need to ssh to meso3, then go into the folder I have in the scratch directory (start with "cd /" command.  Then the WRF files are in the directory in parentheses:

1 - Updated namelist.input "tracer\_opt" (/compute1/scratch/eneemann/WRFV3/test/em\_real)

2 - Updated Registry.EM\_COMMON (/compute1/scratch/eneemann/WRFV3/Registry)

3 - Updated solve\_em.F (/compute1/scratch/eneemann/WRFV3/dyn\_em)

4 - Updated module\_initialize\_real.F (/compute1/scratch/eneemann/WRFV3/dyn\_em)

I'm not totally sure where the "tiling" error is, but likely in module\_initialize\_real.F where our loops reference jts instead of jds, for example.  Or it could be in solve\_em.F, because that's where the tracer data should be calculated while the model is running.

It's probably easiest to copy the files into the directory you'll use and do a diff on the original files.  Or you can look for my initials "EMN" so see where I edited the code.

It looks like everything was turned on in the last run I did (BASE), so you can see what was output here:
/uufs/[chpc.utah.edu/common/home/horel-group2/eneemann/Uintah\_Basin\_Runs/WRFv3.5/Feb\_2013\_BASE](http://chpc.utah.edu/common/home/horel-group2/eneemann/Uintah_Basin_Runs/WRFv3.5/Feb_2013_BASE)

STUFF1 and STUFF2 are the outputs under 4D variables.  Let me know if you have any questions or run into problems,

Erik N

On Wed, Mar 26, 2014 at 10:40 AM, Erik Neemann <erikneemann@gmail.com> wrote:

Sorry, I sent the wrong email and will update this...

On Wed, Mar 26, 2014 at 10:37 AM, Erik Neemann <erikneemann@gmail.com> wrote:

Erik,

From following Allison's directions I took 4 steps:

On Tue, May 28, 2013 at 4:00 PM, Erik Crosman <Erik.Crosman@utah.edu> wrote:

tracer info in email...

**From:** Neil Lareau [neil.lareau@gmail.com]
**Sent:** Thursday, November 01, 2012 1:53 PM
**To:** Erik Crosman
**Subject:** Fwd: Tracers in WRF

CODE FROM ALISON!

Should be a big help!

---------- Forwarded message ----------
From: **Alison Nugent** <adnugent@gmail.com>
Date: Thu, Nov 1, 2012 at 10:50 AM
Subject: Re: Tracers in WRF
To: Alison Nugent <adnugent@gmail.com>
Cc: Neil Lareau <neil.lareau@gmail.com>

Hey Neil,

So sorry. I was going to do it Friday but then I got completely distracted by Sandy.  I'm fine, I have electricity, but I feel really stuck.  I can't really go anywhere since the subways are mostly down.  Some of them are coming back up now but they're beyond PACKED so there is no point in going anywhere.  Anyway, I've attached the code pieces that need to be modified in the folder called Tracer attached.

In model\_initialize\_real.F or wherever you want the tracers to go, you need to initialize the tracers first as zero everywhere....or you can also initialize them as a certain value.  Both examples are given.  Here is a snippet of the code (just search for tracer or stuff).  Note that tracer\_opt is a namelist flag you'll set in the namelist.

!  Our tracer arrray init thingies

      IF ( config\_flags%tracer\_opt == 1 ) THEN

         DO j=jts,MIN(jde-1,jte)

            DO k=kts,kte

               DO i=its,MIN(ide-1,ite)

                  tracer(i,k,j,P\_stuff1) = 0.0 [HERE THE TRACER IS INITIALIZED AS ZERO]

                  tracer(i,k,j,P\_stuff2) = 0.0

               END DO

            END DO

         END DO

         k=kts

         DO j=jts,MIN(jde-1,jte)

            if ( abs(j-jde/2).le.4) then

                jw = 1

            else

                jw = 0

            end if

            DO i=its,MIN(ide-1,ite)

               if ( abs(i-ide/2).le.4) then

                   iw = 1

               else

                   iw = 0

               end if

               val = 1.e-6 \* real(iw) \* real(jw)

               tracer(i,k,j,P\_stuff2) = val [HERE THE TRACER IS SET AS A CERTAIN VALUE]

            END DO

         END DO

      END IF

Next in the namelist, set a namelist value of tracer\_opt.  If you have tracers in different domains, you can specify them separately.

In the Registry, find the tracer section.  I've added my own package of tracers called stuff.  I didn't choose the name...Dave Gill, the guy that was helping me chose it and I didn't feel like changing it. :P  You can be more creative if you want.  You need to modify three things in the registry...the names of the tracers you added in module\_initialize, the package name, and the namelist option.

[SET THE NAMELIST VALUE IN THE REGISTRY]

rconfig   integer     tracer\_opt          namelist,dynamics     max\_domains    0       rh    "tracer\_opt"

[MAKE A NEW PACKAGE AND TELL THEM WHICH TRACERS ARE PART OF THE PACKAGE]

package   tracer\_prac1  tracer\_opt==1       -             tracer:stuff1,stuff2

[NAME THE TRACERS YOU'LL USE IN THE REGISTRY (NOTE, I HAVE 15 TRACERS NOW AND I JUST KEEP ADDING THEM ON HERE AND ABOVE)]

state   real    stuff1     ikjftb  tracer        1         -     irhusdf=(bdy\_interp:dt)    "STUFF1"         "Practice tracer #1" -

state   real    stuff2     ikjftb  tracer        1         -     irhusdf=(bdy\_interp:dt)    "STUFF2"         "Practice tracer #2" -

Finally, in solve\_em.F you need to add your tracer source or whatever you want it to be.  For example, this is a tracer source at 4 grid points in each time step.  At the location (40,1,40) and the 3 points above it, the tracer value is set to a certain value at each time step.  This isn't the best way...its better to add it to the value there.  For example tracer=tracer+source so you don't have a loss of tracer by resetting the value.  But you get the idea.  For some reason its best to use really small value of tracers like e-6 shown here.  I'm not exactly sure why but thats what i was told.  You can always scale it up later.

  IF ( config\_flags%tracer\_opt == 1 ) THEN

     IF ( grid%id == 1 ) THEN

        tracer(40,1,40,P\_stuff1) = 1.e-6 [SMALL NUMER IS IMPORTANT!]

        tracer(40,2,40,P\_stuff1) = 1.e-6 [MAY WANT A SUM INSTEAD OF A RESET]

        tracer(40,3,40,P\_stuff1) = 1.e-6

        tracer(40,4,40,P\_stuff1) = 1.e-6

     END IF

  END IF

Look for these pieces of code in the 4 files attached.  Search for tracer or stuff and you should find em.  I think it is somewhat random where they're placed, but for example in solve\_em, the code snippet needs to be in the RK loops.

Modify namelist and registry so the code knows what these tracers are.

Initialize them as zero or as a set value.

Use solve\_em to modify them with each time step.

Good luck!

Email me back if its not clear...

Alison

On Oct 25, 2012, at 8:28 AM, Alison Nugent wrote:

Hey Neil,
I'm more than happy to help.  I'll send you some stuff either later today or tomorrow...copies of my code where the tracers were added in.  I'm on the train and WRF is on the cluster or else I'd do it now.  You can use them as an example to get them going in your WRF.  You're probably not finding any documentation because I'm not sure that any exists.  I got help with it during the WRF workshop that I went to...it was one of my main goals to figure out by the end of it and I certainly wouldn't've figured it out on my own!
Alison

On Oct 24, 2012, at 1:41 PM, Neil Lareau wrote:

Alison,

Hope things are well in NY/CT. Looks like things might get interesting there with potential for Sandy to slam into the Northeast.

I was hoping you could help point me in the right direction for initializing some tracers in WRF LES. I really liked your work for DOMEX showing the different tracer sources on different parts of the island and am hoping to do something similar for some LES runs of our cold air pool experiment.

However, I'm having a hard time finding any documentation on how to actually initialize tracers. (I've figured out the namelist options, and know that it is controlled in the Registry somewhere).

Any help or insights you might have would be much appreciated.

Thanks,

Neil

--
Neil Lareau