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Ben Foster <foster@ucar.edu>

TIEGCM with ESMF, nproc=1

8 messages

Ben Foster <foster@ucar.edu> Wed, Sep 30, 2015 at 2:22 PM
To: Robert Oehmke <robert.oehmke@noaa.gov>

Bob,

Ok, I did get a PET0 file, which is attached below. Also attached is the source module (esmf.F) that makes the call to FieldRegridStore - search on "513" to find the call to store regrid handle for geographic to geomagnetic gridding. Above the call, you'll see 2 calls to ESMF_GridWriteVTK, one for geographic grid, and another for magnetic grid. The resulting *.vtk files are also attached. Thanks for looking at this..

--Ben

On Fri, Sep 25, 2015 at 1:12 PM, Robert Oehmke <robert.oehmke@noaa.gov> wrote:

> Hi Ben,
>
> I took a look at the output file. It doesn't have much information. It's strange that the Pet files are empty. When you abort do you call ESMF_Finalize()? It flushes the log messages to file.
>
> If that doesn't work, let me know and I'll think of another way to debug.
>
> Thanks!
>
> - Bob
>
> On Sep 24, 2015, at 4:04 PM, Ben Foster <foster@ucar.edu> wrote:
>
> > Yes, long time no talk. BTW, now that Sean Elvidge's problem is resolved, I have been meaning to ask you about a problem: I get the same error that Sean got when I run the model with only a single processor (nproc=1).
> >
> > 0: >>> esmf_init: error return from ESMF_FieldRegridStore for 3d geo2mag: rc= 513
> >
> > Surprisingly, it apparently did not produce a PET file (the 4 PET files from a previous successful run with nproc=4 are there and are empty). I would like to be able to occaisionally run the code with nproc=1 for debugging purposes. I'm attaching the stdout file w/ the error. Let me know if I can give you more information. No hurry on this - I no longer work on Fridays, so no need to reply before next week). Thanks,
> >
> > --Ben

4 attachments

- **PET0.ESMF_LogFile** 1K
- **esmf.F** 42K
- **geoSrcGrid.vtk** 157K
- **magDesGrid.vtk** 480K

Robert Oehmke <robert.oehmke@noaa.gov> Wed, Sep 30, 2015 at 5:05 PM
To: Ben Foster <foster@ucar.edu>

Hi Ben,

I took a look at this and I see what the problem is. There's a gap in the grid that's leading to some unmapped points. However, I'm not sure where that gap is coming from. It looks a bit like one strip of coordinates is being set to the wrong thing (e.g. zero), but it's hard to tell. Can you think of a

way that could happen when you run it on one proc? Also what release of ESMF are you using?

Thanks,

- Bob

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> [Quoted text hidden]
> <PET0.ESMF_LogFile><esmf.F><geoSrcGrid.vtk><magDesGrid.vtk>

Ben Foster <foster@ucar.edu> Thu, Oct 1, 2015 at 10:02 AM
To: Robert Oehmke <robert.oehmke@noaa.gov>

On yellowstone, I module load esmf-6.3.0r-ncdfio-mpi-O,
and at hao I link ESMF_5_2_0rp1_beta_snapshot_21,
which I built myself a couple of years ago. I get the same
error from both libs when running w/ a single task.

Is the gap with zeroes in the source grid (geographic), or the
destination grid (magnetic)? The poles are usually a suspect:
the geographic source grid does NOT go to +/-90 deg latitude
(it goes to within 2.5 or 1.25 degrees of the poles depending on
resolution), but I intend for ESMF to provide pole values on the magnetic
destination grid, hence the ESMF_POLEMETHOD_ALLAVG argument
to ESMF_FieldRegridStore. I'm not sure why this would work with
> 1 mpi task, but not work with only a single task. I have seen some
small "holes" (zeroes?) in horizontal plots of fields on the magnetic
grid about where the mag poles should be after the geo2mag regridding
with > 1 tasks, although it does not throw the error like it does when nproc==1.

--B
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--
Ben Foster
National Center for Atmospheric Research (NCAR)
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303-497-1595

Robert Oehmke <robert.oehmke@noaa.gov> Fri, Oct 2, 2015 at 10:20 AM
To: Ben Foster <foster@ucar.edu>

Hi Ben,

Thanks for all the useful information. :-)

If you've tried 6.3.0r, then that's probably fine and it's not some incomplete implementation in a snapshot.

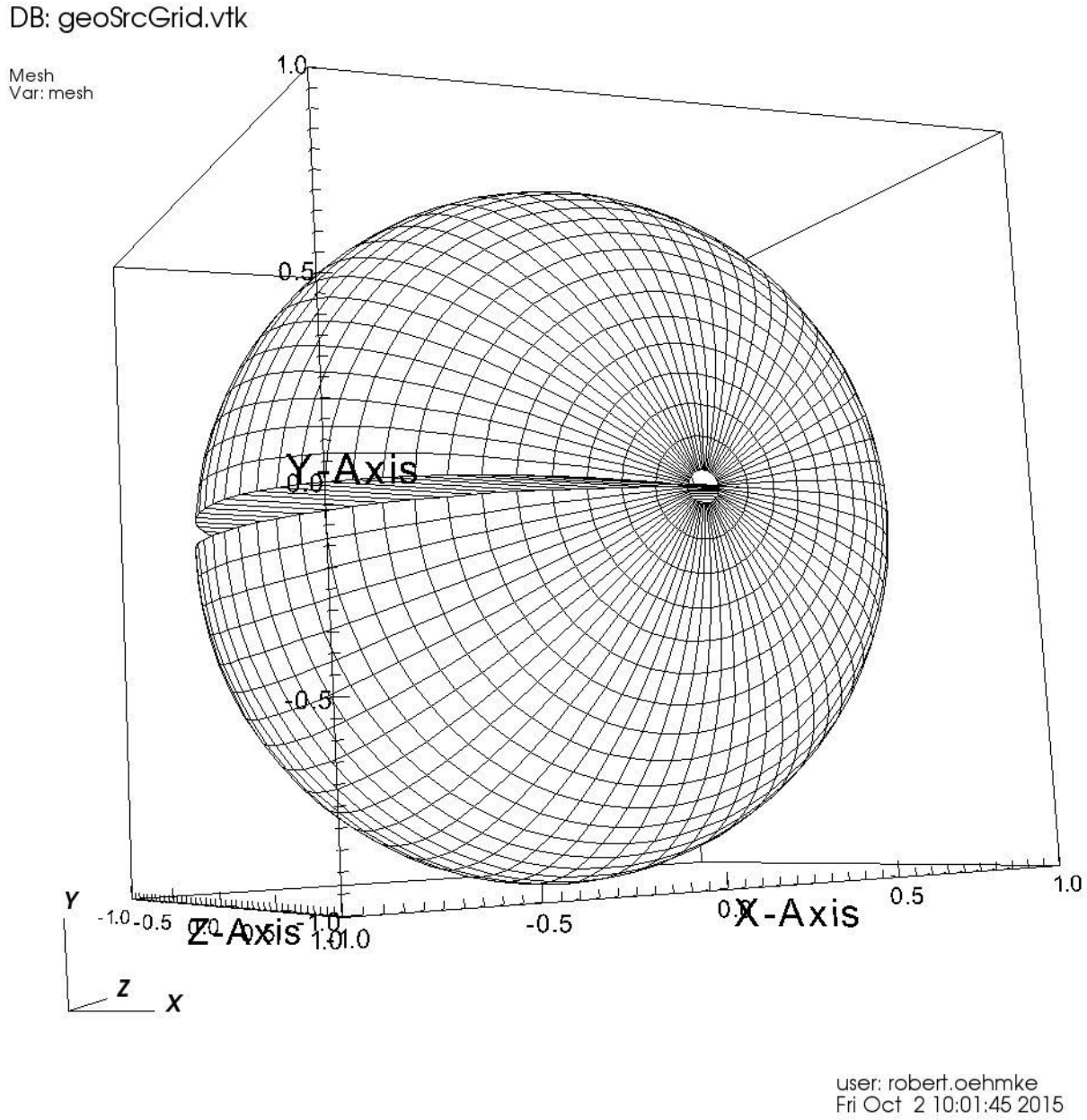
It's not the pole, there is a slice missing from pole to pole from the source grid. See attached picture. To be more precise, it looks to me like that set of points is folding into the grid as if the coordinates are wrong (e.g. set to 0). The missing point that's being reported as an error falls within that gap.

Since the gap falls along a constant longitude strip, maybe a good next step would be to print out your longitude coordinate array to make sure that the values look ok, the array is the size that you expect, etc… Would you mind doing that.

Let me know if you have any questions.

Thanks,

- Bob



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Ben Foster <foster@ucar.edu> Fri, Oct 2, 2015 at 1:13 PM
To: Robert Oehmke <robert.oehmke@noaa.gov>

Oh great, this is a good hint. Now I suspect periodic points. When not regridding, the geographic grid has 2 periodic points at each end of the longitude dimension (for 4th order differencing),
but the destination magnetic grid has only 1 periodic point (-180 == +180).
I would think that I should exclude the periodic points during regridding, then add the single periodic point to the magnetic fields, but since the gap is in the source grid, maybe I inadvertently included the periodic points in the coordinate array, and the fields had zeroes at those points, or or vice-versa. I will look further and let you know.

But actually, it would be good if I do not have to set the periodic point in the magnetic fields, since that would take some communication overhead. Maybe I can pass the geographic fields without periodic points, and have ESMF add the single point to the magnetic output field.

--Ben
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Robert Oehmke <robert.oehmke@noaa.gov> Fri, Oct 2, 2015 at 1:58 PM
To: Ben Foster <foster@ucar.edu>

Hi Ben,

Since you specify a periodic grid (1PeriDim) when creating the source, you shouldn't specify the periodic point (i.e. the point that's the same), otherwise you'll get a row of degenerate cells.

If you need ESMF to fill in an extra periodic point on the destination side. I think that you can just put it in and it'll happen as part of the regridding. I know that this contradicts the above, but for bilinear ESMF only cares about points on the destination side not the whole cells. I think that it should work, but I'm not sure, because I haven't tested that case in that release. In the soon to be released version of ESMF, this should definitely work because we've loosened things up on the destination side to make things more flexible and you can pretty much have points scattered anywhere (e.g. on top of one another) and it should work.

Have a good weekend.

- Bob

On Oct 2, 2015, at 1:13 PM, Ben Foster <foster@ucar.edu> wrote:

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>> Thanks,
>>
>> - Bob
>>
>> <geosrc0000.jpeg>
>> [Quoted text hidden]
> [Quoted text hidden]

Ben Foster <foster@ucar.edu> Tue, Oct 6, 2015 at 1:18 PM
To: Robert Oehmke <robert.oehmke@noaa.gov>

Bob, ok, I fixed it. It was indeed a problem with periodic points.
When making the geographic source grid, I was correctly removing
2 periodic points from each end of the longitude grid dimension,
but because of the way the conditional was written, when ntask==1,
there is only one "end", so only 2 periodic points were removed
instead of 4. Thanks a lot for your help - that graphic you sent was the key.

I'm leaving for PTO tomorrow, but when I get back (the 23rd), I'll
upgrade my ESMF lib at hao (should I go to 6.3.0r?). I also have
a question about linking ESMF when running on yellowstone, but
will ask you about that when I get back. Thanks again,

--Ben
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Robert Oehmke <robert.oehmke@noaa.gov> Wed, Oct 7, 2015 at 3:12 PM
To: Ben Foster <foster@ucar.edu>
Cc: ESMF Support E-mail list <esmf_support@list.woc.noaa.gov>

Hi Ben,

That's great. Right now I would go for 6.3.0rp1 (the first patch to 6.3.0r). We're planning on releasing 7.0.0 soon, but I'm not sure exactly when. Why don't you check in when you get back and we can talk about which would be best.

Have a good trip!

- Bob
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