Subject: cgmap_gshhs.pro minarea issue
Posted by pvelissariou on Fri, 22 Nov 2013 00:09:28 GMT
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Apparently, in the recent versions (>= 2.2) of gshhs database
the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
For cgmap_gshhs to work properly the line:
  polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
should be changed to:
  polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 00:33:16 GMT
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pvelissariou@fsu.edu writes:

> Apparently, in the recent versions (>= 2.2) of gshhs database
> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
> For cgmap_gshhs to work properly the line:
>   polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
> should be changed to:
>   polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

Here is what the creators of the data base say:

"The area of small (< 0.1 km^2) polygons got truncated to 0.
 This would cause gshhs to consider them as lines (borders or
 rivers) instead of polygons. Furthermore, the areas were
 recomputed using the WGS-84 ellipsoid as the previous
 area values were based on a spherical calculation. Thanks
 to José Luis García Pallero for pointing this out. We now
 store the area with a magnitude scale tuned to each polygon."

I don't really know what "tuned to each polygon" means, but I'm not
convinced it means what you seem to think it means.

Does anyone else know anything about this?

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
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Subject: Re: cgmap_gshhs.pro minarea issue
Posted by pvelissariou on Fri, 22 Nov 2013 02:05:30 GMT
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On Thursday, November 21, 2013 7:09:28 PM UTC-5, Panagiotis Velissariou wrote:
> Apparently, in the recent versions (>= 2.2) of gshhs database
>
> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
>
> For cgmap_gshhs to work properly the line:
>
> polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
>
> should be changed to:
>
> polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

David,
Thank you for the reply. You are right.
The problem is that from version 2.2 and on they have introduced a
magnification factor for the area, see the header structure below:

```
struct GSHHS { /* Global Self-consistent Hierarchical High-resolution Shorelines */
 int id;  /* Unique polygon id number, starting at 0 */
 int n;  /* Number of points in this polygon */
 int flag; /* = level + version << 8 + greenwich << 16 + source << 24 + river << 25 + p << 26 */
 /* flag contains 6 items, as follows:
  * low byte: level = flag & 255: Values: 1 land, 2 lake, 3 island_in_lake, 4 pond_in_island_in_lake
  * 2nd byte: version = (flag >> 8) & 255: Values: Should be 9 for GSHHS release 9
   * 3rd byte: greenwich = (flag >> 16) & 3: Values: 0 if Greenwich nor Dateline are crossed,
  *  1 if Greenwich is crossed, 2 if Dateline is crossed, 3 if both is crossed.
  * 4th byte: source = (flag >> 24) & 1: Values: 0 = CIA WDBII, 1 = WVS
  * 4th byte: river = (flag >> 25) & 1: Values: 0 = not set, 1 = river-lake and GSHHS level = 2 (or
WDBII class 0)
  * 4th byte: area magnitude scale p (as in 10^p) = flag >> 26.  We divide area by 10^p.
  */
 int west, east, south, north; /* min/max extent in micro-degrees */
 int area; /* Area of polygon in km^2 * 10^p for this resolution file */
 int area_full; /* Area of corresponding full-resolution polygon in km^2 * 10^p */
 int container; /* Id of container polygon that encloses this polygon (-1 if none) */
 int ancestor; /* Id of ancestor polygon in the full resolution set that was the source of this polygon
(-1 if none) */
};
```

I have modified the code in cgmap_gshhs.pro as follows:

```
    ; Discriminate polygons based on header information.
    IF version LT 9 THEN BEGIN
       area_mag = 1.0e-1 ; km^2 / 10 -> km^2
```

```
    ENDIF ELSE BEGIN
       area_mag = 10.0 ^ ( - ISHFT(f, -26) ); km^2 / 10^p -> km^2
    ENDELSE
    polygonArea = header.area * area_mag
```

and it seems that gives the correct results.

---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 04:10:47 GMT
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Panagiotis Velissariou writes:

> Thank you for the reply. You are right.
> The problem is that from version 2.2 and on they have introduced a
> magnification factor for the area, see the header structure below:

Yes, thanks. I found this independently and have already made the
changes you suggest. I just have to do a bit of testing in the morning,
and I'll check it into the Library. Appreciate your help with this. :-)

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by Takis.Velissariou on Fri, 22 Nov 2013 15:57:59 GMT
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On Thursday, November 21, 2013 7:09:28 PM UTC-5, pvelis...@fsu.edu wrote:
> Apparently, in the recent versions (>= 2.2) of gshhs database
>
> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
>
> For cgmap_gshhs to work properly the line:
>
>  polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
>
> should be changed to:
>

>    polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

David,

I saw the modified code in gmap_gshhs.pro and I think that:
   magnitude = ISHFT(f, -26) AND 1B
should change to:
   magnitude = ISHFT(f, -26) AND 255B

also
  polygonArea = header.area * 0.1 * 10^magnitude
should change to:
  polygonArea = header.area * 0.1 (for version lt 9)
and
  polygonArea = header.area * 10^(-magnitude) (for version gt 9)

---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 16:22:32 GMT
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Takis.Velissariou@deep-c.org writes:

>
> On Thursday, November 21, 2013 7:09:28 PM UTC-5, pvelis...@fsu.edu wrote:
>> Apparently, in the recent versions (>= 2.2) of gshhs database
>>
>> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
>>
>> For cgmap_gshhs to work properly the line:
>>
>>    polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
>>
>> should be changed to:
>>
>>    polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)
>
> David,
>
> I saw the modified code in gmap_gshhs.pro and I think that:
>    magnitude = ISHFT(f, -26) AND 1B
> should change to:
>    magnitude = ISHFT(f, -26) AND 255B
>

Well, here is the header I am using to figure this out:

   http://www.idlcoyote.com/misc/gshhs.h

I presume the magnitude is the 6th byte in the flag (not the 4th as the documentation indicates). I see no evidence that we are to use a negative magnitude power. My way of pulling out the flag value is consistent with how I find the other byte values in the flag.

> also
>  polygonArea = header.area * 0.1 * 10^magnitude
> should change to:
>  polygonArea = header.area * 0.1 (for version lt 9)
> and
>  polygonArea = header.area * 10^(-magnitude) (for version gt 9)

Since I set magnitude=0 if magnitude is not found in the file, and 10^0 is 1, I think my way of doing this is equivalent to yours.

Do you have a polygon you KNOW the area of that we can test?

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 16:39:27 GMT
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Takis.Velissariou@deep-c.org writes:

> I saw the modified code in gmap_gshhs.pro and I think that:
>  magnitude = ISHFT(f, -26) AND 1B
> should change to:
>  magnitude = ISHFT(f, -26) AND 255B

I think I am doing this correctly:

IDL> print, binary(f)
0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1
IDL> print, binary(ishft(f,-26))
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1

Cheers,

David

--
David Fanning, Ph.D.
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 16:46:58 GMT
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David Fanning writes:

>
> Takis.Velissariou@deep-c.org writes:
>
>> I saw the modified code in gmap_gshhs.pro and I think that:
>> magnitude = ISHFT(f, -26) AND 1B
>> should change to:
>> magnitude = ISHFT(f, -26) AND 255B
>
> I think I am doing this correctly:
>
> IDL> print, binary(f)
> 0 0 0 0 0 1 0 1 0 0 0 0 0 0 1 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 1
> IDL> print, binary(ishft(f,-26))
> 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1

I've changed my mind. I think you are right about this. :-)

It should be AND 255B.

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 16:50:49 GMT
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Takis.Velissariou@deep-c.org writes:

> also
>  polygonArea = header.area * 0.1 * 10^magnitude
> should change to:
>  polygonArea = header.area * 0.1 (for version lt 9)
> and
>  polygonArea = header.area * 10^(-magnitude) (for version gt 9)

I still don't know what to make of this. The documentation is screwy.

At one place in the header file you find this:

"area magnitude scale p (as in 10^p) = flag >> 26.
We divide area by 10^p."

Then, in the next couple of lines, you find this *twice*:

"Area of polygon in km^2 * 10^p for this resolution file"

We need to know the area of known polygons to be able to tell.

David

--
David Fanning, Ph.D.
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by pvelissariou on Fri, 22 Nov 2013 17:34:29 GMT
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On Thursday, November 21, 2013 7:09:28 PM UTC-5, pvelis...@fsu.edu wrote:
> Apparently, in the recent versions (>= 2.2) of gshhs database
>
> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
>
> For cgmap_gshhs to work properly the line:
>
>  polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
>
> should be changed to:
>

>    polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

David,

From gshhs.c file we have:
```
  line = (h.area) ? 0 : 1;   /* Either Polygon (0) or Line (1) (if no area) */
  if (version >= 9) {    /* Variable magnitude for area scale */
   m = h.flag >> 26;
   scale = pow (10.0, (double)m);  /* Area scale */
  }
  area = h.area / scale;    /* Now im km^2 */
  f_area = h.area_full / scale;   /* Now im km^2 */
```

so, in the cgmap_gshhs.pro
we should have something like:
magnitude = 10.0 ^ ( - ISHFT(f, -26) ) for version >= 9
and
magnitude = 0.1 for version < 9

and
polygonArea = header.area * magnitude

in order to produce the correct results for the polygon area

---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Fri, 22 Nov 2013 17:37:53 GMT
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David Fanning writes:

>
>  Takis.Velissariou@deep-c.org writes:
>
>>  also
>>    polygonArea = header.area * 0.1 * 10^magnitude
>>  should change to:
>>    polygonArea = header.area * 0.1 (for version lt 9)
>>  and
>>    polygonArea = header.area * 10^(-magnitude) (for version gt 9)
>
>  I still don't know what to make of this. The documentation is screwy.
>
>  At one place in the header file you find this:
>
>    "area magnitude scale p (as in 10^p) = flag >> 26.
>     We divide area by 10^p."
>

> Then, in the next couple of lines, you find this *twice*:
>
> "Area of polygon in km^2 * 10^p for this resolution file"
>
> We need to know the area of known polygons to be able to tell.

OK, I agree with you about dividing by the magnitude, too. :-)

I have an example using the Australian polygon, and I get the correct area for the land mass only by dividing: header.area / 10^magnitude.

I'm currently having trouble with v. 2.1 of the GSHHS data. Clearly the header is different from the one for v 2.0 and 2.2, but I can't figure out what it is. :-(

Cheers,

David
--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
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---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by pvelissariou on Sun, 24 Nov 2013 04:03:03 GMT
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On Thursday, November 21, 2013 7:09:28 PM UTC-5, pvelis...@fsu.edu wrote:
> Apparently, in the recent versions (>= 2.2) of gshhs database
>
> the units of the header.area changed from 1/10 km^2 to 1/10 m^2.
>
> For cgmap_gshhs to work properly the line:
>
> polygonArea = header.area * 0.1 (ok for gshhs < 2.2)
>
> should be changed to:
>
> polygonArea = header.area * 1.0e-7 (for gshhs >= 2.2)

David,

I think the following changes are required:

the line: river = ISHFT(f, -25) AND 255B
should be: river = ISHFT(f, -25) AND 1B

also, header.area is of type LONG and 10^magnitude is of type INT
therefore the calculated polygonarea is wrong, I have modified the
following lines as:

from:
```
    IF version LE 8 THEN BEGIN
       polygonArea = header.area * 0.1 ; km^2
    ENDIF ELSE BEGIN
       polygonArea = header.area / 10^magnitude ; km^2
    ENDELSE
```
to:
```
    IF version LT 9 THEN BEGIN
       polygonArea = Double(header.area) * 0.1 ; km^2
    ENDIF ELSE BEGIN
       polygonArea = Double(header.area) / 10.0^magnitude ; km^2
    ENDELSE
```

---

Subject: Re: cgmap_gshhs.pro minarea issue
Posted by David Fanning on Sun, 24 Nov 2013 05:15:05 GMT
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pvelissariou@fsu.edu writes:

> I think the following changes are required:
>
> the line:  river = ISHFT(f, -25) AND 255B
> should be: river = ISHFT(f, -25) AND 1B
>
> also, header.area is of type LONG and 10^magnitude is of type INT
> therefore the calculated polygonarea is wrong, I have modified the
> following lines as:
>
> from:
>     IF version LE 8 THEN BEGIN
>        polygonArea = header.area * 0.1 ; km^2
>     ENDIF ELSE BEGIN
>        polygonArea = header.area / 10^magnitude ; km^2
>     ENDELSE
> to:
>     IF version LT 9 THEN BEGIN
>        polygonArea = Double(header.area) * 0.1 ; km^2
>     ENDIF ELSE BEGIN
>        polygonArea = Double(header.area) / 10.0^magnitude ; km^2
>     ENDELSE

OK, I'm going to assume you can make more sense of that documentation

than I can. ;-)

I'll check this in tomorrow with the other changes. Thanks for your help.

Cheers,

David

--
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.idlcoyote.com/
Sepore ma de ni thue. ("Perhaps thou speakest truth.")

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