ANTARCTIC ICE CHART PRODUCTION
Nick Hughes, 2013-x-18

Antarctic ice chart files can be found in `/disk1/Antarctic` on pc2790. There is a routine in place to automatically keep any file cretaed in this area as read/write by all users.

Copy files for the new date

1. Open a Terminal window and
```
cd /disk1/Antarctic
cp -r old_date newdate
```
  where old_date is the date of the previous ice chart (as `yyyymmdd`) and new_date
  is the date of todays ice chart (as `yyyymmdd`).

Startup sequence

2. Start QGIS and do the following sequence:

 a) Open the previous ice chart project (`icechart_yyyymmdd.qgs` in the `qgis` sub-folder of the new folder for today).

 b) `File > Save Project As...` and save the project changing the filename to todays date.

 c) Go down the layers panel to the `Satellite` group and right-click - `Remove` any satellite image files (NOT the `rs2files` and `modis_subsets_ll` layers).

 d) In the Ice Chart group, right-click - `Remove` the `antarctic_yyyymmdd` layer.

 e) In the Ice Chart group, right-click - `Save As...` the `blank_icechart` layer to `antarctic_yyyymmdd`.shp in the **qgis/icechart sub-folder** of the new folder for today. Remember to click the `Add saved file to map` box at the bottom left of the `Save vector layer as...` window before hitting OK. Drag the new layer down to just abive the `blank_icechart` layer. Double-click on the layer name and click `Load Style...` and select `ice_concentration_colours.qml`

 f) In the Ice Chart group, right-click – `Save As...` the `antarctic_yyyymmdd_icebergs` layer. Save as with the new date and adding the saved file to the map. Drag down to just above the new `antarctic_yyyymmdd` layer. Right-click and `Remove` the `antarctic_yyyymmdd_icebergs` layer for the old date. Double-click on the layer name and click `Load Style...` and select `iceberg_polygons.qml`

 g) In the Annotation group, right-click – `Save As...` the `antarctic_yyyymmdd_hires` layer and save as with the new date and adding the saved file to the map. Drag down to the top of the Annotation group layers and double-click the layer name. Click `Load Style...` and select `hires_coverage.qml`. Right-click and `Remove` the `antarctic_yyyymmdd_hires` layer for the old date.

 h) In the Icebergs group, right-click – `Remove` the `byu_iceberg_yyyymmdd` layer for the old date.

3. In the terminal window,
```
cd yyyymmdd/tmp
```
(where `yyyymmdd` is todays date)
 Delete all the old temporary satellite image files, e.g.
```
rm asi* byu* RS2* modis*
```

Get the satellite data

4. In QGIS, make the `rs2files` layer visible, right-click and select `Query....` Edit the query text so that the date is more recent, e.g. yesterday, and click OK. This shows you the coveage of the most recent Radarsat-2 images. Click on (Identify Features) and click on the blue RS2 polygons. This gives you a window with information including the date and time of the image that you can use when copying the files to the `tmp` folder.

5. In QGIS, the `modis_subsets_ll` layer shows the coverage and names of the standard areas of MODIS images. The (Identify Features) provides information such as the `shortname` that is part of the filename for copying files.

6. In the terminal window,
  a) Copy the BYU iceberg marker information from the Istjenesten server,
    `cp /vol/istjenesten/data/Antarctic/byu_iceberg_yyyymmdd.* ./`
  b) Copy the RS2 image files, using the date and times acquires using the method in Step 4, e.g.
    `cp /vol/istjenesten/data/Radarsat-2/Antarctic/GeoTIFF/*_yyyymmdd_hhmmss_* ./`
  c) Copy the AMSR2 image file, using yesterdays date,
    `cp /vol/istjenesten/data/AMSR2/Antarctic/GeoTIFF/*20131017* ./`
  d) Copy MODIS image files, e.g.
    `cp /vol/istjenesten/data/MODIS/Antarctic/GeoTIFF/*20131018* ./`

7. Open the image files in QGIS, select (Add Raster Layer) and select filenames ending in `.tif`.

For the AMSR2 data, double-click on the layer name and select `Load Style...` and the `AMSR_Transparent_Background.qml` file to remove the dark blue openwater back ground to the image.

For the RS2 data where the files end in `_HH.tif`, double-click on the layer name and select `Load Style...` and the `RS2_HH_Transparent_Background.qml` file to quickly get a viewable grey-scaling and remove the surround of the image. Selecting the `Pyramids` tab at the top of the `Layer Properties` window, highlighting the diferrent `Pyramid resolutions` and clicking `Build pyramids` will generate a file to improve QGIS performance.

Icebergs

8. In QGIS, open the icebergs marker file from the tmp-folder for today, select (Add Vector Layer) and select the filename `byu_iceberg_yyyymmdd.shp`. Sometimes the automatic script to generate this file glitches. If you get a cluster of points obviously in the wrong place (e.g. over land and around 0°E), run the script again manually. Login to the Istjenesten server as istjenesten, `cd ~/software/Antarctic/iceberg`, `./antarctic_icebergs.sh`. **Redo 6.a)** Double click on the layer name and `Load Style...`, selecting `iceberg_markers.qml` to get the red trinagles with ID label.

9. Where you have good RS2 coverage. create or edit the exiting polygon in the `antarctic_yyyymmdd_icebergs` layer AND delete the corresponding marker in the

`byu_iceberg_yyyymmdd` layer. Delete any polygons where you are unable to match with satellite images, but leave the marker.

Sea Ice

10. The initial ice chart layer created in Step 2e provides blank coverage polygon for the ice chart. This should be split using the ✂ (Split Features) tool. The polygons have *iceconc* and *icetype* attributes, just like those for the StatOil sea ice mapping. For the moment, just the *iceconc* field should be used and a training session on Antarctic sea ice types should be arranged for early November.

See Table 1 for the ice concentration and Table 2 for the ice type coding.

High Resolution Coverage

11. The high resolution coverage layer (`antarctic_yyyymmdd_hires`) created in step 2g should be editted to show the areas where RS2 was used to draw the ice chart. Existing polygons should be deleted and new ones drawn.

Iceconc value	Ice concentration
0	Ice free (undefined)
1	Open water
2	Very open drift ice
3	Open drift ice
4	Close drift ice
5	Very close drift ice
6	Fast ice

Table 1: Ice concentration classes and corresponding values.

Icetype value	Ice type (Stage of Development = SoD)
0	Ice free
1	<1/10 ice of unspecified SoD (open water)
2	New ice
3	Dark nilas
4	Light nilas
5	Young ice
6	Grey ice
7	Grey-white ice
8	First-year ice (FY)
9	FY thin ice (white ice)

10	FY thin ice (white ice) first stage
11	FY thin ice (white ice) second stage
12	FY medium ice
13	FY thick ice
14	Old ice
15	Second-year ice
16	Multi-year ice
17	Fast ice of unspecified SoD
18	Ice shelf
19	Ice of unspecified SoD
20	Drifitng ice of land origin (icebergs)

Table 2: Ice types (stage of development) and corresponding values.

Creating, Saving and Printing Maps

12. The page layout tools for generating a map for printing can be found in the *File* menu. This gives the option to add a *New Print Composer*, open the *Composer Manager*, or select a *Print Composer* individually.

2 maps need to be created, for ice concentration over the whole area, and within the Antarctic Peninsula subset. Start by opening the *Composer Manager*, select each and *Rename* to todays date. Use show to bring up the `Ice Chart yyyymmdd` map. Then *Close* the Composer Manager.

See previous examples in Appendix A for how the maps, titles and legends should look.

Main Ice Chart map

Select the map area and change from *Rectangle* to *Cache* in the *Update Preview* box to the right. Deselect *Lock layers for map item* tick box and click *Update Preview* to get the current layers into the map. The following layers should be made visible in the main QGIS window:
        antarctic_yyyymmdd (ice chart layer),
        antarctic_yyyymmdd_icebergs,
        iceshelf_20100222 (ice shelf),
        points_antarctic (longitude/latitude points),
        graticule_antarctic (longitude/latitude lines),
        country (landmask),
        antarctic_yyyymmdd_hires (high resolution satellite coverage), and
        byu_iceberg_yyyymmdd.
Reselect the *Lock layers for map item* tick box.

Click the title text lines and edit the source satellite, date and time in the text box on the left-hand side of the window.

Select the Legend box. Edit the text for *Legend items* (hit the button at the bottom-right to bring up the list) and remove items such as longitude/latitude lines that should not be listed.

Save a new template file , then generate an output PNG graphic , before closing the print composer window. The name of the PNG graphic should be `satfname_NIS_iceconc.png`.

Peninsula Ice Chart Map

This is the same just using the `Ice Chart yyyymmdd Peninsula` map.

Generate small JPEG images

13. The PNG graphic files can be JPEG compressed and reduced in size (< 200 Kb) for transmission over a slow satellite link with the following command in a Linux terminal window:
```
convert -resize 50% -fuzz 5% -trim +repage -define jpeg:extent=200kb
    filename.png filename.jpg
```
Replace the filename with `antarctic_yyyymmdd` and `antarctic_yyyymmdd_peninsula` as needed.

Conversion to SIGRID-3/ICEMAR format

14. The SIGRID-3/ICEMAR production script is designed to run off the ice charts database on the Istjenesten server. All we need to copy the data to the database...
```
/disk1/Antarctic/scripts/inject_icechart_antarctic.sh yyyymmdd AA
```
where yyyymmdd is the date and AA is the analyst's initials (2 letters, e.g. HL = Håvard Larsen and NH = Nick Hughes). All files must be in the correct places, `yyyymmdd/qgis/icechart` ! The conversion uses the ice shelf and iceberg polygons to mask the sea ice polygons.

The modified version of the ICEMAR product script on the Istjenesten server will automatically recognise that there are Antarctic ice charts polygons available and do the rest.

Upload to FTP server

15. Use gFTP or other software to upload the PNG and JPEG files to `ftp://ftp.met.no/projects/icecharts` The usual Istjenesten login can be used.

Copy graphics to Polar View web server

16. Generate thumbnail -
```
convert -resize 217x153 antarctic_yyyymmdd.jpg antarctic_tmb.JPG
```

Copy `antarctic_yyyymmdd.jpg` to Polar View server. Ftp to `polarview.met.no` (user: polarview, passwd: polar00view) and copy to `/var/www/antarctic/antarctic.jpg` and `/var/www/antarctic/antarctic_tmb.JPG`. The script
```
/disk1/Antarctic/scripts/copy_to_polarview.sh yyyymmdd
```
does this automatically.

 ("cd ../../scripts/ - ./copy_to_polarview.sh yyyymmdd)

Steps 13-16 should be an automatic script…

APPENDIX A – Examples of ice concentration maps

Norwegian Meteorological Institute
Ice Service

14 October 2013

Radarsat-2 07:21 UTC

Legend

Ice Concentration

- Open Water
- Very Open Drift Ice
- Open Drift Ice
- Close Drift Ice
- Very Close Drift Ice
- Fast Ice

Icebergs

Other Icebergs (BYU)

Ice Shelves

High Resolution Coverage

Additional iceberg positions from Brigham Young
University Center for Remote Sensing
(http://www.scp.byu.edu/current_icebergs.html)

Map Projection (proj4):
+proj=stere +lat_0=90s +lon_0=0e +lat_ts=90s
+ellps=WGS84 +datum=WGS84
Corner Coordinates (UL,LR):
-2970000 2479600, -2250000 850000
Scale:
6.000.000

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