

## Technical Notes for North America Seasons

I was intrigued by a thread on AVSIM.COM about the possibility of better seasonal textures in FSX. In the course of the thread, reference was made to a US Govt (NOAA) source for daily snow and ice coverage maps for the northern hemisphere. The data are archived for several years and are updated daily. Thus, it is possible to create a seasonal texture map that would allow proper placement of the snow (hard winter) textures throughout winter. The problem is that FS9 doesn't provide a straightforward means of doing this.

My first step was to visit the NOAA site and understand the data. The data are reached from here:

<http://nsidc.org/data/g02156.html>

this is the (US) National Snow and Ice Data Center in Boulder, CO.

The data are formatted as gridded ascii files at 24km and 4 km resolution. Each sample point is in the range of 0 -4 (0x30-0x34). There is some header data and EOL characters in the files. I couldn't read the files directly, but I stripped out the extra characters and created a header file which allowed the data to be imputed as BIL (Band interleaved) grid format. The data are projected in polar stereographic. I did a simple conversion of the ascii data into grayscale Hex:

30 = 00 (no data)

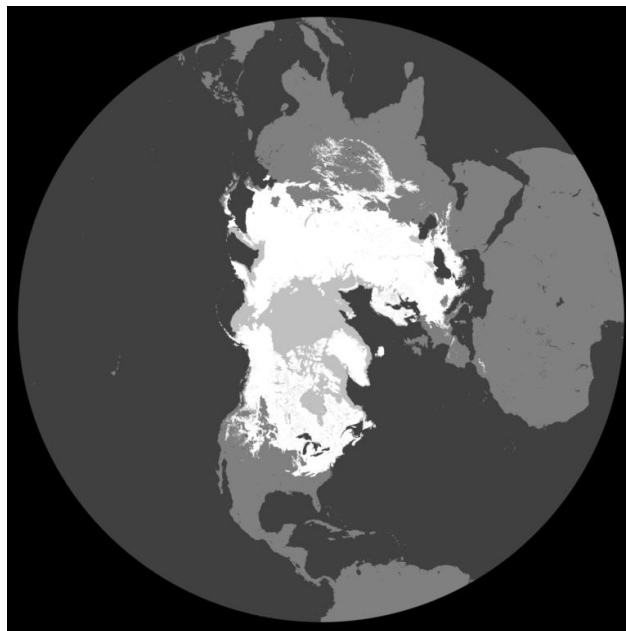
31 = 40 (water)

32 = 80 (land without snow)

33 = C0 (ice)

34 = FF (snow)

This was just to create contrast for viewing. After the edits, I could input the data into Global Mapper 6:

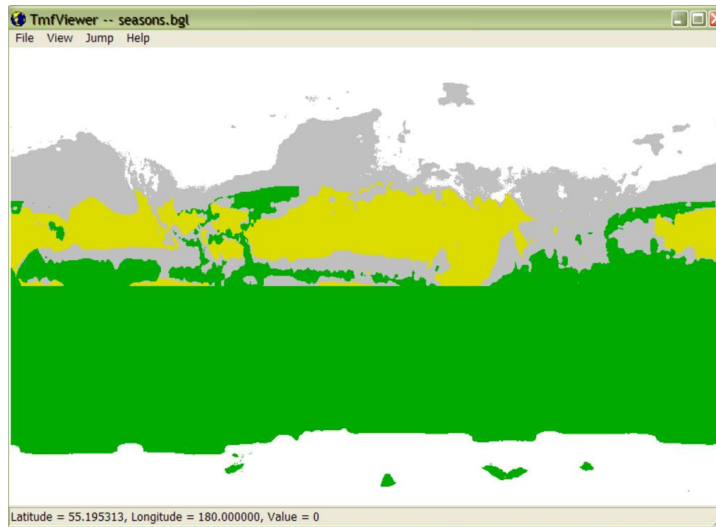


Now, the problem was to get the data in a proper format for FS9. Christian Stock has published a paper on FS terrain data called the TMF Manual (tmf\_manual.zip). This document explains and extends the documentation in the terrain SDKs. In particular, Christian has provided a description of the default seasons.bgl file, as well as showing how to compile new season map files using the FS2000 resample.exe tool.

Seasons.bgl can be viewed graphically using the terrain SDK tmfviewer tool. There are 5 seasonal values which are displayed in color codes as follows:

0	winter	gray
1	hard winter	white
2	spring	yellow
3	summer	green
4	fall	red

The default file covers the whole world:

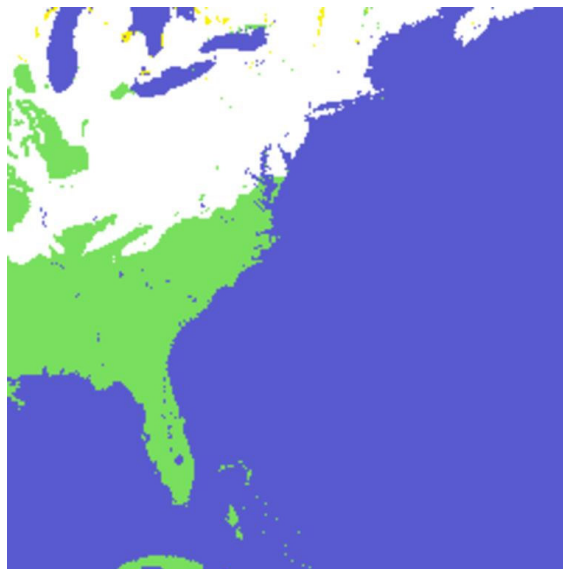


Under the view menu is an option to display 12 different seasons -- these equate to months of the year, though it appears that the months change around the 19th calendar day of each month. This view is month 2 (February). Per Christian's document, it is possible to replace the default file. The basic data is a 256x256 grid (analogous to elevation mesh) which covers an area of LOD2. This is a fairly large area (30 degrees in long and 22.5 degrees in lat) and each sample covers an area about 9.8km square. The size of this area means, for example, that it is impossible to just provide for mountain peaks to display snow. The good news is that the 4km grid data from NOAA is better than required and can be down-sampled.

To obtain the required source data, I used Global Mapper to reproject the data to Geo/WGS84 which is the projection required for FS9 source data. I then extracted geotiff files for the LOD2 areas covering North America. The extent of the LOD2 areas of interest is (a total of 8 LOD areas):

Lat	Long
67.5	-150
22.5	-30

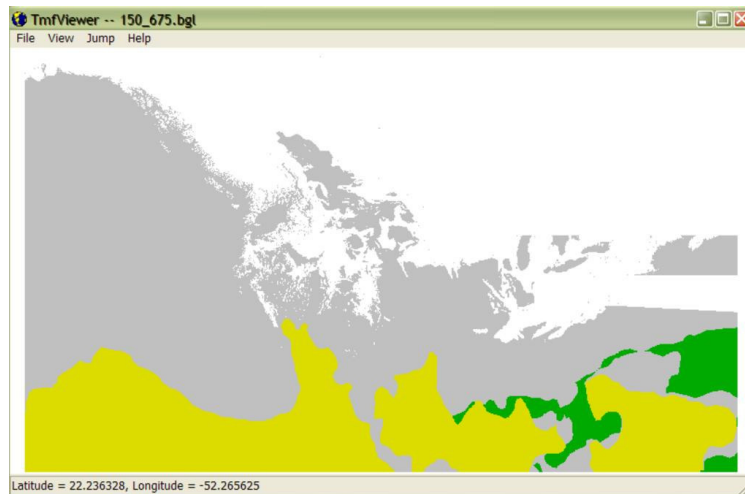
Each extraction was slightly enlarged to the east and south to obtain 257x257 data grid points as required for resample.exe. To provide compatibility with the seasonal numbering scheme of FS9, I equated areas of snow and ice to "1" (hard winter) and all others to "0" (winter) since the source data do not provide any information about growing seasons needed for a spring/summer/fall determination. For illustration, I mapped the grayscale values to color. This is the 45/-90 tile.



For color mapping I used the freeware graphics program GIMP 2.2.10. Areas of water (blue) located within the snow band I converted to snow. Areas of water within in bare band I converted to bare. I also converted ice to snow. In FS9, ice/water is determined by waterclass and isn't affected by the seasons.bgl file. In order to preclude showing winter texture throughout the bare area band, I took a screenshot of the tmfviewer screen and geo-referenced it in Global Mapper. I then did an extract of the identical LOD2 areas as before. Using GIMP, I trimmed the default tiles to the southern portion (where the bare ground band occurred in the source data) and layered it over the source. After flattening, it resulted in a composite tile. Finally, I mapped the colors to gray scale values 0-4 as required by resample.exe. Visually, it is impossible to detect the small color difference. To obtain the gridded data required by resample.exe, I saved each tile as "PGM/raw" format provided in GIMP. It was a simple matter of stripping out the header bytes. After experimentation, I determined that all the required LOD2 areas could be combined into a single source file for compilation into a BGL file. The dates sampled for the 12 monthly seasonal maps are (Julian format):

2006044  
2006060  
2006090  
2006120  
2006150  
2006180  
2006210  
2006244  
2006275  
2006305  
2006335  
2005365

Following the example in Christian's document, I created the inf files for each month, ran resample.exe on each, and used tmfmerge and tmf2bgl to combine the 12 months into a single bgl. The resulting bgl files can be loaded into tmfviewer and viewed:



All that is required is to install the file into a higher priority (than BASE) scenery area folder and the replacement files will be used by FS9.

Scott Smart  
75270.3703@earthlink.net