



The Ottawa GRASS Users Group Presents

Tutorial # 4

Building a National GRASS Framework for Canada

***How I Continued My Love Affair
With
Free Geospatial Data in Canada***

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For:

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Canadian GRASS Community

International GRASS Community



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About the Document

Document History

<i>Version</i>	<i>Date</i>	<i>Revisions</i>	<i>Authors</i>	<i>Sponsor</i>
1	02/04/06	1	Dave Sampson	Ottawa GRASS Users Group http://cemml.carleton.ca:8080/ogug

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Online Linkage:

<http://cemml.carleton.ca:8080/ogug>



Introduction:

This tutorial could be the beginning of a wonderful discovery or rediscovery of using geographical data without breaking the bank. GRASS is open source and free to use, and so is the data presented in this tutorial (unless otherwise specified).

We here at the Ottawa GRASS users Group have been using the spearfish datasets for many of our tests and education with GRASS. This tutorial aims to develop an Ottawa version of the spearfish data based off of as much free and unrestricted use data possible.

This tutorial will emphasize how GRASS has the ability to use data from multiple sources. We will be battling data from different sources, with different projects, different accuracies and many other subjective differences. It is the job of the technician (you) to recognize these limitations and present the final findings accordingly. This is where Art meets Science.

This tutorial covers more data options than some projects may require. We hope to build a somewhat exhaustive dataset. The data gathered in this tutorial will provide the basis for our lab datasets and thus future tutorials. For brevity we may just refer to this tutorial

This tutorial focuses mainly on data acquisition. The interfaces may change over time so please let us know when updates are required. Please refer to other tutorials on how to import all the data.

OGUG will hopefully in the future provide pre-fabricated GRASS datasets with this data. But for now you can have fun learning how to build them.

Please provide ample feedback so we can better this document.

Agreements of use:

All data even if it is free comes with a license agreement. Verify all license agreements before using the mentioned data to ensure your use is within the agreed license. By following this tutorial you agree to all the licenses that accompany the data. It is up to you the user to ensure its proper use. This tutorial merely connects all the sources and processes for you.



Document distribution

This document is distributed under the GPL for documents. Feel free to use, duplicate, share and modify this document. However it would be great to offer up credit to the contributors where it is due.

Overview of Data

These are the data sources we will use for future tutorials.

Atlas of Canada: National Framework

- ⑩ Road Network
- ⑩ Populated Places
- ⑩ Drainage network
- ⑩ Rail network
- ⑩ Administrative Bounds
- ⑩ Geographical Classification
- ⑩ Geopolitical Boundaries

Atlas of Canada: Vector and tabular Data

- ⑩ Electoral Districts
- ⑩ 1996 Census Data
- ⑩ 2001 Census Bounds
- ⑩ Canadian Conservation Areas Database

Getting the data.

The Atlas of Canada: National Framework

Web Link: <http://atlas.gc.ca/>

METADATA: <http://geogratis.cgdi.gc.ca/clf/en?action=fullMetadata&entryId=138>

Select language

1. Free Data



2. Canada Base Maps
3. 1:2 000 000 Base Map Data
4. The Atlas of Canada Base Maps (Quick before the java errors)
You are now on GeoGratis (there is more data here we'll explore later)
5. National Scale Frameworks (on side bar)
6. National Frameworks, Canada - 1M scale
7. Download the desired datasets and documents by selecting the desired layer, navigate to 'data directory for download' , download; *.doc, *.pdf, *.shp.zip (note 1)
8. Repeat for all datasets
9. Unzip Files to a desired directory
10. Import into GRASS. Next section

Note 1:

We will be using the ESRI Shape (.shp) zip files.

For this tutorial lets limit our datasets to:

- ⑩ Road Network
- ⑩ Populated Places
- ⑩ Drainage network
- ⑩ Rail network
- ⑩ Administrative Bounds
- ⑩ Geographical Classification
- ⑩ Geopolitical Boundaries

Some datasets may be added or removed over time. The datasets available at publication included:

- * National Scale Frameworks Road Network, Canada
- * National Scale Frameworks Populated Places, Canada
- * National Scale Frameworks Hydrology - Drainage Network , Canada
- * National Scale Frameworks Hydrology - Drainage Areas, Canada
- * National Scale Frameworks Hydrology - Hydrometric Gauging Stations and Station Basins, Canada
- * National Scale Frameworks Hydrology - Catchments, Canada
- * National Scale Frameworks Rail Network, Canada
- * National Frameworks Administrative Boundaries, Canada
- * National Frameworks Level 0 Standard Geographical Classification, Canada
- * National Framework Canada Lands Administrative Boundaries Level 1
- * Canadian Geopolitical Boundaries, Level 1
- * Maritime Strategic (1987) Land Use Database (SLUD), Canada



ABOUT THE DATA

Spatial Reference Information:

Horizontal Coordinate System Definition:

Geographic:

Latitude Resolution: 0.000001

Longitude Resolution: 0.000001

Geographic Coordinate Units: Decimal degrees

Geodetic Model:

Horizontal Datum Name: North American Datum of 1983

Ellipsoid Name: Geodetic Reference System 80

Semi-major Axis: 6378137.000000

Denominator of Flattening Ratio: 298.257222

The Atlas of Canada: Vector and Tabular Data

Web Link: <http://atlas.gc.ca/>

Now that we have our basic layers lets explore some more interesting layers available through the Atlas of Canada. These will include

- ⑩ Electoral Districts
- ⑩ Census Data
- ⑩ Canadian Conservation Areas Database

1. Select 'Vector/Tabular Data'
2. Select 'Federal Electoral Districts'
3. Select 'Data Directory to download'
4. Select 2004
5. Download The Files and appropriate docs

6. From the vector / tabular screen, select 'Canadian Conservation Area Database (CCAD)'
7. Select 'Data Directory to Download'
8. Download CCAD.zip and the guide

The Atlas of Canada: Census Data (1996 and 2001)

1. From the vector / tabular screen, select 'Census Data'
2. Choose 2001 for the geography files



3. We will get the 3 .e00 files for this one and the docs. The three files are three coverages, read the docs. You can choose gif to view what you are downloading.
9. Lets explore the 1996 population census data as well

Supplemental 2001 Census Data

Online Linkage: <http://www12.statcan.ca/english/census01/home/index.cfm>

I include this site out of interest and to present some further opportunities for GRASS. Stats Can has data packages for purchase and they also list some tabular data on line. Check the usage rights before you copy and paste.

I imagine their data products can be built in reference to the census divisions. Basically load the free geography in GRASS as we will do. Then purchase the data of interest. Import the data into a DBF file. Try asking for the tables in D-Base 3 or 5 format I forget which GRASS uses to import tabular info, double check though. Link the GRASS geography with the DBF (database functions) and start your queries. Let me know if you have had success. We would love to showcase census maps made from GRASS.

Supplemental 1996 Census Data

Refer to Tutorial #3, section 'Getting the Data: Statistics Canada'. Here you'll find some methods of gathering Census Data. It does not cover how to import and connect to it in GRASS. That tutorial will come later perhaps.

The Atlas of Canada: Radarsat

Web Link: <http://atlas.gc.ca/>

1. you guessed it. Select RADARSAT from the side bar
2. You have the choice what resolution you want to use. Lets use 250m. Just for kicks
3. Select 'Data Directory for download'
4. You should be prompted to download right away. Note the LCC in the file name. Lambert Conformal Conic (LCC) is the projection



Conclusion

Now that you have an idea of how to gather data to build a national scale framework to use in GRASS for Canada the challenge will be the import and manipulation. You will have multiple projects and degrees of accuracies. This is where data massaging comes in. Also data formats become a challenge but GRASS has tools. It is just a matter of learning how to use them.

I hope you've learned something about free geographic data in Canada and I encourage you to check out future tutorials as we explore how to import all this data

Future Work

This document will continue to evolve and always Welcomes feedback and contributions. Some future additions we hope to have.

- ⑩ more description of tools, process, theory and potential application
- ⑩ Some screen shots of the tools
- ⑩ A means to ensure we keep this document up to date as on line tools change.

About the Contributors

Dave Sampson

Dave is a Geographer specializing in Geographic Information Systems (GIS). Dave has achieved an [Honours of Outdoor, Recreation, Parks and Tourism](#) and a [Bachelor of Arts in Geography](#) from [Lakehead University](#) in Thunder Bay, Ontario, Canada. He is particularly interested in the applications of GIS and Remote sensing in the management of parks and protected areas.

Dave was exposed to GRASS during university even though it was not in the curriculum and few people had ever heard of it. He picked it up along with an interest in other open source projects. Dave is still very interested in its continued evolution getting closer to mainstream commercial acceptance. He formed the Ottawa GRASS (GIS) Users Group ([OGUG](#)) with the help of Scott Mitchel – a professor at Carleton University.

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