
GeoNode Developers Workshop

Documentation

Release 2.0

GeoNode

February 22, 2013

CONTENTS

1	Introduction to GeoNode development	3
1.1	GeoNode Components	3
1.2	Standards	4
1.3	GeoNode Architecture	7
1.4	Exercises	8
1.5	Development References	9
2	Development Prerequisites and Core Modules	13
2.1	GeoNode's Development Prerequisites	13
2.2	GeoNode's Core Modules	16
2.3	Exercises	19
3	Customized GeoNode Projects	21
3.1	Introduction to GeoNode Projects	21
3.2	Setting up your GeoNode project	22
3.3	Theming your GeoNode project	28
3.4	Adding additional Django apps to your GeoNode Project	35
3.5	Integrating your project with other systems	48
4	Loading Data into a GeoNode	89
4.1	Using importlayers to import Data into GeoNode	89
4.2	GeoServer Data Configuration	91
4.3	Using GDAL and OGR to convert your Data for use in GeoNode	98
4.4	Loading OSM Data into GeoNode	103
5	GeoNode debugging techniques	113
5.1	Debugging GeoNode in the Browser	113
5.2	Debugging GeoNode's Python Components	119
5.3	Debugging GeoServer	120
6	Spatial Processing with GeoNode	123
6.1	Spatial Processing with Sextante	123
7	GeoNode APIs	133
7.1	OGC Services	133
7.2	GeoServer REST API	133
7.3	GeoServers Import and Print APIs	133
7.4	GeoNode's Ad-Hoc API	133
8	Setting up a GeoNode development environment	135

8.1	GeoNode Development Tools	135
8.2	Git Repository Setup	135
8.3	Installing GeoNode's Python Package	135
8.4	Pavement.py and Paver	135
8.5	Manually Deploying your Development Environment	135
9	GeoNode's development process	137
9.1	GeoNode's Issue Tracking System	137
9.2	Testing in GeoNode	137
9.3	GeoNode's Patch Review Process	137
9.4	GeoNode Improvement Proposals	137
9.5	GeoNode's Roadmap Process	137
9.6	Development Resources	137

Welcome to the GeoNode Developers Workshop! This workshop will teach how to develop with and for the [GeoNode](#) software application.

Introduction to GeoNode development Learn about GeoNode's core components, its Architecture, the tools it is developed with and the standards it supports.

Development Prerequisites and Core Modules Learn about the pre-requisites you will need in order to develop with GeoNode. Take a look at its core modules and how they work together to provide a complete web mapping tool.

Customized GeoNode Projects Learn how existing projects leverage GeoNode and create your own GeoNode based project.

Loading Data into a GeoNode Learn how to load data into a GeoNode with GeoServer, on the command line or programmatically with scripts.

GeoNode debugging techniques Learn how to debug GeoNode instances and projects.

Spatial Processing with GeoNode Learn how to use the data in your GeoNode to do Spatial data processing with various tools.

Setting up a GeoNode development environment Learn how to set up a GeoNode development environment so you can contribute to GeoNode's core.

GeoNode APIs Learn about the APIs GeoNode leverages and provides.

GeoNode's development process Learn about GeoNode's development process and how to work with the GeoNode community.

INTRODUCTION TO GEONODE DEVELOPMENT

This module will introduce you to the components that GeoNode is built with, the standards that it supports and the services it provides based on those standards, and an overview its architecture.

GeoNode is a web based GIS tool, and as such, in order to do development on GeoNode itself or to integrate it into your own application, you should be familiar with basic web development concepts as well as with general GIS concepts.

A set of reference links on these topics is included at the end of this module.

1.1 GeoNode Components

GeoNode's architecture is based on a set of core tools and libraries that provide the building blocks on which the application is built. Having a basic understanding of each of these components is critical to your success as developer working with GeoNode.

Lets look at each of these components and discuss how they are used within the GeoNode application.

1.1.1 Django

GeoNode is based on [Django](#) which is a high level Python web development framework that encourages rapid development and clean pragmatic design. Django is based on the Model View Controller ([MVC](#)) architecture pattern, and as such, GeoNode models layers, maps and other modules with Django's [Model](#) module and these models are used via Django's [ORM](#) in views which contain the business logic of the GeoNode application and are used to drive HTML templates to display the web pages within the application.

1.1.2 GeoServer

[GeoServer](#) is a an open source software server written in Java that provides OGC compliant services which publish data from many spatial data sources. GeoServer is used as the core GIS component inside GeoNode and is used to render the layers in a GeoNode instance, create map tiles from the layers, provide for downloading those layers in various formats and to allow for transactional editing of those layers.

1.1.3 GeoExplorer

GeoExplorer is a web application, based on the [GeoExt](#) framework, for composing and publishing web maps with OGC and other web based GIS Services. GeoExplorer is used inside GeoNode to provide many of the GIS and

cartography functions that are a core part of the application.

1.1.4 PostgreSQL and PostGIS

PostgreSQL and PostGIS are the database components that store and manage spatial data and information for GeoNode and the django modules that it is composed of, pycsw and GeoServer. All of these tables and data are stored within a geonode database in PostgreSQL. GeoServer uses PostGIS to store and manage spatial vector data for each layer which are stored as a separate table in the database.

1.1.5 pycsw

pycsw is an OGC CSW server implementation written in Python. GeoNode uses pycsw to provide an OGC compliant standards-based CSW metadata and catalogue component of spatial data infrastructures, supporting popular geospatial metadata standards such as Dublin Core, ISO 19115, FGDC and DIF.

1.1.6 Geospatial Python Libraries

GeoNode leverages several geospatial python libraries including [gsconfig](#) and [OWSLib](#). gsconfig is used to communicates with GeoServer's REST Configuration API to configure GeoNode layers in GeoServer. OWSLib is used to communicate with GeoServer's OGC services and can be used to communicate with other OGC services.

1.1.7 Django Pluggables

GeoNode uses a set of Django plugins which are usually referred to as pluggables. Each of these pluggables provides a particular set of functionality inside the application from things like Registration and Profiles to interactivity with external sites. Being based on Django enables GeoNode to take advantage of the large ecosystem of these pluggables out there, and while a specific set is included in GeoNode itself, many more are available for use in applications based on GeoNode.

1.1.8 jQuery

jQuery is a feature-rich javascript library that is used within GeoNode to provide an interactive and responsive user interface as part of the application. GeoNode uses several jQuery plugins to provide specific pieces of functionality, and the GeoNode development team often adds new features to the interface by adding additional plugins.

1.1.9 Bootstrap

Bootstrap is a front-end framework for laying out and styling the pages that make up the GeoNode application. It is designed to ensure that the pages render and look and behave the same across all browsers. GeoNode customizes bootstraps default style and its relatively easy for developers to customize their own GeoNode based site using existing Bootstrap themes or by customizing the styles directly.

1.2 Standards

GeoNode is based on a set of Open Geospatial Consortium (OGC) standards. These standards enable GeoNode installations to be interoperable with a wide variety of tools that support these OGC standards and enable federation

with other OGC compliant services and infrastructure. Reference links about these standards are also included at the end of this module.

GeoNode is also based on Web Standards ...

1.2.1 Open Geospatial Consortium (OGC) Standards

Web Map Service (WMS)

The Web Map Service (WMS) specification defines an interface for requesting rendered map images across the web. It is used within GeoNode to display maps in the pages of the site and in the GeoExplorer application to display rendered layers based on default or custom styles.

Web Feature Service (WFS)

The Web Feature Service (WFS) specification defines an interface for reading and writing geographic features across the web. It is used within GeoNode to enable downloading of vector layers in various formats and within GeoExplorer to enable editing of Vector Layers that are stored in a GeoNode.

Web Coverage Service (WCS)

The Web Coverage Service (WCS) specification defines an interface for reading and writing geospatial raster data as “coverages” across the web. It is used within GeoNode to enable downloading of raster layers in various formats.

Catalogue Service for Web (CSW)

The Catalogue Service for Web (CSW) specification defines an interface for exposing a catalogue of geospatial metadata across the web. It is used within GeoNode to enable any application to search GeoNode’s catalogue or to provide federated search that includes a set of GeoNode layers within another application.

Tile Mapping Service (TMS/WMTS)

The Tile Mapping Service (TMS) specification defines an interface for retrieving rendered map tiles over the web. It is used within geonode to enable serving of a cache of rendered layers to be included in GeoNode’s web pages or within the GeoExplorer mapping application. Its purpose is to improve performance on the client vs asking the WMS for rendered images directly.

GeoNode Component Architecture

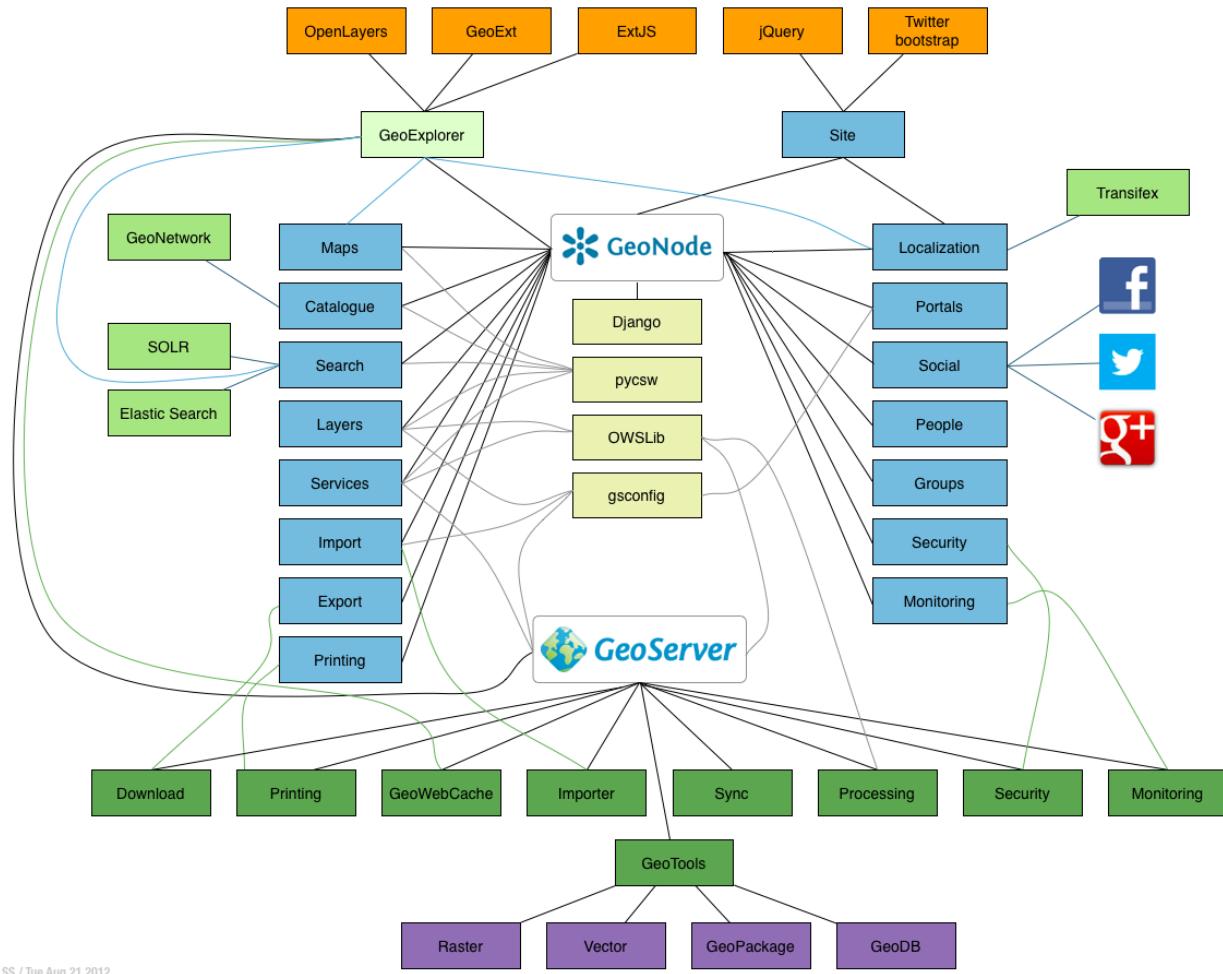


Figure 1.1: GeoNode Component Architecture

1.2.2 Web Standards

HTML

CSS

REST

1.3 GeoNode Architecture

1.3.1 The Big Picture

1.3.2 Django Architecture

MVC/MVT

MVC Model, View, Controller

MVT Model, View, Template

- Model represents application data and provides rich ORM functionality
- Views are a rendering of a Model most often using the Django template engine
- In Django, the controller part of this commonly discussed, layered architecture is a subject of discussion. According to the standard definition, the controller is the layer or component through which the user interacts and model changes occur.

More: <http://reinout.vanrees.org/weblog/2011/12/13/django-mvc-explanation.html>

WSGI

WSGI Web Server Gateway Interface (whis-gey)

- This is a python specification for supporting a common interface between all of the various web frameworks and an application (Apache, for example) that is ‘serving’.
- This allows any WSGI compliant framework to be hosted in any WSGI compliant server.
- For most GeoNode development, the details of this specification may be ignored.

More: <http://en.wikipedia.org/wiki/Wsgi>

1.3.3 GeoNode and GeoServer

GeoNode uses GeoServer for providing OGC services.

- GeoNode configures GeoServer via the REST API
- GeoNode retrieves and caches spatial information from GeoServer. This includes relevant OGC service links, spatial metadata, and attribute information.

In summary, GeoServer contains the layer’s data and GeoNode’s layer model extends what metadata is present in GeoServer with its own.

- GeoNode can discover existing layers published in a GeoServer via the WMS capabilities document

- GeoServer delegates authentication and authorization to GeoNode
- Data uploaded to GeoNode is first processed in GeoNode and finally published to GeoServer (or ingested into the spatial database)

1.3.4 GeoNode and PostgreSQL/PostGIS

In production, GeoNode is configured to use PostgreSQL/PostGIS for its persistent store. In development and testing mode, often an embedded sqlite database is used. The latter is not suggested for production.

- The database stores configuration and application information. This includes users, layers, maps, etc.
- It is recommended that GeoNode be configured to use PostgreSQL/PostGIS for storing vector data as well. While serving layers directly from shapefile allows for adequate performance in many cases, storing features in the database allows for better performance especially when using complex style rules based on attributes.

1.3.5 GeoNode and pycsw

GeoNode is built with pycsw embedded as the default CSW server component.

Publishing

Since pycsw is embedded in GeoNode, layers published within GeoNode are automatically published to pycsw and discoverable via CSW. No additional configuration or actions are required to publish layers, maps or documents to pycsw.

Discovery

GeoNode's CSW endpoint is deployed available at `http://localhost:8000/catalogue/csw` and is available for clients to use for standards-based discovery. See <http://pycsw.org/docs/tools.html> for a list of CSW clients and tools.

1.3.6 Javascript in GeoNode

- GeoExplorer runs in the browser and talks with GeoNode and GeoServer's APIs using AJAX.
- jQuery is used for incremental enhancement of many GeoNode HTML interfaces.

1.4 Exercises

1.4.1 Components and Services

Hint, if `bash-completion` is installed, try `<TAB><TAB>` to get completions.

1. start/stop services

```
$ sudo service apache2
$ sudo service apache2 reload
$ sudo service tomcat7
$ sudo service postgresql
```

1. basic psql interactions

```
$ sudo su - postgres
$ psql
=> help          # get help
=> \?            # psql specific commands
=> \l            # list databases
=> \c geonode    # switch database
=> \ds           # list tables
=> \dS layers_layer # describe table
```

1.4.2 OGC Standards

WMS

1. Use the layer preview functionality in GeoServer to bring up a web map.
2. Copy a the URL for the image in the map.
3. Alter URL parameters for the request.
4. Use *curl* to get the capabilities document

```
$ curl 'http://localhost/geoserver/wms?request=getcapabilities'
```

More: <http://docs.geoserver.org/stable/en/user/services/wms/index.html>

WFS

1. Describe a feature type using curl (replace ws:name with your layer)

```
$ curl 'http://localhost/geoserver/wfs?request=describefeaturetype&name=ws:name'
```

More: <http://docs.geoserver.org/stable/en/user/services/wfs/reference.html>

1.5 Development References

1.5.1 Basic Web based GIS Concepts and Background

- OGC Services
 - <http://www.opengeospatial.org/>
 - http://en.wikipedia.org/wiki/Open_Geospatial_Consortium
- Web Application Architecture
 - http://en.wikipedia.org/wiki/Web_application
 - <http://www.w3.org/2001/tag/2010/05/WebApps.html>
 - <http://www.amazon.com/Web-Application-Architecture-Principles-Protocols/dp/047051860X>
- AJAX and REST
 - [http://en.wikipedia.org/wiki/Ajax_\(programming\)](http://en.wikipedia.org/wiki/Ajax_(programming))
 - http://en.wikipedia.org/wiki/Representational_state_transfer

- OpenGeo Suite
 - <http://workshops.opengeo.org/suiteintro/>
 - <http://suite.opengeo.org/opengeo-docs/>
- GeoServer Administration
 - <http://suite.opengeo.org/opengeo-docs/geoserver/>
 - <https://docs.google.com/a/opengeo.org/presentation/d/15fvUDYg0TO6WGFQIMLM2J1qiTVBYpfjCp0aQBDF0GrM/edit#>
 - <http://suite.opengeo.org/docs/sysadmin/index.html#sysadmin>
- PostgreSQL and PostGIS Administration - <http://workshops.opengeo.org/postgis-intro/> -
<http://workshops.opengeo.org/postgis-spatialdbtips/>

1.5.2 Core development tools and libraries

- python
 - <http://docs.python.org/2/tutorial/>
 - <http://www.learnpython.org/>
 - <http://learnpythonthehardway.org/book/>
- django
 - <https://docs.djangoproject.com/en/dev/intro/tutorial01/>
 - <https://code.djangoproject.com/wiki/Tutorials>
- javascript
 - <http://www.crockford.com/javascript/inheritance.html>
 - <http://geoext.org/tutorials/quickstart.html>
- jquery
 - <http://www.w3schools.com/jquery/default.asp>
 - http://docs.jquery.com/Tutorials:Getting_Started_with_jQuery
 - <http://www.jquery-tutorial.net/>
- bootstrap
 - <http://twitter.github.com/bootstrap/>
 - <http://www.w3resource.com/twitter-bootstrap/tutorial.php>
- geotools/geoscript/geoserver
 - <http://docs.geotools.org/stable/tutorials/feature/csv2shp.html>
 - <http://geoscript.org/tutorials/index.html>
 - <http://docs.geotools.org/stable/tutorials/>
 - <https://github.com/dwins/gsconfig.py/blob/master/README.rst>
- geopython
 - <http://pycsw.org/docs/documentation.html>
 - <http://geopython.github.com/OWSLib/>

- <https://github.com/toblerity/shapely>
- <https://github.com/sgillies/Fiona>
- <http://pypi.python.org/pypi/pyproj>
- gdal/ogr
 - http://www.gdal.org/gdal_utilities.html
 - http://www.gdal.org/ogr_utilities.html

DEVELOPMENT PREREQUISITES AND CORE MODULES

This module will introduce you to the

2.1 GeoNode's Development Prerequisites

2.1.1 Basic Shell Tools

ssh and sudo

ssh and sudo are very basic terminal skills which you will need to deploy, maintain and develop with GeoNode. If you are not already familiar with their usage, you should review the basic descriptions below and follow the external links to learn more about how to use them effectively as part of your development workflow.

ssh is the network protocol used to connect to a remote server where you run your GeoNode instance whether on your own network or on the cloud. You will need to know how to use an ssh command from the terminal on your unix machine or how to use a ssh client like putty or winscp on windows. You may need to use pki certificates to connect to your remove server, and should be familiar with the steps and options necessary to connect this way. More information about ssh can be found in the links below.

- <http://winscp.net/eng/docs/ssh>

sudo is the command used to execute a terminal command as the superuser when you are logged in with a normal user. You will to use sudo in order to start, stop and restart key services on your GeoNode instance. If you are not able to grant yourself these privileges on the machine you are using for your GeoNode instance, you may need to consult with your network administrator to arrange for your user to be granted sudo permissions. More information about sudo can be found in the links below.

- <http://en.wikipedia.org/wiki/Sudo>

bash

Bash is the most common unix shell which will usually be the default on servers where you will be deploying your GeoNode instance. You should be familiar with the most common bash commands in order to be able to deploy, maintain and modify a geonode instance. More information about Bash and common bash commands can be found in the links below.

- [http://en.wikipedia.org/wiki/Bash_\(Unix_shell\)](http://en.wikipedia.org/wiki/Bash_(Unix_shell))

apt

apt is the packaging tool that is used to install GeoNode on ubuntu and other debian based systems. You will need to be familiar with adding Personal Package Archives to your list of install sources, and will need to be familiar with basic apt commands. More information about apt can be found in the links below.

- http://en.wikipedia.org/wiki/Advanced_Packaging_Tool

2.1.2 Python Development Tools

The GeoNode development process relies on several widely used python development tools in order to make things easier for developers and other users of the systems that GeoNode developers work on or where GeoNodes are deployed. They are considered best practices for modern python development, and you should become familiar with these basic tools and be comfortable using them on your own projects and systems.

virtualenv

virtualenv is a tool used to create isolated python development environments such that the the versions of project dependencies are sandboxed from the system-wide python packages. This eliminates the commonly encountered problem of different projects on the same system using different versions of the same library. You should be familiar with how to create and activate virtual environments for the projects you work on. More information about virtualenv can be found in the links below.

- <http://pypi.python.org/pypi/virtualenv>
- <http://www.virtualenv.org/en/latest/>

virtualenvwrapper is a wrapper around the *virtualenv* package that makes it easier to create and switch between virtual environments as you do development. Using it will make your life much easier, so its recommended that you install and configure it and use its commands as part of your *virtualenv* workflow. More info about *virtualenvwrapper* can be found in the links below.

- <http://www.doughellmann.com/projects/virtualenvwrapper/>

pip

pip is a tool for installing and managing python packages. Specifically it is used to install and upgrade packages found in the Python Pacakge Index. GeoNode uses pip to install itself, and to manage all of the python dependencies that are needed as part of a GeoNode instance. As you learn to add new modules to your geonode, you will need to become familiar with the use of pip and about basic python packaging usage. More information about pip can be found in the links below.

- <http://www.pip-installer.org/en/latest/>
- <http://pypi.python.org/pypi/pip>
- [http://en.wikipedia.org/wiki/Pip_\(Python\)](http://en.wikipedia.org/wiki/Pip_(Python))

miscellaneous

ipython is a set of tools to make your python development and debugging experience easier. The primary tool you want to use is an interactive shell that adds introspection, integrated help and command completion and more. While not strictly required to do GeoNode development, learning how to use ipython will make your development more productive and pleasant. More information about ipython can be found in the links below.

- <http://ipython.org/>
- <http://pypi.python.org/pypi/ipython>
- <https://github.com/ipython/ipython>
- <http://en.wikipedia.org/wiki/IPython>

pdb is a standard python module that is used to interactively debug your python code. It supports setting conditional breakpoints so you can step through the code line by line and inspect your variables and perform arbitrary execution of statements. Learning how to effectively use *pdb* will make the process of debugging your application code significantly easier. More information about *pdb* can be found in the links below.

- <http://docs.python.org/2/library/pdb.html>

2.1.3 Django

GeoNode is built on top of the *Django web framework*, and as such, you will need to become generally familiar with Django itself in order to become a productive GeoNode developer. Django has excellent documentation, and you should familiarize yourself with Django by following the Django workshop and reading through its documentation as required.

Model Template View

Django is based on the Model Template View paradigm (more commonly called Model View Controller). Models are used to define objects that you use in your application and Django's ORM is used to map these models to a database. Views are used to implement the business logic of your application and provide objects and other context for the templates. Templates are used to render the context from views into a page for display to the user. You should become familiar with this common paradigm used in most modern web frameworks, and how it is specifically implemented and used in Django. The Django tutorial itself is a great place to start. More information about MTV in Django can be found in the links below.

- <http://en.wikipedia.org/wiki/Model%E2%80%93view%E2%80%93controller>
- <http://www.codinghorror.com/blog/2008/05/understanding-model-view-controller.html>
- <https://docs.djangoproject.com/en/1.4/>

HTTP Request Response

Django and all other web frameworks are based on the HTTP Request Response cycle. Requests come in to the server from remote clients which are primarily web browsers, but also can be api clients, and the server returns with a Response. You should be familiar with these very basic HTTP principles and become familiar with the way that Django implements them. More information about HTTP, Requests and Responses and Djangos implementation in the links below.

- <http://devhub.fm/http-requestresponse-basics/>
- http://en.wikipedia.org/wiki/Hypertext_Transfer_Protocol
- <https://docs.djangoproject.com/en/dev/ref/request-response/>

Management Commands

Django projects have access to a set of management commands that are used to manage your project. Django itself provides a set of these commands, and django apps (including GeoNode) can provide their own. Management commands are used to do things like synchronize your models with your database, load data from fixtures or back up your

database with fixtures, start the development server, initiate the debugger and many other things. GeoNode provides management commands for synchronizing with a GeoServer or updating the layers already in your GeoNode. You should become familiar with the basic management commands that come with Django, and specifically with the commands that are part of GeoNode. The GeoNode specific commands are covered in section. More information about management commands can be found in the links below.

- <https://docs.djangoproject.com/en/dev/ref/django-admin/>

Django Admin Interface

Django provides a build-in management console that administrators and developers can use to look at the data in the database that is part of the installed applications. Administrators can use this console to perform many common administration tasks that are a necessary part of running a GeoNode instance, and as a developer, you will use this interface during your development process to inspect the database and the data stored in your models. More information about the django admin interface can be found in the links below.

- <https://docs.djangoproject.com/en/dev/ref/contrib/admin/>

Template Tags

Django templates make use of a set of tags to inject, filter and format content into a rendered HTML page. Django itself includes a set of built-in template tags and filters that you will use in your own templates, and GeoNode provides a geonode specific set of tags that are used in the GeoNode templates. You should become familiar with the built-in tag set and with GeoNode's specific tags as you work on developing your own templates or extending from GeoNode's. More information about Django template tags can be found in the links below.

- <https://docs.djangoproject.com/en/dev/ref/templates/builtins/>

2.2 GeoNode's Core Modules

GeoNode is made up of a set of core Django pluggable modules (known as apps in Django) that provide the functionality of the application. Together they make up the key components of a GeoNode site. While your own use case and implementation may not require that you work directly on these modules, it is important that you become familiar with their layout, structure and the functionality that they provide. You may need to import these apps into your own apps, and as such, becoming familiar with them is an important step in becoming a proficient GeoNode developer.

2.2.1 geonode.layers

geonode.layers is the most key GeoNode module. It is used to represent layers of data stored in a GeoNode's paired GeoServer. The layer model class inherits fields from the ResourceBase class which provides all of the fields necessary for the metadata catalogue, and adds fields that map the object to its corresponding layer in GeoServer. When your users upload a layer via the user interface, the layer is imported to GeoServer and a record is added to GeoNode's database to represent that GeoServer layer within GeoNode itself.

The Layer model class provides a set of helper methods that are used to perform operations on a Layer object, and also to return things such as the list of Download or Metadata links for that layer. Additional classes are used to model the layers Attributes, Styles, Contacts and Links. The Django signals framework is used to invoke specific functions to synchronize with GeoServer before and after the layer is saved.

The views in the layers app are used to perform functions such as uploading, replacing, removing or changing the points of contact for a layer, and views are also used to update layer styles, download layers in bulk or change a layers permissions.

The forms module in the layer app is used to drive the user interface forms necessary for performing the business logic that the views provide.

The Layers app also includes a set of templates that are paired with views and used to drive the user interface. A small set of layer template tags is also used to help drive the layer explore and search pages.

Some helper modules such as geonode.layers.metadata and geonode.layers.ows are used by the layer views to perform specific functions and help keep the main views module more concise and legible.

Additionally, the GeoNode specific management commands are a part of the geonode.layers app.

You should spend some time to review the layers app through GitHub's code browsing interface.

<https://github.com/GeoNode/geonode/tree/master/geonode/layers>

2.2.2 geonode.maps

The geonode.maps app is used to group together GeoNodes multi layer map functionality. The Map and MapLayer objects are used to model and implement maps created with the GeoExplorer application. The Map object also extends from the ResourceBase class which provides the ability to manage a full set of metadata fields for a Map.

The views in the maps app perform many of the same functions as the views in the layers app such as adding, changing, replacing or removing a map and also provide the endpoints for returning the map configuration from the database that is used to initialize the GeoExplorer app.

The maps app also includes a set of forms, customization of the Django admin, some utility functions and a set of templates and template tags.

You can familiarize yourself with the maps app on GitHub.

<https://github.com/GeoNode/geonode/tree/master/geonode/maps>

2.2.3 geonode.security

The geonode.security app is used to provide object level permissions within the GeoNode Django application. It is a custom Django authentication backend and is used to assign Generic, User and Group Permissions to Layers, Maps and other objects in the GeoNode system. Generic permissions are used to enable public anonymous or authenticated viewing and/or editing of your data layers and maps, and User and Group specific permissions are used to allow specific users or groups to access and edit your layers.

2.2.4 geonode.search

The geonode.search module provides the search API that is used to drive the GeoNode search pages. It is configured to index layers, maps, documents and profiles, but is extensible to allow you to use it to index your own model classes. This module is currently based on the Django ORM and as such has a limited set of search features, but the GeoNode development team is actively working on making it possible to use this module with more feature-rich search engines.

2.2.5 geonode.catalogue

The geonode.catalogue app provides a key set of metadata catalogue functions within GeoNode itself. GeoNode is configured to use an integrated version of the pycsw library to perform these functions, but can also be configured to use any OGC compliant CS-W implementation such as GeoNetwork or Deegree. The metadata app allows users to import and/or edit metadata for their layers, maps and documents, and it provides an OGC compliant search interface for use in federating with other systems.

2.2.6 geonode.geoserver

The geonode.geoserver module is used to interact with GeoServer from within GeoNode's python code. It relies heavily on the gsconfig library which addresses GeoServer's REST configuration API. Additionally, the geonode.geoserver.uploader module is used to interact with GeoServers Importer API for uploading and configuring layers.

2.2.7 geonode.people

The geonode.people module is used to model and store information about both GeoNode users and people outside of the system who are listed as Points of Contact for particular layers. It is the foundational module for GeoNode's social features. It provides a set of forms for users to edit and manage their own profiles as well as to view and interact with the profiles of other users.

2.2.8 geoexplorer

GeoNode's core GIS client functions are performed by GeoExplorer. The GeoExplorer app is in turn based on GeoExt, OpenLayers and ExtJS. It provides functionality for constructing maps, styling layers and connecting to remote services. GeoExplorer is the reference implementation of the OpenGeo Suite SDK which is based on GXP. GeoNode treats GeoExplorer as an external module that is used out of the box in GeoNode, but it is possible for you to create your own Suite SDK app and integrate it with GeoNode.

2.2.9 Static Site

The front end of GeoNode is composed of a set of core templates, specific templates for each module, cascading style sheets to style those pages and a set of javascript modules that provide the interactive functionality in the site.

Templates

GeoNode includes a basic set of core templates that use Django's template inheritance system to provide a modular system for constructing the web pages in GeoNode's interface. These core templates drive the overall page layout and things like the home page. You will start the process of customizing your GeoNode instance by overriding these templates, so you should familiarize yourself with their structure and how they inherit from each other to drive the pages.

Additionally, most of the apps described above have their own set of templates that are used to drive the pages for each module. You may also want to override these templates for your own purposes and as such should familiarize yourself with a few of the key ones.

CSS

GeoNode's css is based on Twitter's Bootstrap Library which uses the lessc dynamic stylesheet language. GeoNode extends from the basic Bootstrap style and you are able to create your own bootstrap based style to customize the look and feel of your own GeoNode instance. Sites like bootswatch.com also provide ready made styles that you can simply drop in to your project to change the style.

Javascript

The interactive functionality in GeoNode pages is provided by the jQuery javascript framework and a set of jQuery plugins. The core set of GeoNode javascript modules closely aligns with the apps described above, and there are also

a few pieces of functionality provided as javascript modules that are used through out all of the apps. You are able to add your own jQuery code and/or plugins to perform interactive functionality in your own application.

2.3 Exercises

2.3.1 Shell and Utilities

1. *ssh* into your virtual machine or other instance
2. *sudo* to modify the *sshd_config* settings to verify disabling of dns resolution (UseDNS=no)
3. install a command line helper

```
$ sudo apt-get install bash-completion
```

1. exercise command completion

```
$ apt-get install <TAB><TAB>
```

1. activate/deactivate the *virtualenv* on your instance

```
$ source /var/lib/geonode/bin/activate  
$ deactivate
```

1. set the *DJANGO_SETTINGS_MODULE* env variable

```
$ export DJANGO_SETTINGS_MODULE=geonode.settings
```

1. install the *httpie* utility via pip

```
$ pip install httpie  
$ http http://localhost/geoserver/rest  
$ http -a admin http://localhost/geoserver/rest  
<type in password - geoserver>
```

2.3.2 Python

1. launch *ipython* and experiment

```
> x = "some text"  
> x.<TAB><TAB>  
> x.split.__doc__  
> ?
```

1. execute a script with *ipython* and open the REPL

```
$ echo "twos = [ x*2 for x in range(5) ]" > test.py  
$ ipython -i test.py  
> twos
```


CUSTOMIZED GEONODE PROJECTS

This module will teach you about how to set up and customize your own GeoNode-based project by changing the theme, adding additional modules, and integrating with other systems. When complete, you should understand how Downstream GeoNode projects work, and how to set up a project of your own.

3.1 Introduction to GeoNode Projects

GeoNode enables you to set up a complete site simply by installing the packages and adding your data. If you want to create your own project based on GeoNode, there are several options available that enable you to customize the look and feel of your GeoNode site. You can add additional modules that are necessary for your own use case and to integrate your GeoNode project with other external sites and services.

This module assumes that you have installed a GeoNode site with the Ubuntu Packages and that you have a working GeoNode based on that setup. If you want to follow this same methodology on a different platform, you can follow this module and adapt as necessary for your environment.

3.1.1 Overview

GeoNode is an out-of-the-box, full-featured Spatial Data Infrastructure solution, but many GeoNode implementations require either customization of the default site or the use of additional modules, whether they be third-party Django Pluggables or modules developed by a GeoNode implementer.

There are quite a few existing Downstream GeoNode projects some of which follow the methodology described in this module. You should familiarize yourself with these projects and how and why they extend GeoNode. You should also carefully think about what customization and additional modules you need for your own GeoNode-based project and research the options that are available to you. The [Django Packages](#) site is a great place to start looking for existing modules that may meet your needs.

3.1.2 Existing downstream GeoNode projects

- Harvard Worldmap
- MapStory
- Risiko/SAFE

3.1.3 Django template projects

GeoNode follows the Django template projects paradigm introduced in Django 1.4. At a minimum, a Django project consists of a `settings.py` file and a `urls.py` file; Django apps are used to add specific pieces of functionality. The GeoNode development team has created a template project which contains these required files with all the GeoNode configuration you need to get up and running with your own GeoNode project. If you would like learn more about Django projects and apps, you should consult the [Django Documentation](#)

3.2 Setting up your GeoNode project

This section will walk you through the steps necessary to set up your own GeoNode project. It assumes that you have installed GeoNode from the Ubuntu packages and that you have a working GeoNode site.

3.2.1 Setup steps

If you are working remotely, you should first connect to the machine that has your GeoNode installation. You will need to perform the following steps in a directory where you intend to keep your newly created project.

1. Activate GeoNode's Virtual Environment:

```
$ source /var/lib/geonode/bin/activate
```

2. Create your GeoNode project from the template:

```
$ django-admin.py startproject --template=https://github.com/GeoNode/geonode-project/zipball/master
$ cd my_geonode
```

3. Update your `local_settings.py`. You will need to check the `local_settings.py` that is included with the template project and be sure that it reflects your own local environment. You should pay particular attention to the Database settings especially if you intend to reuse the database that was set up with your base GeoNode installation.

4. Synchronize your database:

```
$ python manage.py syncdb --all
```

5. Run the test server:

```
$ python manage.py runserver
```

6. Visit your new GeoNode site at <http://localhost:8000>.

3.2.2 Source code revision control

It is recommended that you immediately put your new project under source code revision control. The GeoNode development team uses Git and GitHub and recommends that you do the same. If you do not already have a GitHub account, you can easily set one up. A full review of Git and distributed source code revision control systems is beyond the scope of this tutorial, but you may find the [Git Book](#) useful if you are not already familiar with these concepts.

1. Create a new repository in GitHub. You should use the GitHub user interface to create a new repository for your new project.
2. Initialize your own repository:

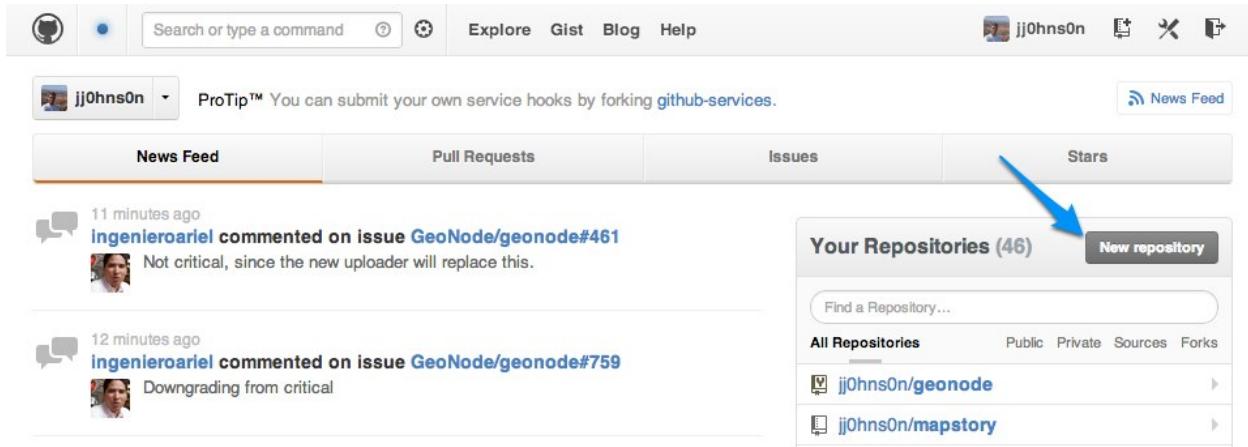


Figure 3.1: Creating a new GitHub Repository From GitHub's Homepage

A screenshot of the GitHub repository creation form. The form includes fields for 'Owner' (set to 'jj0hns0n'), 'Repository name' ('my_geonode'), and a 'Description (optional)' field containing 'My GeoNode Project'. It also includes options for 'Public' or 'Private' visibility (set to 'Public') and a checkbox for initializing the repository with a README. A blue arrow points from the text 'Specifying new GitHub Repository Parameters' to the 'Create repository' button at the bottom left of the form.

Figure 3.2: Specifying new GitHub Repository Parameters

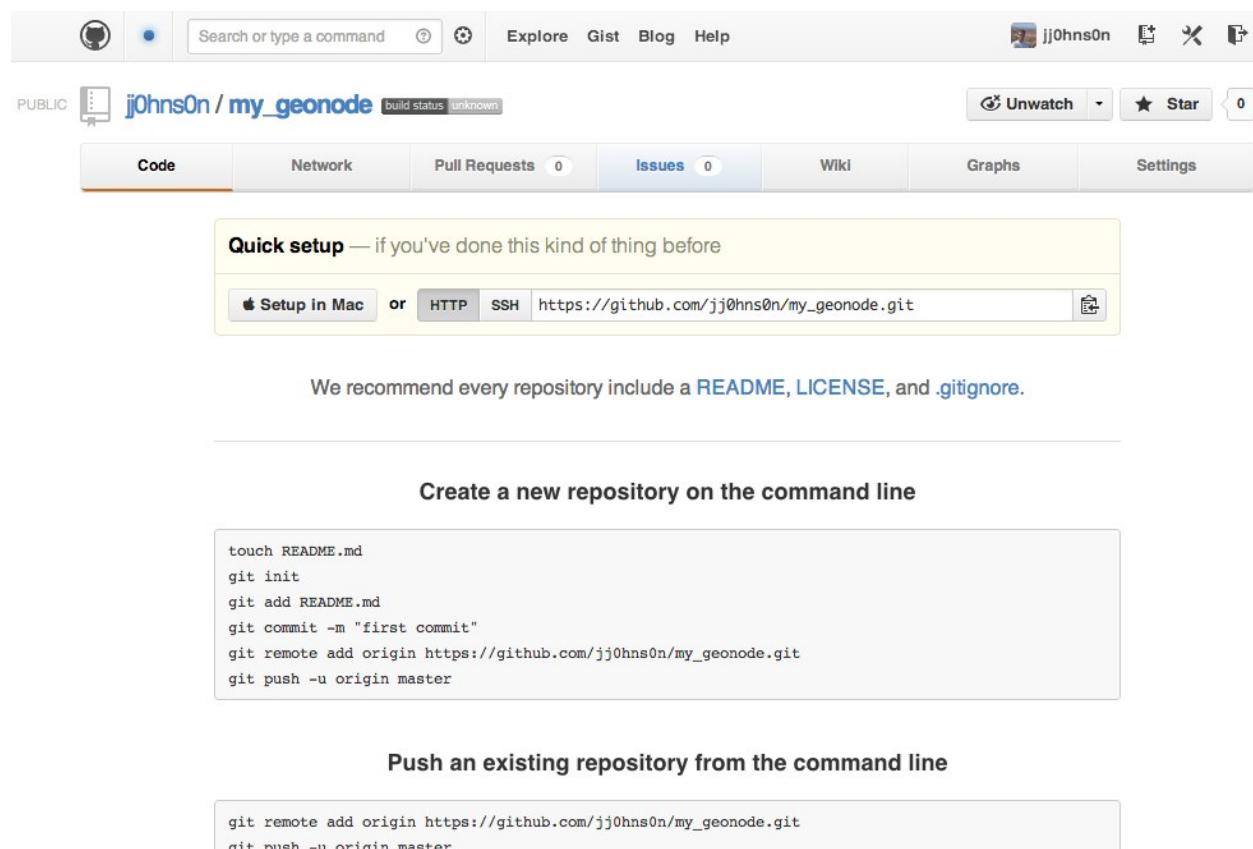


Figure 3.3: Your new Empty GitHub Repository

- ```
$ git init
```
3. Add the remote repository reference to your local git configuration:
- ```
$ git remote add
```
4. Add your project files to the repository:
- ```
$ git add .
```
5. Commit your changes:
- ```
$ git commit -am "Initial commit"
```
6. Push to the remote repository:
- ```
$ git push origin master
```

### 3.2.3 Project structure

Your GeoNode project will now be structured as depicted below:

```
|-- README.rst
|-- manage.py
|-- my_geonode
| |-- __init__.py
| |-- settings.py
| |-- static
| |-- README
| |-- css
| |-- site_base.css
| |-- img
| |-- README
| |-- js
| |-- README
| |-- templates
| |-- site_base.html
| |-- site_index.html
| |-- urls.py
| |-- wsgi.py
|-- setup.py
```

You can also view your project on GitHub.

Each of the key files in your project are described below.

#### manage.py

`manage.py` is the main entry point for managing your project during development. It allows running all the management commands from each app in your project. When run with no arguments, it will list all of the management commands.

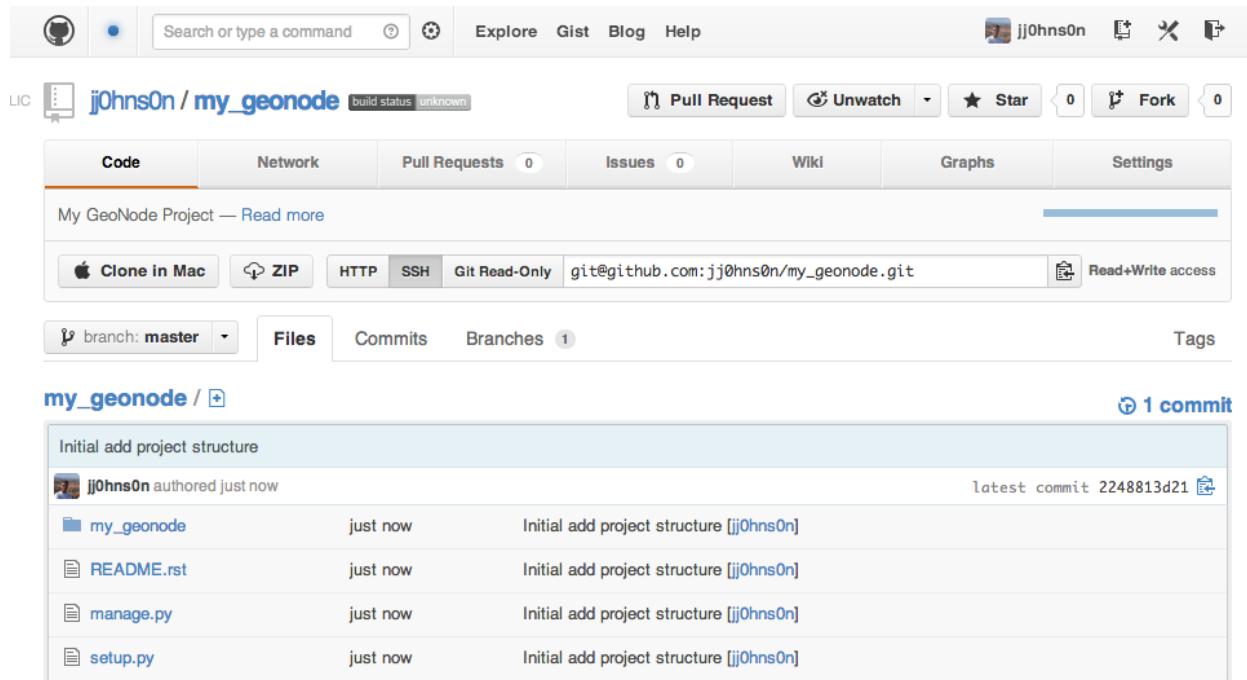


Figure 3.4: Viewing your project on GitHub

## settings.py

`settings.py` is the primary settings file for your project. It is quite common to put all sensible defaults here and keep deployment specific configuration in the `local_settings.py` file. All of the possible settings values and their meanings are detailed in the Django documentation.

A common paradigm for handing ‘local settings’ (and in other areas where some python module may not be available) is:

```
try: from local_settings import *
except: pass
```

This is not required and there are many other solutions to handling varying deployment configuration requirements.

## urls.py

`urls.py` is where your application specific URL routes go. Additionally, any *overrides* can be placed here, too.

## wsgi.py

This is a generated file to make deploying your project to a WSGI server easier. Unless there is very specific configuration you need, `wsgi.py` can be left alone.

## setup.py

There are several packaging options in python but a common approach is to place your project metadata (version, author, etc.) and dependencies in `setup.py`.

This is a large topic and not necessary to understand while getting started with GeoNode development but will be important for larger projects and to make development easier for other developers.

More: <http://docs.python.org/2/distutils/setupscript.html>

### **static**

The `static` directory will contain your fixed resources: css, html, images, etc. Everything in this directory will be copied to the final media directory (along with the `static` resources from other apps in your project).

### **templates**

All of your projects templates go in the `templates` directory. While no organization is required for your project specific templates, when overriding or replacing a template from another app, the path must be the same as the template to be replaced.

## **3.2.4 Deploying your GeoNode Project**

Now that your own project is set up, you will need to replace the existing default configuration with configuration for your own project in order to visit your new project site.

1. Update Apache configuration
2. Check GeoServer configuration
3. Check database configuration

## **3.2.5 Production Ready**

While not a complete checklist, some changes should be made prior to deploying to production.

- Ensure DEBUG=False in your effective *settings*.
- Change any admin passwords from any common defaults (i.e. admin/admin)
- Change the geoserver `master password` from the default
- Ensure GeoServer is `ready`.

## **3.2.6 Staying in sync with mainline GeoNode**

One of the primary reasons to set up your own GeoNode project using this method is so that you can stay in sync with the mainline GeoNode as the core development team makes new releases. Your own project should not be adversely affected by these changes, but you will receive bug fixes and other improvements by staying in sync.

1. Upgrade GeoNode:

```
$ apt-get update
$ apt-get install geonode
```

2. Verify that your new project works with the upgraded GeoNode:

```
$ python manage.py runserver
```

3. Navigate to <http://localhost:8000>.

## 3.3 Theming your GeoNode project

There are a range of options available to you if you want to change the default look and feel of your GeoNode project. Since GeoNode's style is based on Bootstrap you will be able to make use of all that Bootstrap has to offer in terms of theme customization. You should consult Bootstrap's documentation as your primary guide once you are familiar with how GeoNode implements Bootstrap and how you can override GeoNode's theme and templates in your own project.

### 3.3.1 Logos and graphics

GeoNode intentionally does not include a large number of graphics files in its interface. This keeps page loading time to a minimum and makes for a more responsive interface. That said, you are free to customize your GeoNode's interface by simply changing the default logo, or by adding your own images and graphics to deliver a GeoNode experience the way you envision int.

Your GeoNode project has a directory already set up for storing your own images at <my\_geonode>/static/img. You should place any image files that you intend to use for your project in this directory.

Let's walk through an example of the steps necessary to change the default logo.

1. Change into the img directory:

```
$ cd <my_geonode>/static/img
```

2. If you haven't already, obtain your logo image. The URL below is just an example, so you will need to change this URL to match the location of your file or copy it to this location:

```
$ wget http://www2.sta.uwi.edu/~anikov/UWI-logo.JPG
$ cd ../../..
```

3. Override the CSS that displays the logo by editing <my\_geonode>/static/css/site\_base.css with your favorite editor and adding the following lines, making sure to update the width, height, and URL to match the specifications of your image.

```
.nav-logo {
 width: 373px;
 height: 79px;
 background: url(../img/UWI-logo.JPG) no-repeat;
}
```

4. Restart your GeoNode project and look at the page in your browser:

```
$ python manage.py runserver
```

Visit your site at <http://localhost:8000/> or the remote URL for your site.

You can see that the header has been expanded to fit your graphic. In the following sections you will learn how to customize this header to make it look and function the way you want.

---

**Note:** You should commit these changes to your repository as you progress through this section, and get in the habit of committing early and often so that you and others can track your project on GitHub. Making many atomic commits and staying in sync with a remote repository makes it easier to collaborate with others on your project.

---

### 3.3.2 Cascading Style Sheets

In the last section you already learned how to override GeoNode's default CSS rules to include your own logo. You are able to customize any aspect of GeoNode's appearance this way. In the last screenshot, you saw that the main area

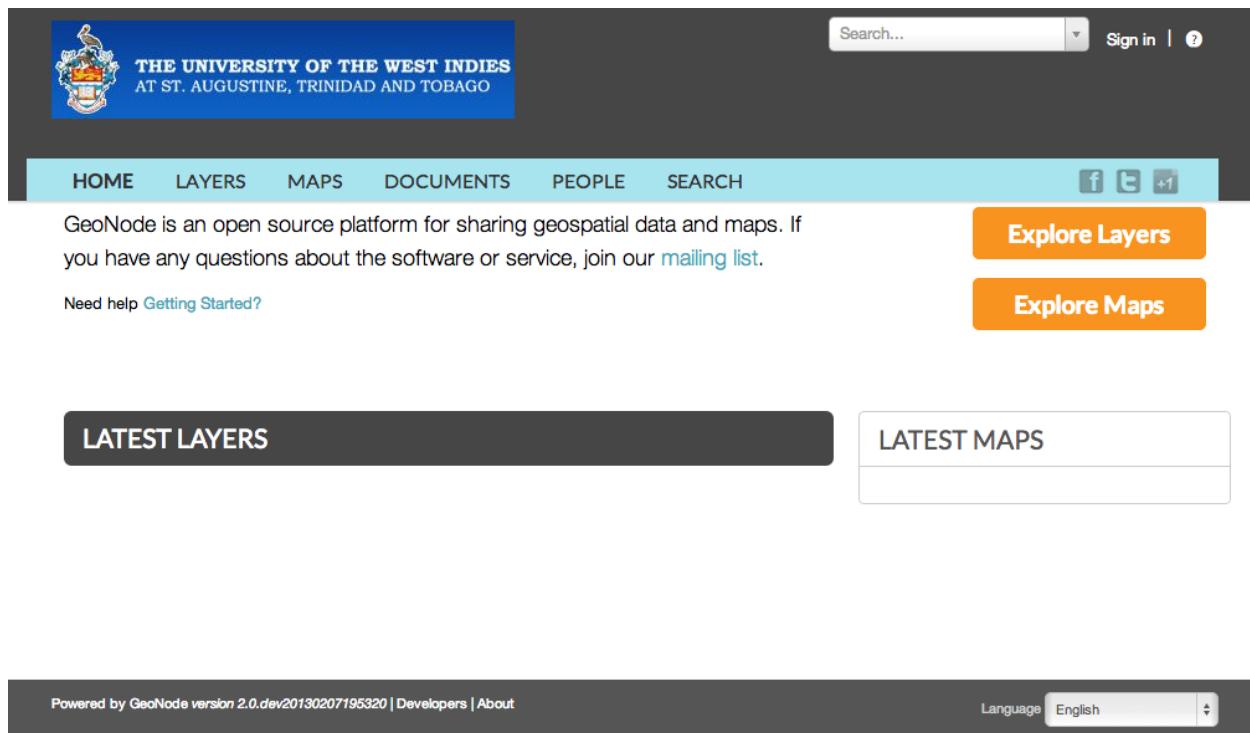


Figure 3.5: *Custom logo*

in the homepage is covered up by the expanded header.

First, we'll walk through the steps necessary to displace it downward so it is no longer hidden, then change the background color of the header to match the color in our logo graphic.

1. Reopen <my\_geonode>/static/css/site\_base.css in your editor and add the following rule after the one added in the previous step:

```
.content-wrap {
 margin: 75px 75px;
}
```

2. Add a rule to change the background color of the header to match the logo graphic we used:

```
.navbar .navbar-inner {
 background: #0e60c3;
}
```

3. Your project CSS file should now look like this:

```
.nav-logo {
 width: 373px;
 height: 79px;
 background: url(..../img/UWI-logo.JPG) no-repeat;
}

.content-wrap {
 margin: 75px 75px;
}
```

```
.navbar .navbar-inner {
 background: #0e60c3;
}
```

4. Restart the development server and reload the page:

```
$ python manage.py runserver
```

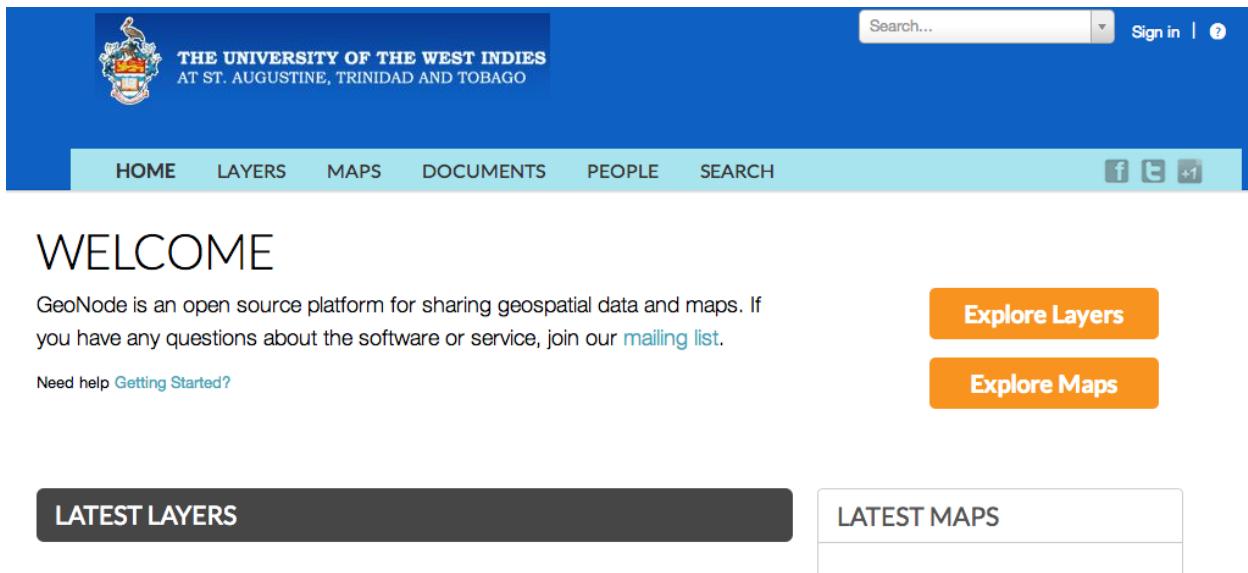


Figure 3.6: CSS overrides

---

**Note:** You can continue adding rules to this file to override the styles that are in the GeoNode base CSS file which is built from [base.less](#). You may find it helpful to use your browser's development tools to inspect elements of your site that you want to override to determine which rules are already applied. See the screenshot below. Another section of this workshop covers this topic in much more detail.

---

### 3.3.3 Templates and static pages

Now that we have changed the default logo and adjusted our main content area to fit the expanded header, the next step is to update the content of the homepage itself. Your GeoNode project includes two basic templates that you will use to change the content of your pages.

The file `site_base.html` (in `<my_geonode>/templates/`) is the basic template that all other templates inherit from and you will use it to update things like the header, navbar, site-wide announcement, footer, and also to include your own JavaScript or other static content included in every page in your site. It's worth taking a look at [GeoNode's base file on GitHub](#). You have several blocks available to you to for overriding, but since we will be revisiting this file in future sections of this workshop, let's just look at it for now and leave it unmodified.

Open `<my_geonode>/templates/site_base.html` in your editor:

```
{% extends "base.html" %}
{% block extra_head %}
 <link href="{{ STATIC_URL }}css/site_base.css" rel="stylesheet"/>
{% endblock %}
```

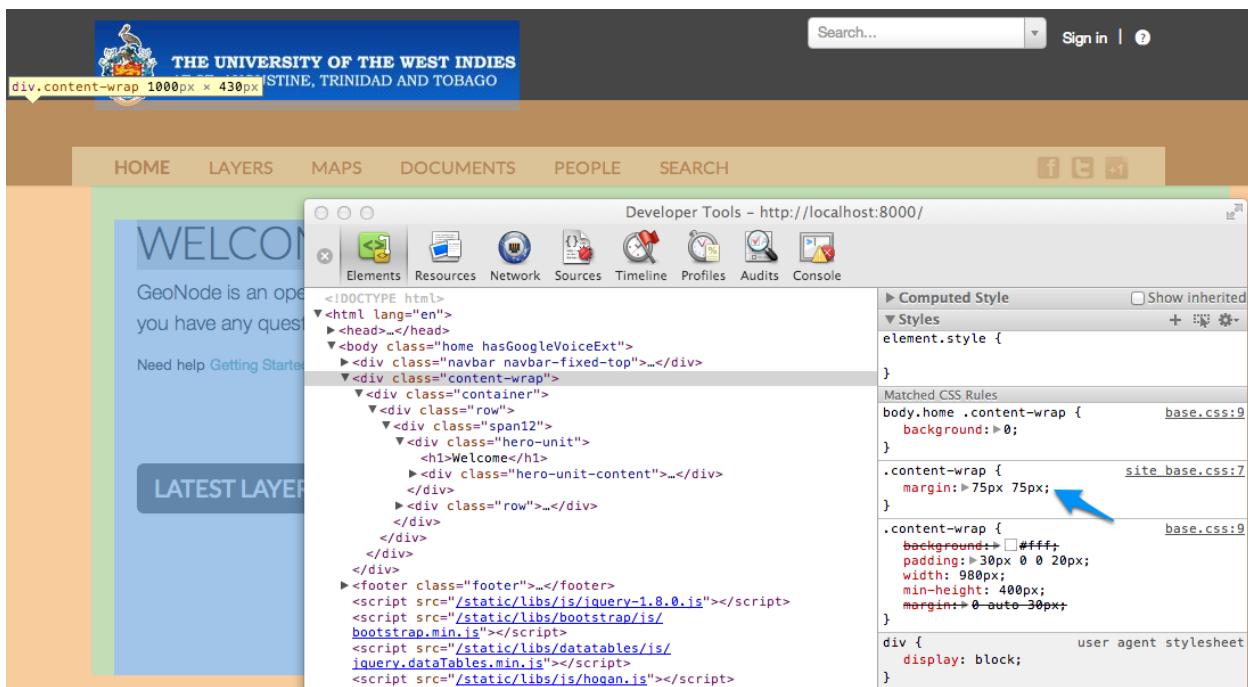


Figure 3.7: Screenshot of using Chrome's debugger to inspect the CSS overrides

You will see that it extends from `base.html`, which is the GeoNode template referenced above and it currently only overrides the `extra_head` block to include our project's `site_base.css` which we modified in the previous section. You can see on line 14 of the GeoNode `base.html` template that this block is included in an empty state and is set up specifically for you to include extra CSS files as your project is already set up to do.

Now that we have looked at `site_base.html`, let's actually override a different template.

The file `site_index.html` is the template used to define your GeoNode project's homepage. It extends GeoNode's default `index.html` template and gives you the option to override specific areas of the homepage like the hero area, but also allows you leave area like the "Latest Layers" and "Maps" and the "Contribute" section as they are. You are of course free to override these sections if you choose and this section shows you the steps necessary to do that below.

1. Open `<my_geonode>/templates/site_index.html` in your editor.
2. Edit the `<h1>` element on line 13 to say something other than "Welcome":

```
<h1>{ % trans "UWI GeoNode" %}</h1>
```

3. Edit the introductory paragraph to include something specific about your GeoNode project:

```
<p>
 { % blocktrans %
 UWI's GeoNode is setup for students and faculty to collaboratively
 create and share maps for their class projects. It is maintained by the
 UWI Geographical Society.
 { % endblocktrans %
</p>
```

4. Change the *Getting Started* link to point to another website:

```

 For more information about the UWI Geographical society,
 visit our website
```

</span>

5. Add a graphic to the hero area above the paragraph replaced in step 3:

```

```

6. Your edited site\_index.html file should now look like this:

```
{% extends 'index.html' %}
{% load i18n %}
{% load maps_tags %}
{% load layers_tags %}
{% load pagination_tags %}
{% load staticfiles %}
{% load url from future %}
{% comment %}
This is where you can override the hero area block. You can simply modify the content below or remove it.
{% endcomment %}
{% block hero %}
 <div class="hero-unit">
 <h1>{% trans "UWI GeoNode" %}</h1>
 <div class="hero-unit-content">
 <div class="intro">

 <p>
 {% blocktrans %}
 UWI's GeoNode is setup for students and faculty to collaboratively
 create and share maps for their class projects. It is maintained by the
 UWI Geographical Society.
 {% endblocktrans %}
 </p>

 For more information about the UWI Geographical society,
 visit our website

 </div>
 <div class="btms">

 {% trans "Explore Layers" %}

 {% trans "Explore Maps" %}

 </div>
 </div>
 {% endblock %}
```

7. Restart your GeoNode project and view the changes in your browser at <http://localhost:8000/> or the remote URL for your site:

```
$ python manage.py runserver
```

From here you can continue to customize your site\_index.html template to suit your needs. This workshop will also cover how you can add new pages to your GeoNode project site.

## UWI GEONODE



[Explore Layers](#)

[Explore Maps](#)

UWI's GeoNode is setup for students and faculty to collaboratively create and share maps for their class projects. It is maintained by the UWI Geographical Society.

For more information about the UWI Geographical society, [visit our website](#)

### 3.3.4 Other theming options

You are able to change any specific piece of your GeoNode project's style by adding CSS rules to `site_base.css`, but since GeoNode is based on Bootstrap, there are many pre-defined themes that you can simply drop into your project to get a whole new look. This is very similar to WordPress themes and is a powerful and easy way to change the look of your site without much effort.

#### Bootswatch

Bootswatch is a site where you can download ready-to-use themes for your GeoNode project site. The following steps will show you how to use a theme from Bootswatch in your own GeoNode site.

1. Visit <http://bootswatch.com> and select a theme (we will use Amelia for this example). Select the *download bootstrap.css option* in the menu:
2. Put this file in `<my_geonode>/static/css`.
3. Update the `site_base.html` template to include this file. It should now look like this:

```
{% extends "base.html" %}
{% block extra_head %}
 <link href="{{ STATIC_URL }}css/site_base.css" rel="stylesheet"/>
 <link href="{{ STATIC_URL }}css/bootstrap.css" rel="stylesheet"/>
{% endblock %}
```

4. Restart the development server and visit your site:

Your GeoNode project site is now using the Amelia theme in addition to the changes you have made.

The screenshot shows the Bootswatch Gallery interface. At the top, there's a navigation bar with links for 'Bootswatch', 'News', 'Gallery', and 'Preview'. Below the navigation, there are three preview cards for different themes:

- Amelia**: A teal-themed card with the title 'Amelia' and a subtitle 'A preview of changes in this swatch.' It includes a 'Typography' section and a 'Download' button with a dropdown menu containing 'bootstrap.min.css' and 'bootstrap.css'.
- Cerulean**: A light blue-themed card with the title 'Cerulean' and a subtitle 'A preview of changes in this swatch.' It includes a 'Typography' section and a 'Download' button.
- Cosmo**: A black-themed card with the title 'Cosmo' and a subtitle 'A preview of changes in this'. It includes a 'Typography' section and a 'Download' button.

At the bottom of the gallery, there are two additional cards: 'BOOTSWATCH NEWS GALLERY' and 'Bootswatch News Gallery'.

The screenshot shows the homepage of the UWI GEONODE. At the top, there's a header with the University of the West Indies logo and the text 'THE UNIVERSITY OF THE WEST INDIES AT ST. AUGUSTINE, TRINIDAD AND TOBAGO'. On the right side of the header are 'Sign in' and help icons. Below the header is a navigation bar with links for 'HOME', 'LAYERS', 'MAPS', 'DOCUMENTS', 'PEOPLE', 'SEARCH', and social media icons for Facebook, Twitter, and LinkedIn.

The main content area features a large teal banner with the text 'UWI GEONODE'. Below the banner is a circular logo for 'UWI GEOGRAPHICAL SOCIETY' with the tagline 'DISCOVERING TODAY, CHANGING TOMORROW'. To the right of the banner are two orange buttons: 'Explore Layers' and 'Explore Maps'. At the bottom of the page, there's a footer banner with the text 'UWI's GeoNode is setup for students and faculty to collaboratively create'.

## 3.4 Adding additional Django apps to your GeoNode Project

Since GeoNode is based on Django, your GeoNode project can be augmented and enhanced by adding additional third-party pluggable Django apps or by writing an app of your own.

This section of the workshop will introduce you to the Django pluggable app ecosystem, and walk you through the process of writing your own app and adding a blog app to your project.

### 3.4.1 Django pluggable apps

The Django app ecosystem provides a large number of apps that can be added to your project. Many are mature and used in many existing projects and sites, while others are under active early-stage development. Websites such as [Django Packages](#) provide an interface for discovering and comparing all the apps that can be plugged in to your Django project. You will find that some can be used with very little effort on your part, and some will take more effort to integrate.

### 3.4.2 Adding your own Django app

Let's walk through an example of the steps necessary to create a very basic Django polling app to add it to your GeoNode project. This section is an abridged version of the Django tutorial itself and it is strongly recommended that you go through this external tutorial along with this section as it provides much more background material and a significantly higher level of detail. You should become familiar with all of the information in the Django tutorial as it is critical to your success as a GeoNode project developer.

Throughout this section, we will walk through the creation of a basic poll application. It will consist of two parts:

- A public site that lets people view polls and vote in them.
- An admin site that lets you add, change, and delete polls.

Since we have already created our GeoNode project from a template project, we will start by creating our app structure and then adding models:

```
$ python manage.py startapp polls
```

That'll create a directory `polls`, which is laid out like this:

```
polls/
 __init__.py
 models.py
 tests.py
 views.py
```

This directory structure will house the poll application.

The first step in writing a database web app in Django is to define your models—essentially, your database layout with additional metadata.

In our simple poll app, we'll create two models: `Polls` and `Choices`. A poll has a question and a publication date. A choice has two fields: the text of the choice and a vote tally. Each choice is associated with a poll.

These concepts are represented by simple Python classes.

Edit the `polls/models.py` file so it looks like this:

```
from django.db import models

class Poll(models.Model):
 pass
```

```
question = models.CharField(max_length=200)
pub_date = models.DateTimeField('date published')
def __unicode__(self):
 return self.question

class Choice(models.Model):
 poll = models.ForeignKey(Poll)
 choice = models.CharField(max_length=200)
 votes = models.IntegerField()
 def __unicode__(self):
 return self.choice
```

That small bit of model code gives Django a lot of information. With it, Django is able to:

- Create a database schema (CREATE TABLE statements) for this app.
- Create a Python database-access API for accessing Poll and Choice objects.

But first we need to tell our project that the polls app is installed.

Edit the <my\_geonode>/settings.py file, and update the INSTALLED\_APPS setting to include the string “polls”. So it will look like this:

```
INSTALLED_APPS = (

 # Apps bundled with Django
 'django.contrib.auth',
 'django.contrib.contenttypes',
 'django.contrib.sessions',
 'django.contrib.sites',
 'django.contrib.admin',
 'django.contrib.sitemaps',
 'django.contrib.staticfiles',
 'django.contrib.messages',
 'django.contrib.humanize',

 # Third party apps
 # <snip>

 # GeoNode internal apps
 'geonode.maps',
 'geonode.upload',
 'geonode.layers',
 'geonode.people',
 'geonode.proxy',
 'geonode.security',
 'geonode.search',
 'geonode.catalogue',
 'geonode.documents',

 # My GeoNode apps
 'polls',
)
```

Now Django knows to include the polls app. Let’s run another command:

```
$ python manage.py syncdb
```

The syncdb command runs the SQL from sqlall on your database for all apps in INSTALLED\_APPS that don’t

already exist in your database. This creates all the tables, initial data, and indexes for any apps you've added to your project since the last time you ran syncdb. syncdb can be called as often as you like, and it will only ever create the tables that don't exist.

GeoNode uses south for migrations ...

Next, let's add the Django admin configuration for our polls app so that we can use the Django Admin to manage the records in our database. Create and edit a new file called `polls/admin.py` and make it look like this:

```
from polls.models import Poll
from django.contrib import admin

admin.site.register(Poll)
```

Run the development server and explore the polls app in the Django Admin by pointing your browser to `http://localhost:8000/admin/` and logging in with the credentials you specified when you first ran syncdb.

Account	
<a href="#">Account deletions</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Accounts</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Signup codes</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Actstream	
<a href="#">Actions</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Follows</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Announcements	
<a href="#">Announcements</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Auth	
<a href="#">Groups</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Users</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Avatar	
<a href="#">Avatars</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Dialogos	
<a href="#">Comments</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Documents	
<a href="#">Contact roles</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Documents</a>	<a href="#"> Add</a> <a href="#"> Change</a>

Layers	
<a href="#">Attributes</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Contact roles</a>	<a href="#"> Add</a> <a href="#"> Change</a>
<a href="#">Layers</a>	<a href="#"> Add</a> <a href="#"> Change</a>

You can see all of the other apps that are installed as part of your GeoNode project, but we are specifically interested in the Polls app for now.

Next we will add a new poll via automatically generated admin form.

You can enter any sort of question you want for initial testing and select today and now for the publication date.

The next step is to configure the Choice model in the admin, but we will configure the choices to be editable in-line with the Poll objects they are attached to. Edit the same `polls/admin.py` so it now looks like the following:

Maps		
Map layers		
Maps		
People		
Profiles		
Roles		
Polls		
Polls		
Relationships		
Relationship statuses		
Request		
Requests		
Security		
Generic object role mappings		
Object roles		
User object role mappings		
Sites		
Sites		
Taggit		
Tags		
Upload		
Upload files		
Uploads		

Django administration Welcome, admin. Change password / Log out

Home > Polls > Polls

Select poll to change

0 polls

+

```
from polls.models import Poll, Choice
from django.contrib import admin

class ChoiceInline(admin.StackedInline):
 model = Choice
 extra = 3

class PollAdmin(admin.ModelAdmin):
 fieldsets = [
 (None, {'fields': ['question']}),
 ('Date information', {'fields': ['pub_date'], 'classes': ['collapse']}),
]
 inlines = [ChoiceInline]

admin.site.register(Poll, PollAdmin)
```

This tells Django that Choice objects are edited on the Poll admin page, and by default, provide enough fields for 3 choices.

You can now return to the Poll admin and either add a new poll or edit the one you already created and see that you can now specify the poll choices inline with the poll itself.

From here, we want to create views to display the polls inside our GeoNode project. A view is a “type” of Web page in your Django application that generally serves a specific function and has a specific template. In our poll application, there will be the following four views:

- Poll “index” page—displays the latest few polls.
- Poll “detail” page—displays a poll question, with no results but with a form to vote.
- Poll “results” page—displays results for a particular poll.
- Vote action—handles voting for a particular choice in a particular poll.

The first step of writing views is to design your URL structure. You do this by creating a Python module called a URLconf. URLconfs are how Django associates a given URL with given Python code.

Let’s start by adding our URL configuration directly to the `urls.py` that already exists in your project at `<my_geonode>/urls.py`. Edit this file and add the following lines after the rest of the existing imports around line 80:

```
url(r'^polls/$', 'polls.views.index'),
url(r'^polls/(?P<poll_id>\d+)/$', 'polls.views.detail'),
url(r'^polls/(?P<poll_id>\d+)/results/$', 'polls.views.results'),
url(r'^polls/(?P<poll_id>\d+)/vote/$', 'polls.views.vote'),
```

Django administration      Welcome, admin. Change password / Log out

Home > Polls > Polls > Did you find the layers you searched for in my GeoNode

**Change poll**

**History**

**Question:** Did you find the layers you searched for i

**Date information (Show)**

**Choices**

Choice: #1

Choice: Yes

Votes:

Choice: #2

Choice: No

Votes:

Choice: #3

Choice: Some, but not all

Votes:

[+ Add another Choice](#)

[✖ Delete](#) [Save and add another](#) [Save and continue editing](#) **Save**

---

**Note:** Eventually we will want to move this set of URL configurations inside the URLs app itself, but for the sake of brevity in this workshop, we will put them in the main urls.py for now. You can consult the Django tutorial for more information on this topic.

---

Next write the views to drive the URL patterns we configured above. Edit polls/views.py to that it looks like the following:

```
from django.template import Context, loader
from polls.models import Poll
from django.http import HttpResponseRedirect
from django.http import Http404
from django.shortcuts import render_to_response

def index(request):
 latest_poll_list = Poll.objects.all().order_by('-pub_date')[:5]
 return render_to_response('polls/index.html',
 RequestContext(request, {'latest_poll_list': latest_poll_list}))

def detail(request, poll_id):
 try:
 p = Poll.objects.get(pk=poll_id)
 except Poll.DoesNotExist:
 raise Http404
 return render_to_response('polls/detail.html', RequestContext(request, {'poll': p}))

def results(request, poll_id):
 return HttpResponseRedirect("You're looking at the results of poll %s." % poll_id)

def vote(request, poll_id):
 return HttpResponseRedirect("You're voting on poll %s." % poll_id)
```

---

**Note:** We have only stubbed in the views for the results and vote pages. They are not very useful as-is. We will revisit these later.

---

Now we have views in place, but we are referencing templates that do not yet exist. Let's add them by first creating a template directory in your polls app at polls/templates/polls and creating polls/templates/polls/index.html to look like the following:

```
{% if latest_poll_list %}

 {% for poll in latest_poll_list %}
 {{ poll.question }}
 {% endfor %}

{% else %}
 <p>No polls are available.</p>
{% endif %}
```

Next we need to create the template for the poll detail page. Create a new file at polls/templates/polls/detail.html to look like the following:

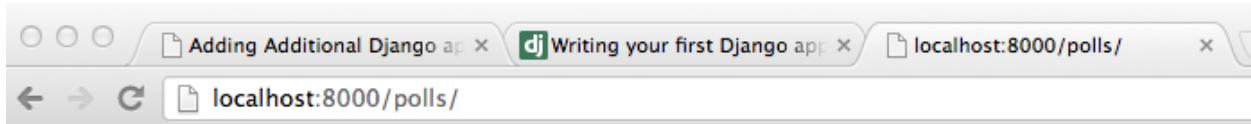
```
<h1>{{ poll.question }}</h1>

 {% for choice in poll.choice_set.all %}
 {{ choice.choice }}
```

```
{% endfor %}

```

You can now visit <http://localhost:8000/polls/> in your browser and you should see the poll question you created in the admin presented like this.



We actually want our polls app to display as part of our GeoNode project with the same theme, so let's update the two templates we created above to make them extend from the `site_base.html` template we looked at in the last section. You will need to add the following two lines to the top of each file:

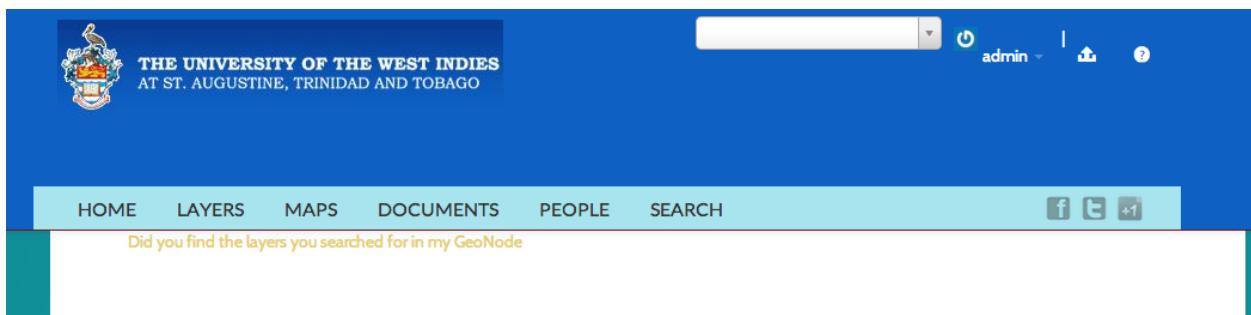
```
{% extends 'site_base.html' %}
{% block body %}
```

And close the block at the bottom of each file with:

```
{% endblock %}
```

This tells Django to extend from the `site_base.html` template so your polls app has the same style as the rest of your GeoNode, and it specifies that the content in these templates should be rendered to the `body` block defined in GeoNode's `base.html` template that your `site_base.html` extends from.

You can now visit the index page of your polls app and see that it is now wrapped in the same style as the rest of your GeoNode site.

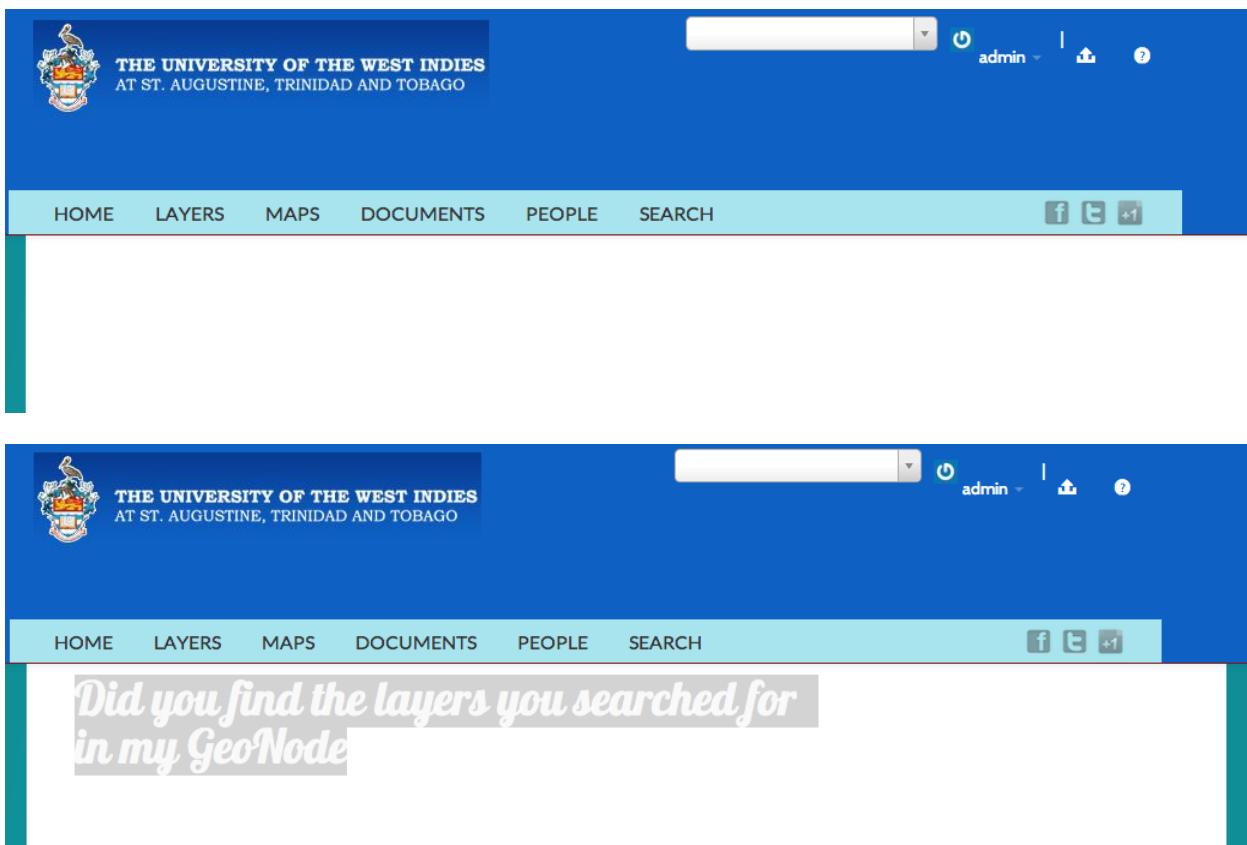


If you click on a question from the list you will be taken to the poll detail page.

It looks like it is empty, but in fact the text is there, but styled to be white by the Bootswatch theme we added in the last section. If you highlight the area where the text is, you will see that it is there.

Now that you have walked through the basic steps to create a very minimal (though not very useful) Django app and integrated it with your GeoNode project, you should pick up the Django tutorial at part 4 and follow it to add the form for actually accepting responses to your poll questions.

We strongly recommend that you spend as much time as you need with the Django tutorial itself until you feel comfortable with all of the concepts. They are the essential building blocks you will need to extend your GeoNode project by adding your own apps.



### 3.4.3 Adding a 3rd party blog app

Now that we have created our own app and added it to our GeoNode project, the next thing we will work through is adding a 3rd party blog app. There are a number of blog apps that you can use, but for purposes of this workshop, we will use a relatively simple, yet extensible app called [Zinnia](#). You can find out more information about Zinnia on its website or on its [GitHub project page](#) or by following its [documentation](#). This section will walk you through the minimal set of steps necessary to add Zinnia to your GeoNode project.

The first thing to do is to install Zinnia into the virtualenv that you are working in. Make sure your virtualenv is activated and execute the following command:

```
$ pip install django-blog-zinnia
```

This will install Zinnia and all of the libraries that it depends on.

Next add Zinnia to the INSTALLED\_APPS section of your GeoNode projects `settings.py` file by editing `<my_geonode>/settings.py` and adding ‘`django.contrib.comments`’ to the section labeled “Apps Bundled with Django” so that it looks like the following:

```
Apps bundled with Django
'django.contrib.auth',
'django.contrib.contenttypes',
'django.contrib.sessions',
'django.contrib.sites',
'django.contrib.admin',
'django.contrib.sitemaps',
'django.contrib.staticfiles',
'django.contrib.messages',
```

```
'django.contrib.humanize',
'django.contrib.comments',
```

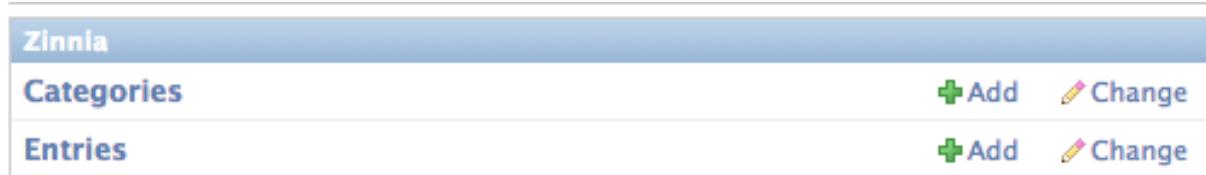
And then add the tagging, mptt and zinnia apps to the end of the INSTALLED\_APPS where we previously added a section labeled “My GeoNode apps”. It should like like the following:

```
My GeoNode apps
'polls',
'tagging',
'mptt',
'zinnia',
```

Next you will need to run syncdb again to synchronize the models for the apps we have just added to our project’s database. This time we want to pass the --all flag to syncdb so it ignores the schema migrations. Schema migrations are discussed further in GeoNode’s documentation, but it is safe to ignore them here.

```
$ python manage.py syncdb --all
```

You can now restart the development server and visit the Admin interface and scroll to the very bottom of the list to find a section for Zinnia that allows you to manage database records for Categories and Blog Entries.



The screenshot shows the Django Admin interface for the Zinnia application. At the top, there's a blue header bar with the word "Zinnia". Below it, there are two main sections: "Categories" and "Entries". Each section contains a green "Add" button and a blue "Change" button. The "Categories" section also has a small icon of a tree-like structure.

Next we need to configure our project to add Zinnia’s URL configurations. Add the following two URL configuration entries to the end of <my\_geonode>/urls.py:

```
url(r'^blog/', include('zinnia.urls')),
url(r'^djcomments/', include('django.contrib.comments.urls')),
```

If you visit the main blog page in your browser at <http://localhost:8000/blog/> you will find that the blog displays with Zinnia’s default theme as shown below.



The screenshot shows the Zinnia blog homepage. At the top, there's a logo consisting of four overlapping colored shapes (orange, yellow, green, blue) followed by the text "Zinnia's Blog" in a large blue font. Below that, it says "Just another Zinnia Weblog.". On the right side, there are links for "Sitemap" and "RSS Feed", and a search bar with the placeholder "Keywords...". In the center, there's a "Welcome!" message. To the left, a teal bar says "No entries yet.". To the right, there's a "Categories" section with the message "No categories yet." and an "Authors" section.

This page includes some guidance for us on how to change the default theme. The first thing we need to do is to copy Zinnia's base.html template into our own project so we can modify it. When you installed Zinnia, templates were installed to /var/lib/geonode/lib/python2.7/site-packages/zinnia/templates/zinnia/. You can copy the base template by executing the following commands:

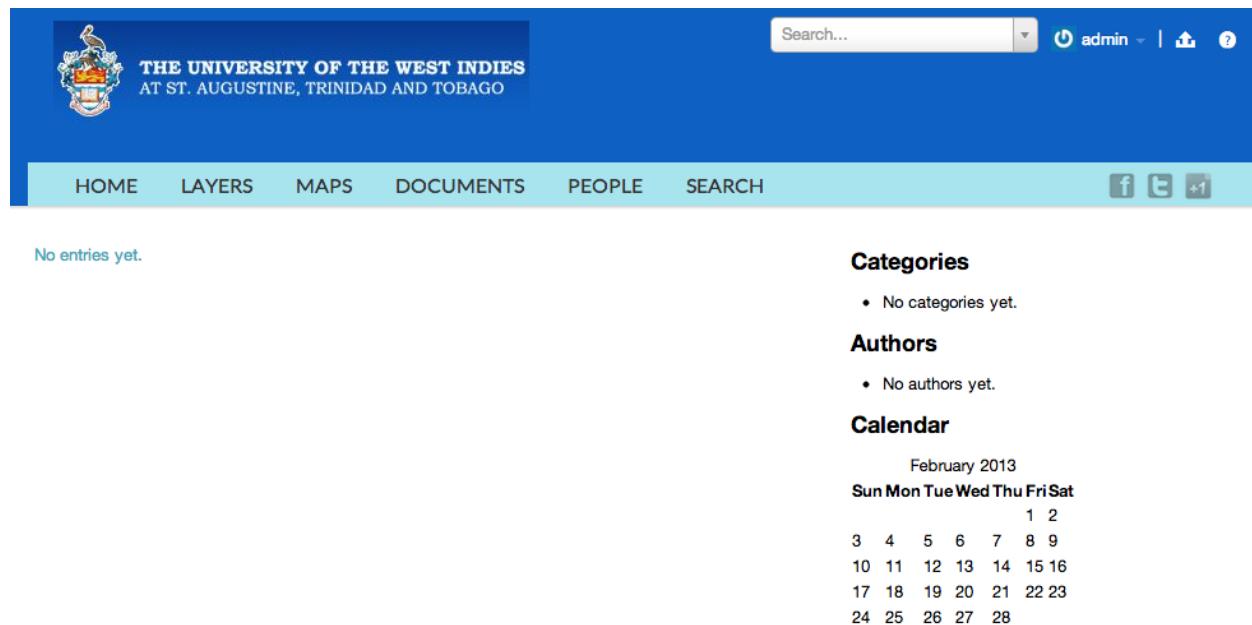
```
$ mkdir <my_geonode>/templates/zinnia
$ cp /var/lib/geonode/lib/python2.7/site-packages/zinnia/templates/zinnia/base.html <my_geonode>/temp
```

Then you need to edit this file and change the topmost line to read as below such that this template extends from our projects site\_base.html rather than the zinnia skeleton.html:

```
{% extends "site_base.html" %}
```

Since Zinnia uses a different block naming scheme than GeoNode does, you need to add the following line to the bottom of your site\_base.html file so that the content block gets rendered properly:

```
{% block body %}{% block content %}{% endblock %}{% endblock %}
```



You can see that there are currently no blog entries, so let's add one. Scroll to the bottom of the interface and click the *Post an Entry* link to go to the form in the Admin interface that lets you create a blog post. Go ahead and fill out the form with some information for testing purposes. Make sure that you change the Status dropdown to “published” so the post shows up right away.

You can explore all of the options available to you as you create your post, and when you are done, click the *Save* button. You will be taken to the page that shows the list of all your blog posts.

You can then visit your blog post/entry at <http://localhost:8000/blog/>.

And if you click on the blog post title, you will be taken to the page for the complete blog post. You and your users can leave comments on this post and various other blog features from this page.

The last thing we need to do to fully integrate this blog app (and our polls app) into our site is to add it to the options on the navbar. To do so, we need to add the following block override to our Projects site\_base.html:

```
{% block extra-nav %}
<li id="nav_polls">
 Polls
```



The screenshot shows the top navigation bar of the GeoNode interface. It features the University of the West Indies logo and name, a search bar, and user authentication information ('admin'). Below the main header, there is a secondary navigation bar with links for HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, and SEARCH, along with social media sharing icons.

## UWI GeoNode Ready for Use

Written by admin on Feb. 8, 2013.

Last update on Feb. 8, 2013.

The new GeoNode system for use by UWI Students and Staff is now up and running.

[Continue reading](#)

Tags : No tags

Short url : <http://localhost:8000/blog/1/>

Discussions : No comments yet. [Be first to comment!](#)

### Yearly archives

- 2013

### Categories

- No categories yet.

### Authors

- admin 1 entry

### Calendar

February 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2		
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

### Tags

- No tags yet.

### Recent entries

- [UWI GeoNode Ready for Use](#)

The screenshot shows the top navigation bar of the GeoNode interface. It features the University of the West Indies logo and name, a search bar, and user authentication information ('admin'). Below the main header, there is a secondary navigation bar with links for HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, and SEARCH, along with social media sharing icons.

## UWI GeoNode Ready for Use

Written by admin on Feb. 8, 2013.

Last update on Feb. 8, 2013.

The new GeoNode system for use by UWI Students and Staff is now up and running.

Tags : No tags

Short url : <http://localhost:8000/blog/1/>

Discussions : No comments yet. [Be first to comment!](#)

### Similar entries

- No similar entries.

### Comments

No comments yet.

### Pingbacks

Pingbacks are open.

### Trackbacks

[Trackback URL](#)

**POST YOUR COMMENT**

### Categories

- No categories yet.

### Authors

- admin 1 entry

### Calendar

February 2013

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2			
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

### Tags

- No tags yet.

### Recent entries

- [UWI GeoNode Ready for Use](#)

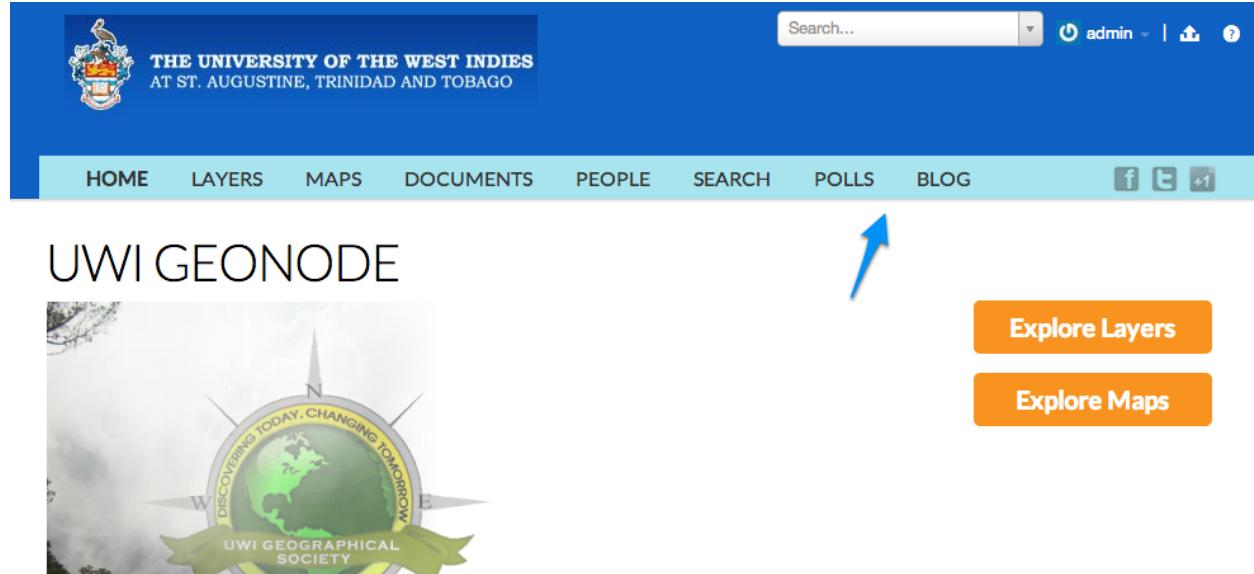
### Recent comments

- No comments yet.

```

<li id="nav_blog">
 Blog

{% endblock %}
```



At this point, you could explore options for tighter integration between your GeoNode project and Zinnia. Integrating blog posts from Zinnia into your overall search could be useful, as well as including the blog posts a user has written on their Profile Page. You could also explore the additional plugins that go with Zinnia.

### 3.4.4 Adding other apps

Now that you have both written your own app and plugged in a 3rd party one, you can explore sites like Django Packages to look for other modules that you could plug into your GeoNode project to meet your needs and requirements. For many types of apps, there are several options and Django Packages is a nice way to compare them. You may find that some apps require significantly more work to integrate into your app than others, but reaching out to the app's author and/or developers should help you get over any difficulties you may encounter.

## 3.5 Integrating your project with other systems

Your GeoNode project is based on core components which are interoperable and as such, it is straightforward for you to integrate with external applications and services. This section will walk you through how to connect to your GeoNode instance from other applications and how to integrate other services into your GeoNode project. When complete, you should have a good idea about the possibilities for integration, and have basic knowledge about how to accomplish it. You may find it necessary to dive deeper into how to do more complex integration in order to accomplish your goals, but you should feel comfortable with the basics, and feel confident reaching out to the wider GeoNode community for help.

### 3.5.1 OGC services

Since GeoNode is built on GeoServer which is heavily based on OGC services, the main path for integration with external services is via OGC Standards. A large number of systems, applications and services support adding WMS



## Django Packages

ACTIVITIES	AUTHORIZATION	CAPTCHA	DATABASE MIGRATION	DOCUMENT MANAGEMENT	FLASH
ADMIN INTERFACE	AUTO-COMPLETE	CHAT	DATA TOOLS	E-COMMERCE	FORMS
ANALYTICS	AWARDS AND ...	CMS	DEPLOYMENT	EMAIL	FORUMS
ANTI-SPAM	BLOGS	COMMENTING	DESIGN	ERROR HANDLING	GALLERY
API CREATION	BOOTSTRAPS	CONFIGURATION	DEVELOPER TOOLS	FEEDBACK	GOOGLE APP ...
ASSET MANAGERS	CACHING	COUNTRIES	DJANGO CMS	FIELDS	INTERNATIONALIZA...
AUTHENTICATION	CALENDAR	CUSTOM MODELS	DJANGO SHOP ...	FILE MANAGERS	LAYOUT

**Django Packages is a directory of reusable apps, sites, tools, and more for your Django projects.**

1619 packages and counting!

Know of any packages not listed here? Add them now! It's quick and easy.

[add package »](#)

Or add a grid comparing the features of 2 or more similar packages.

[add grid »](#)

**Package Categories**

**Apps ( 1304 )**  
Small components used to build projects. An app is anything that is installed by placing in settings.INSTALLED\_APPS.

**Frameworks ( 64 )**  
Large efforts that combine many python modules or apps. Examples include Django, Pinax, and Satchmo. Most CMSEs fall into this category.

**Other ( 199 )**  
Other are not installed by settings.INSTALLED\_APPS, are not frameworks or sites but still help Django in some way.

**Projects ( 52 )**  
This is for individual projects such as Django Packages, DjangoProject.com, and others.

**random 5**

- django-rtf** Django Rich Text Editor widget  
Django Rich Text Editor based on FCKEditor, turn a TextField into a rich field stored in H...
- django-wysiwyg**  
A Django application for making Django textareas rich text editors. Certainly as a template tag and possibly as a form widg...
- django-cms-social-networks**  
Django CMS plugins for social networks (only facebook at the moment)
- django-feedstorage**  
Storage for Feeds where subscribers are notified for new feeds entries
- emergelusion-nivelader**

layers to them, but only a few key ones are covered below. WFS and WCS are also supported in a wide variety of clients and platforms and give you access to the actual data for use in GeoProcessing or to manipulate it to meet your requirements. GeoServer also bundles GeoWebCache which produces map tiles that can be added as layers in many popular web mapping tools including Google Maps, Leaflet, OpenLayers and others. You should review the reference material included in the first chapter to learn more about OGC Services and when evaluating external systems make sure that they are also OGC Compliant in order to integrate as seamlessly as possible.

### 3.5.2 ArcGIS

ArcGIS Desktop (ArcMap) supports adding WMS layers to your map project. The following set of steps will walk you through how to configure a WMS Layer from your GeoNode within ArcMap.

First, you can start with a new empty project or add these layers to your existing project.

Next click the ArcCatalog button on the toolbar to bring up its interface.

From there, double click the “Add WMS Server” item in the tree to bring up the dialog that lets you enter the details for your WMS.

Next, enter the URL for your GeoNode’s WMS endpoint which is the base url with /geoserver/wms appended to the end of the URL. You can also enter your credentials into the optional Account section of this dialog to gain access to non-public layers that your user may have access to.

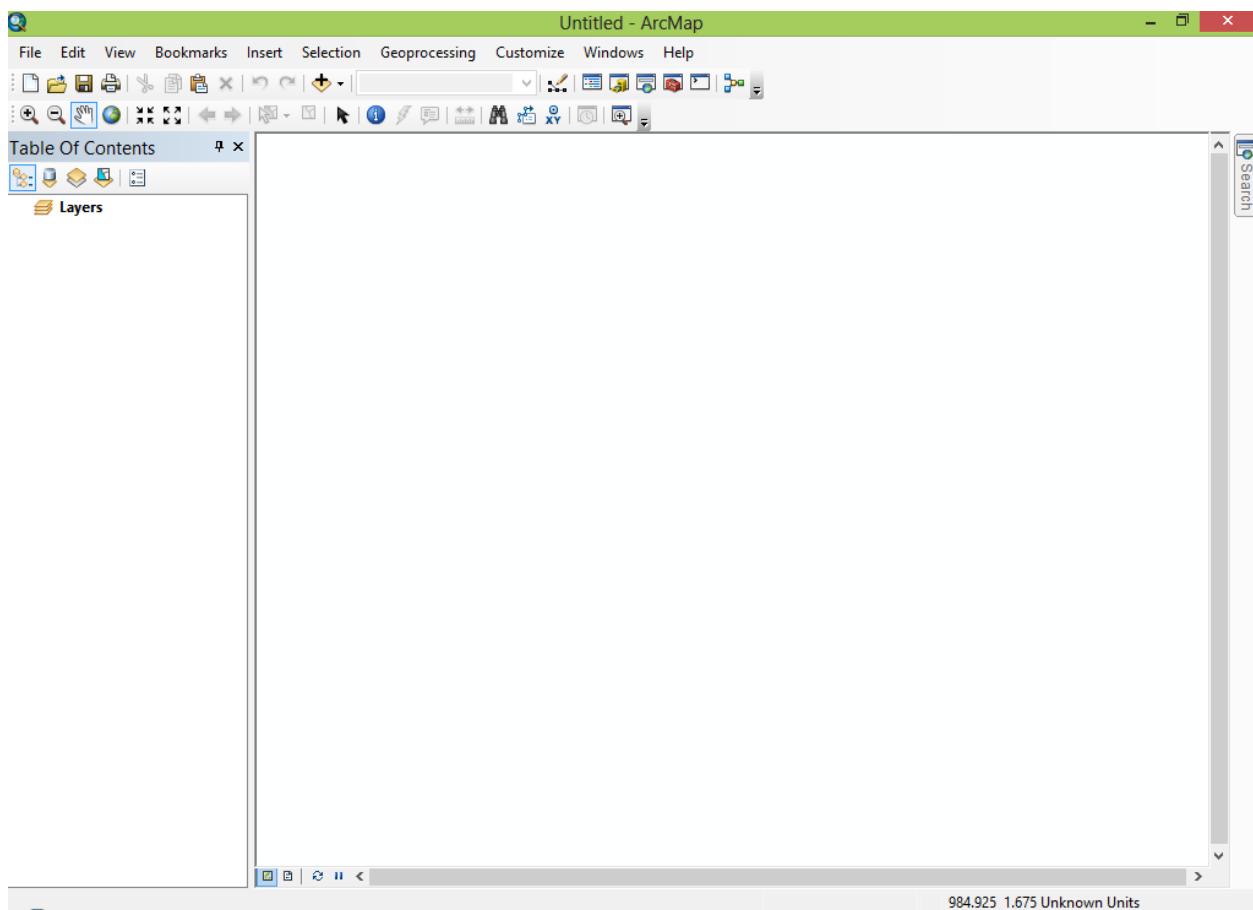
Click the “Get Layers” button to ask ArcMap to query your WMS’s GetCapabilities document to get the list of available layers.

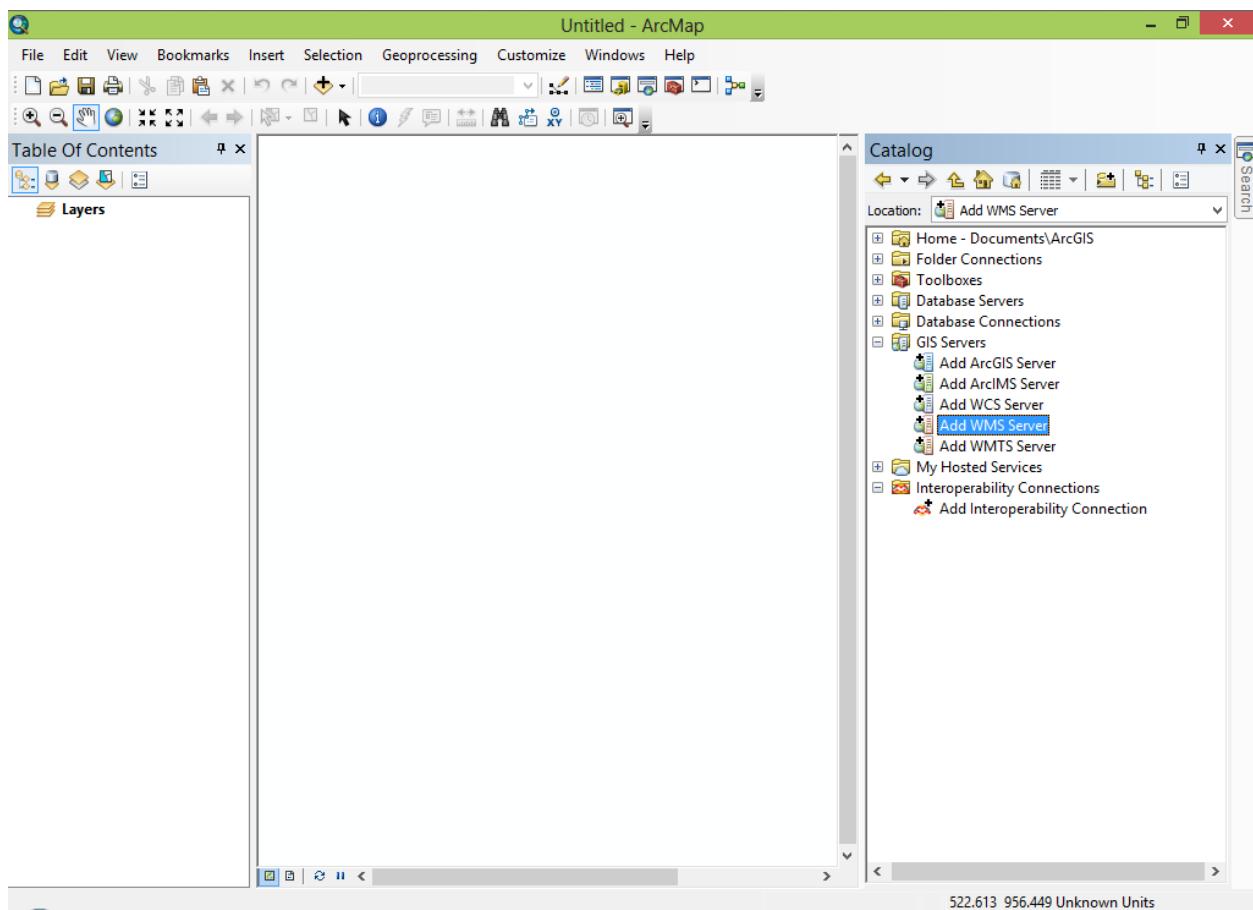
After you click the OK button, your GeoNode layers will appear in the ArcCatalog Interface.

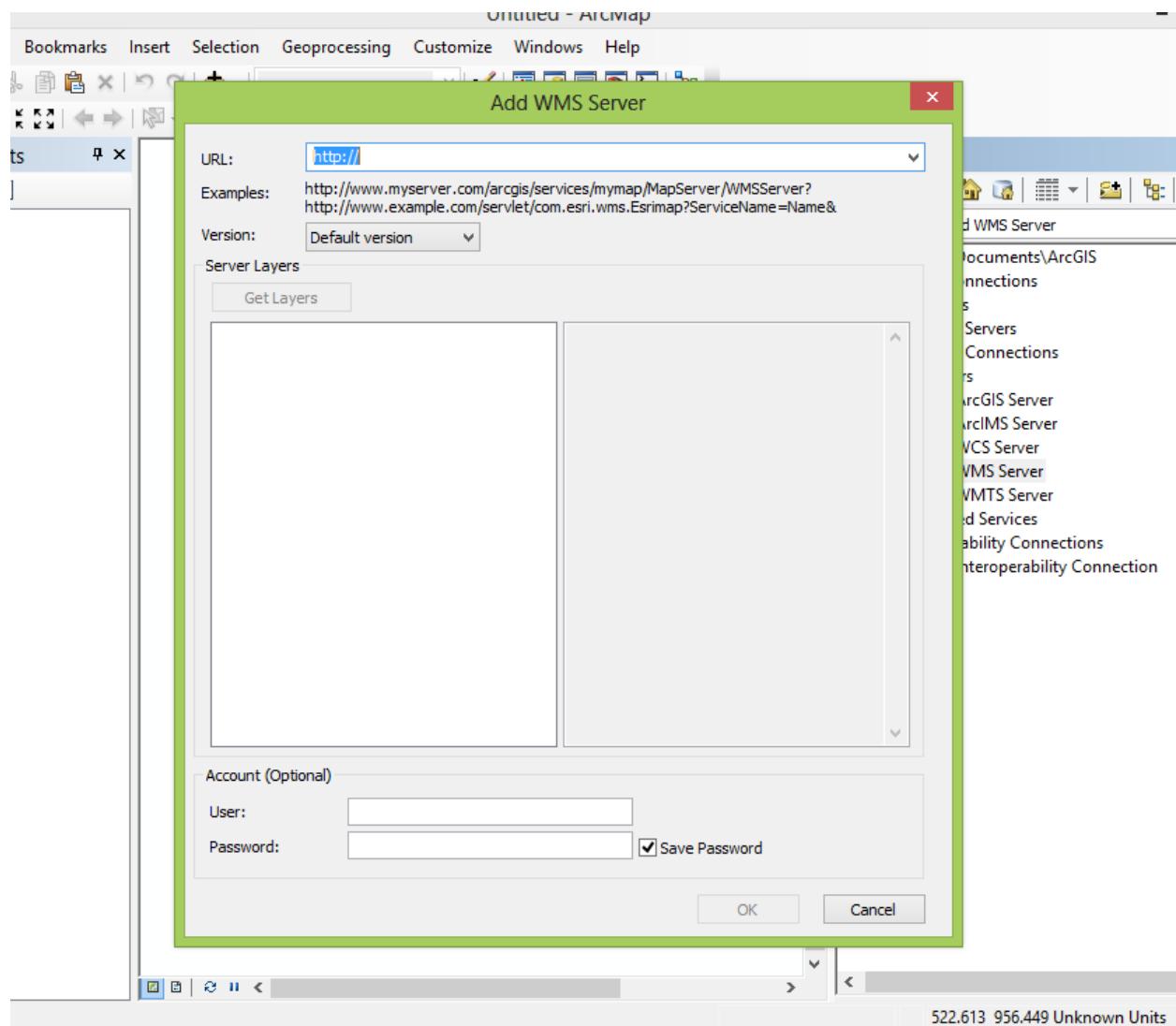
Once your server is configured in ArcMap, you can right click on one of the layers and investigate its properties.

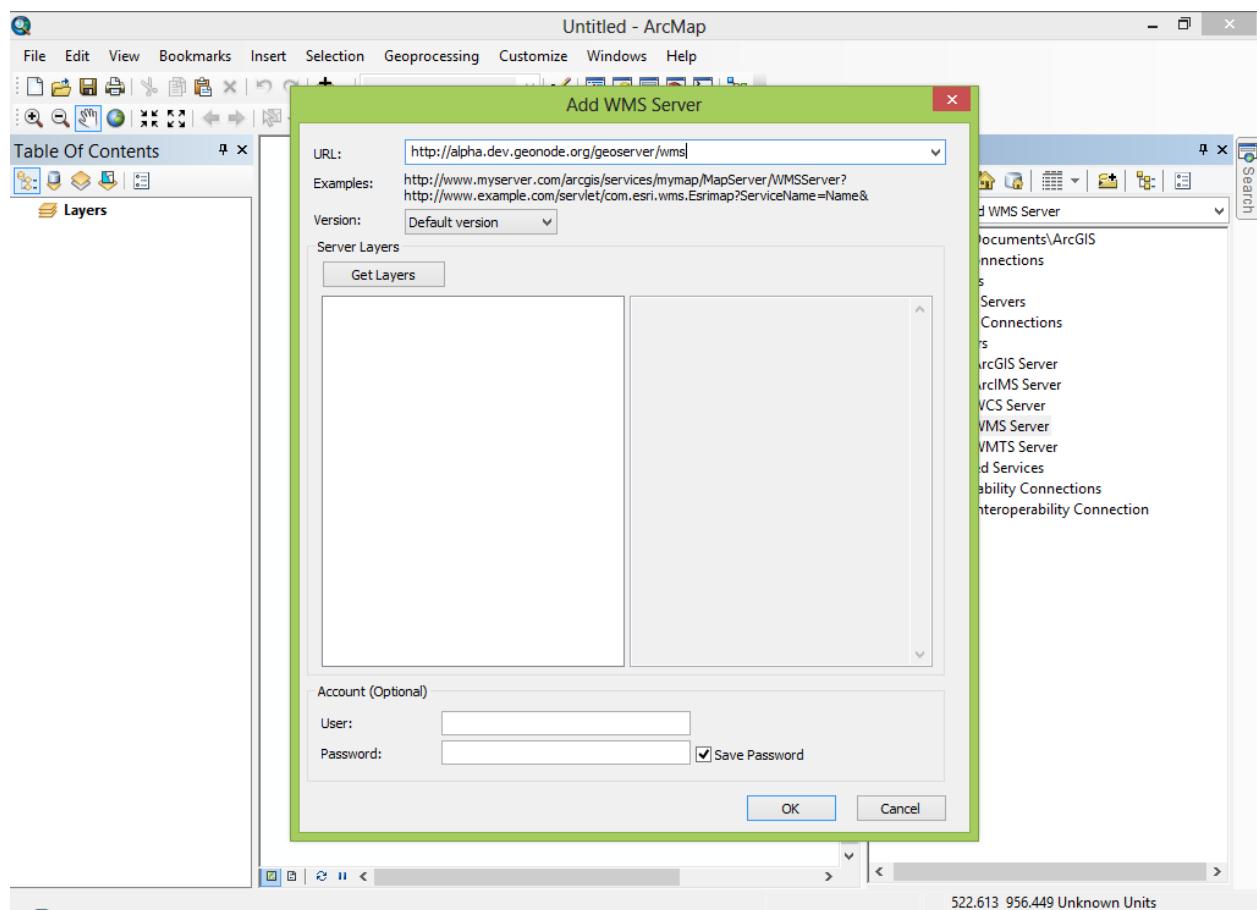
In order to actually add the layer to your project, you can drag and drop it into the Table of Contents, or right click and select “Create Layer”. Your Layer will now be displayed in the map panel of your project.

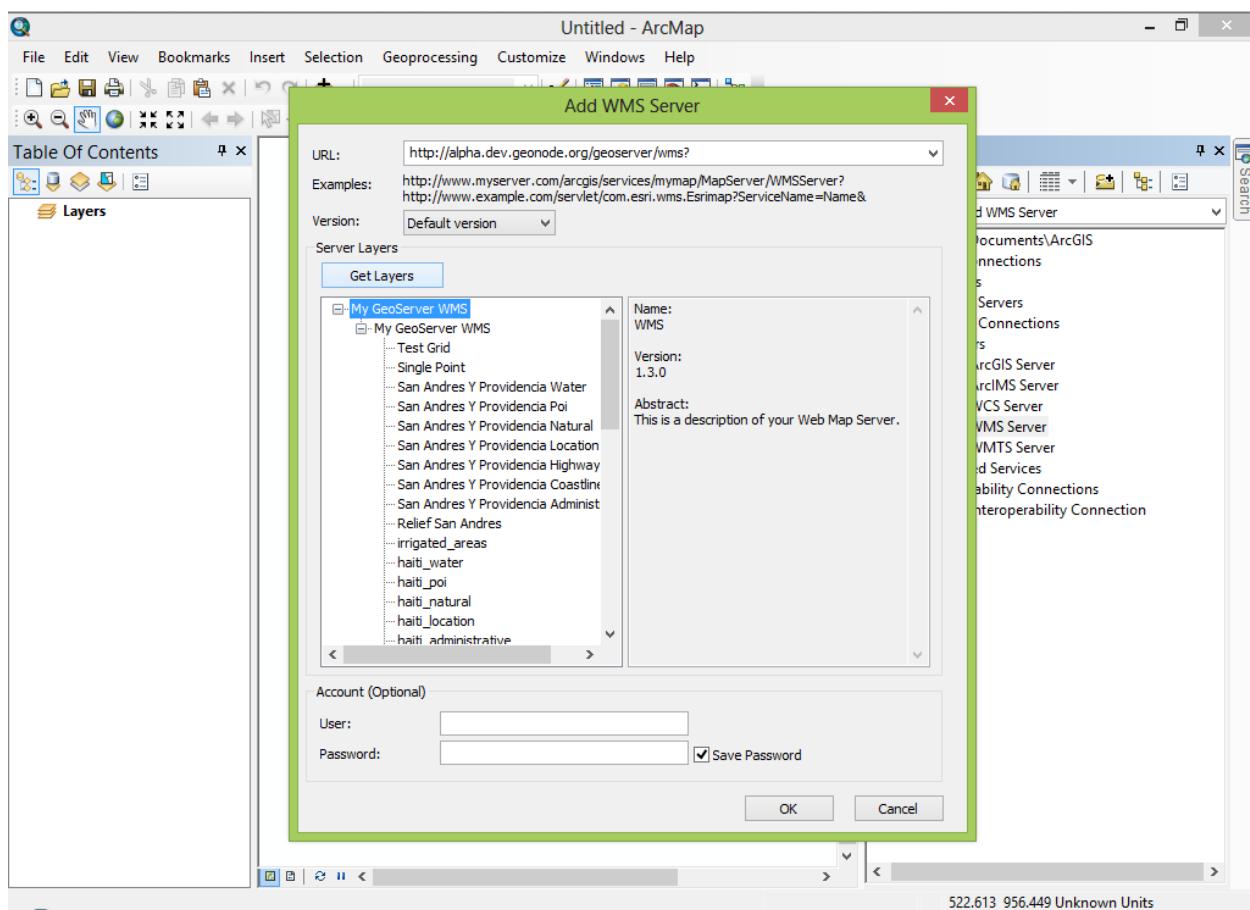
Once the layer is in your projects Table of Contents, you can right click on it and select the Layer Properties option and select the Styles Tab to choose from the available styles for that layer.

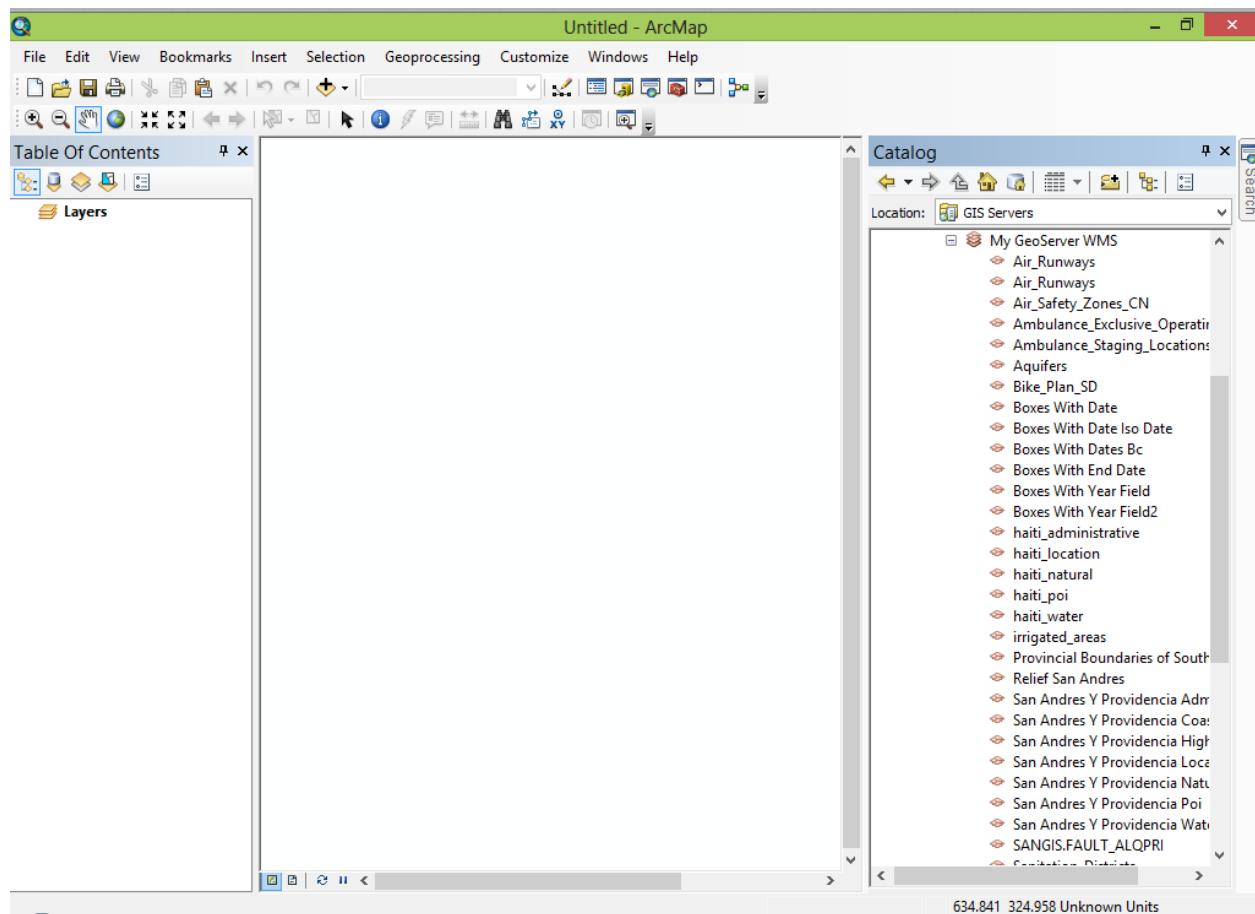


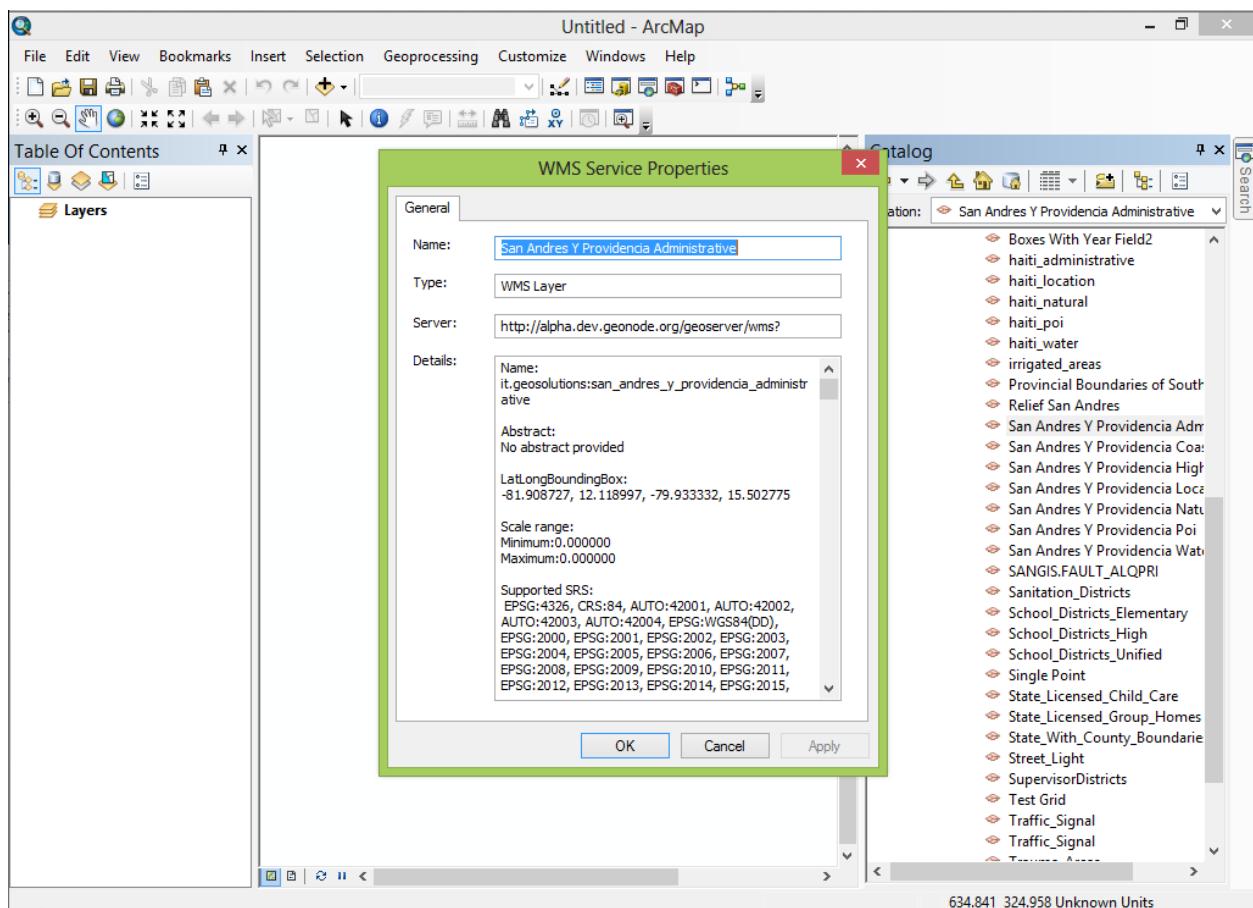


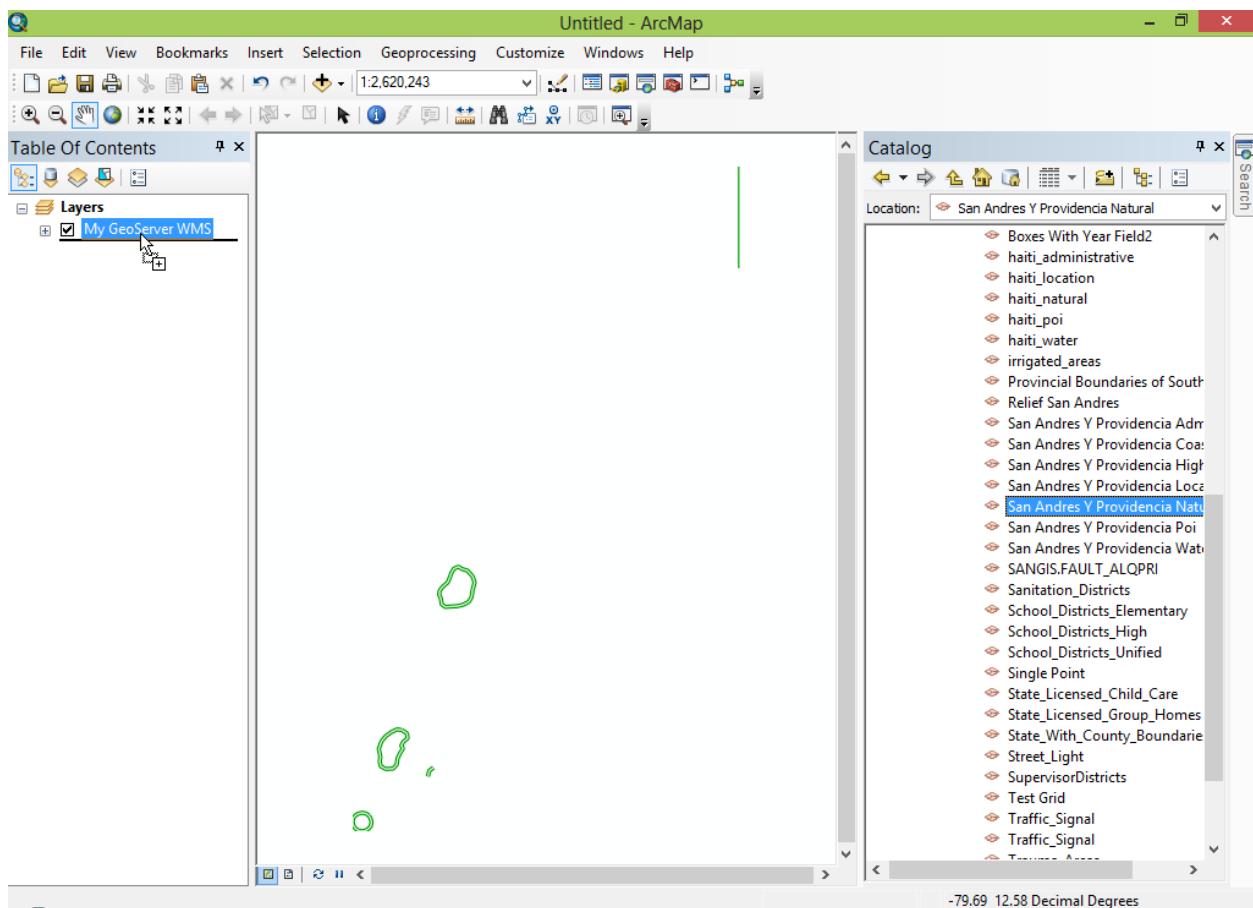


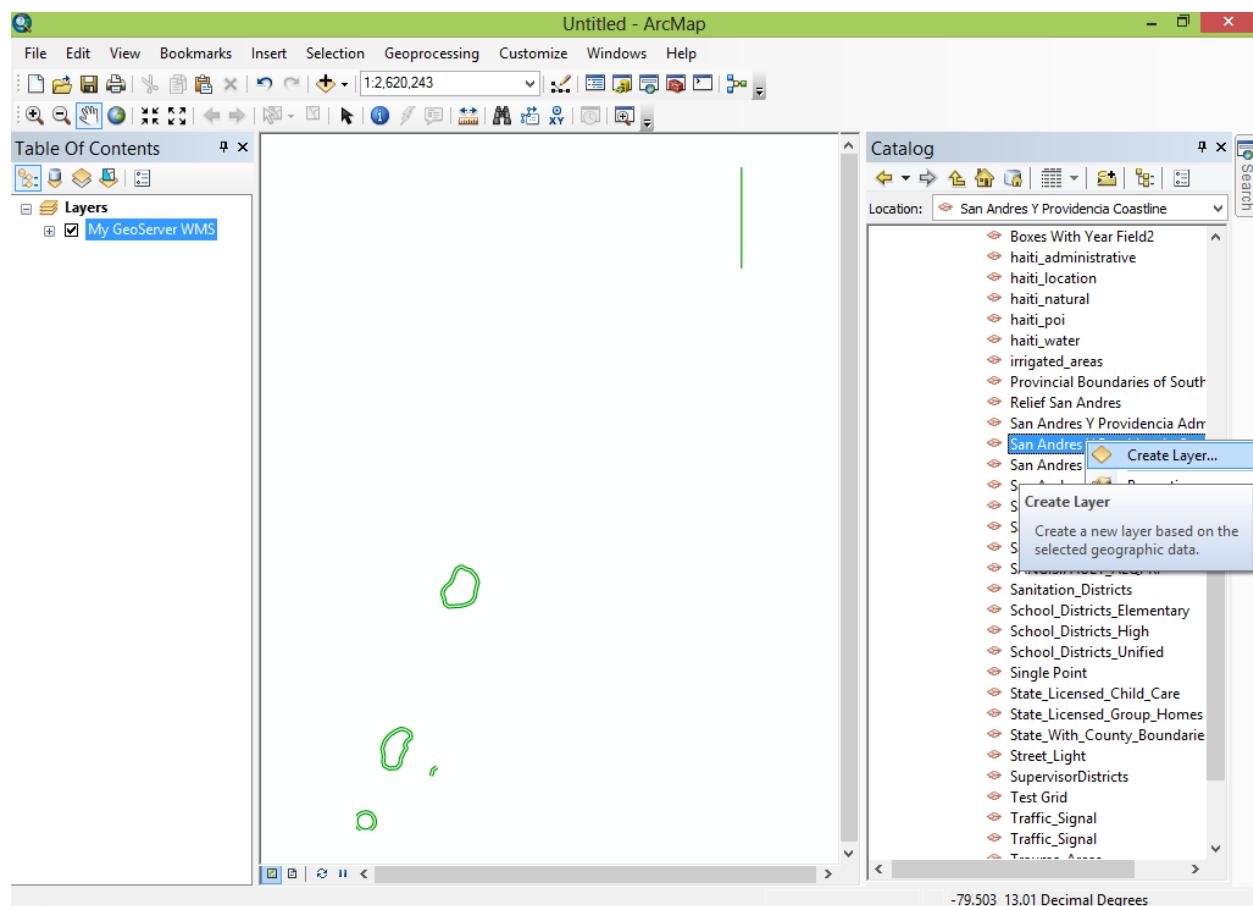


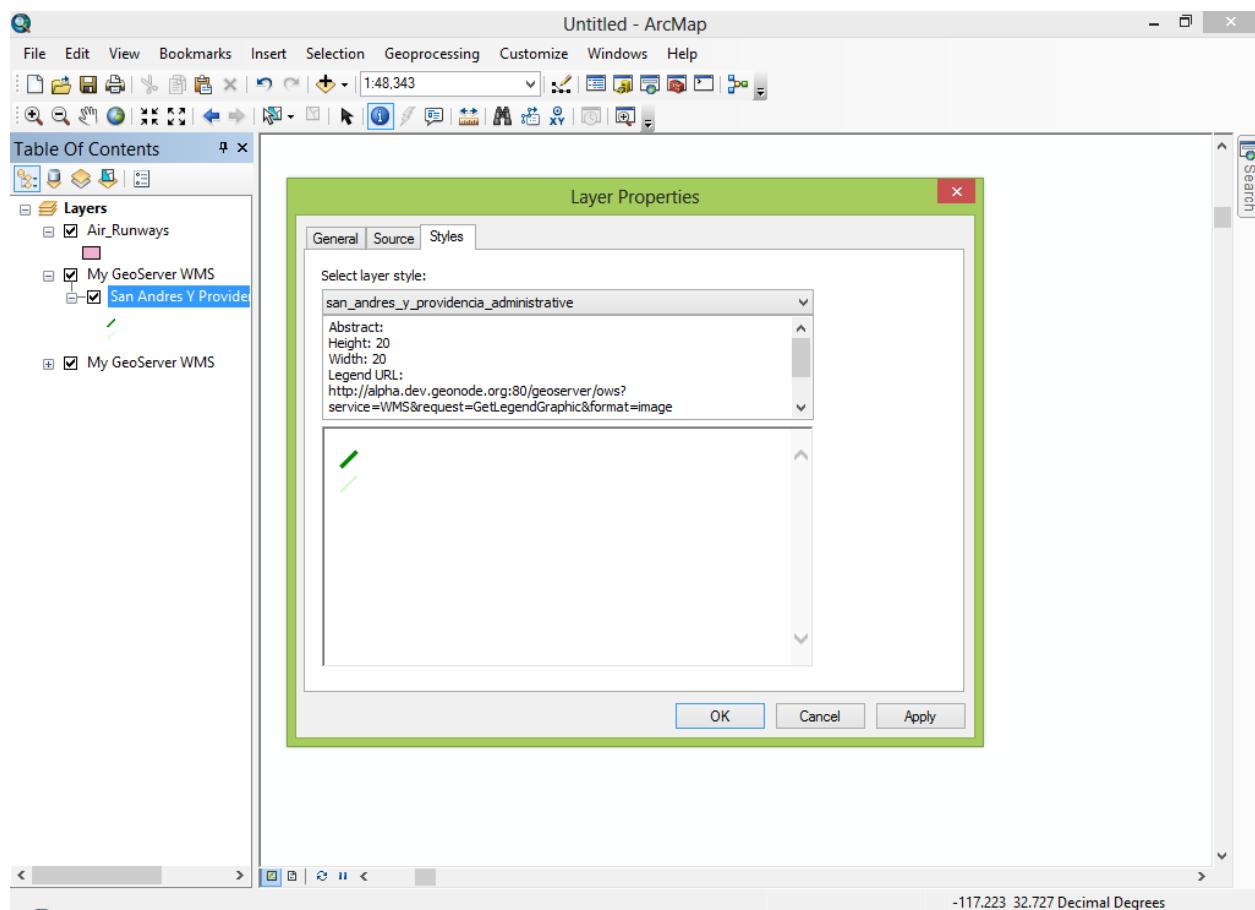












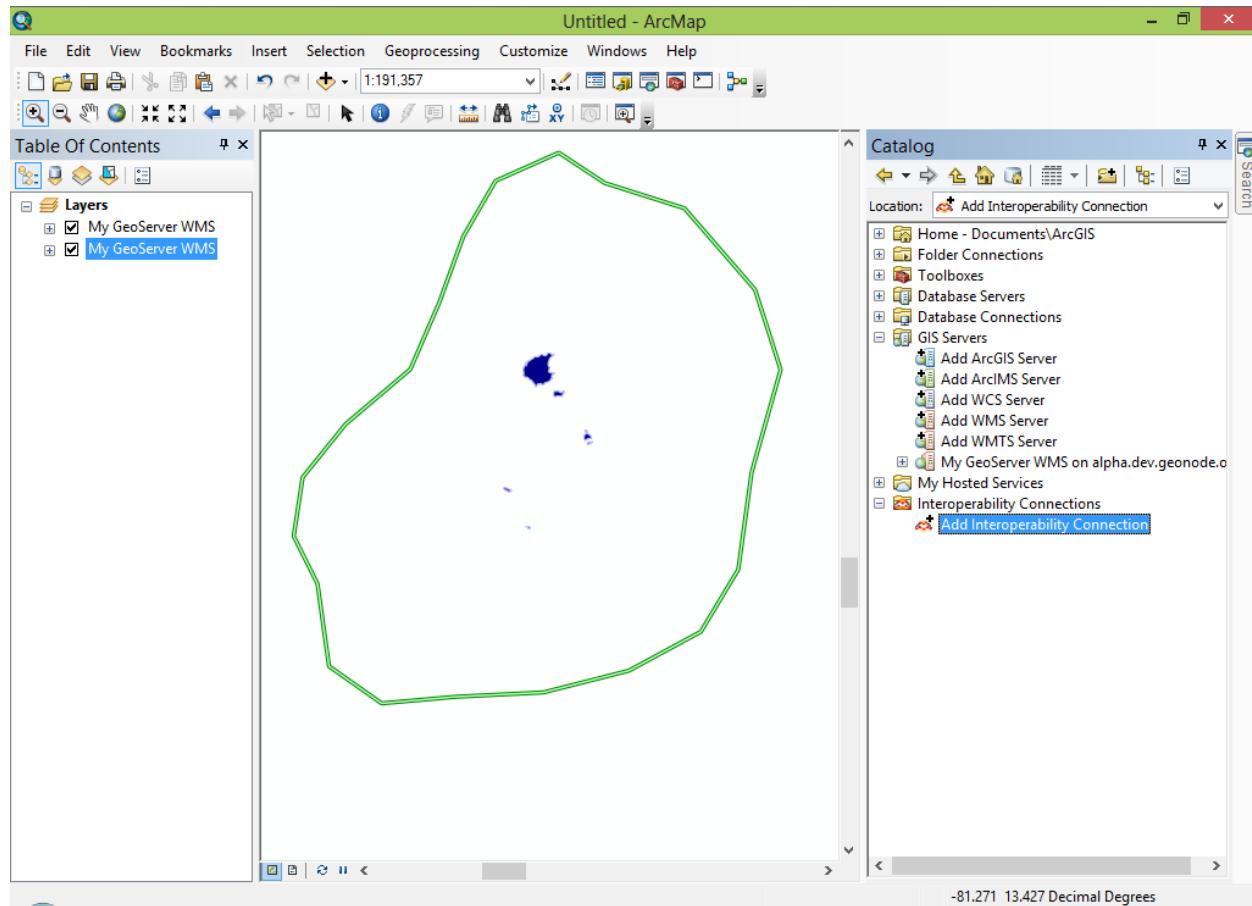
Now that we have seen how to add a WMS layer to our ArcMap project, lets walk through how to add the same layers as a WFS which retrieves the actual feature data from your GeoNode rather than a rendered map as you get with WMS. Adding layers as a WFS gives you more control over how the layers are styled within ArcMap and makes them available for you to use with other ArcGIS tools like the Geoprocessing toolbox.

---

**Note:** Adding WFS layers to ArcMap requires that you have the Data Interoperability Extension installed. This extension is not included in ArcMap by default and is licensed and installed separately.

---

Start by opening up the ArcCatalog Interface within ArcMap and make sure that you have the “Interoperability Connections” option listed in the list.



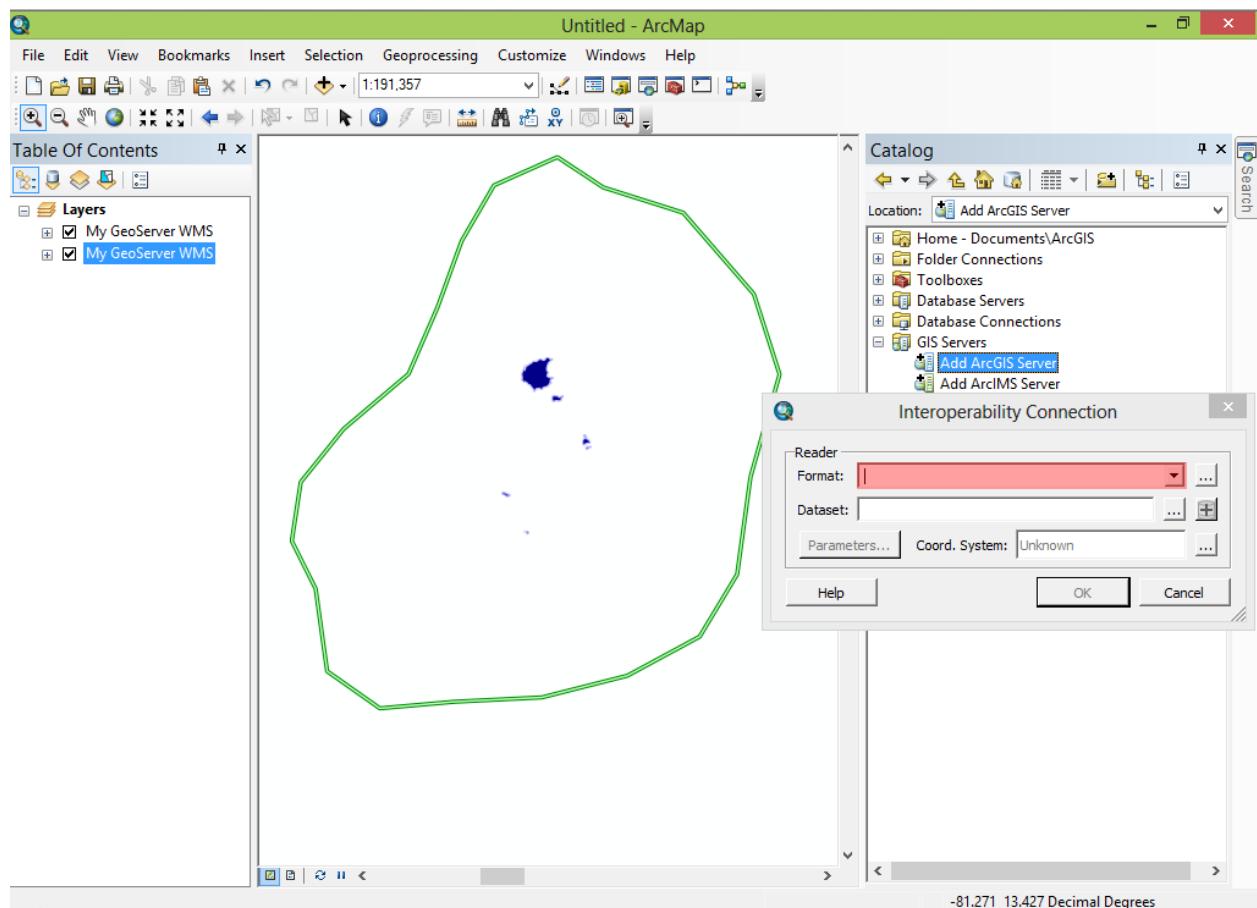
Next select “Add Interoperability Connection” to bring up the dialog that lets you add the WFS endpoint from your GeoNode.

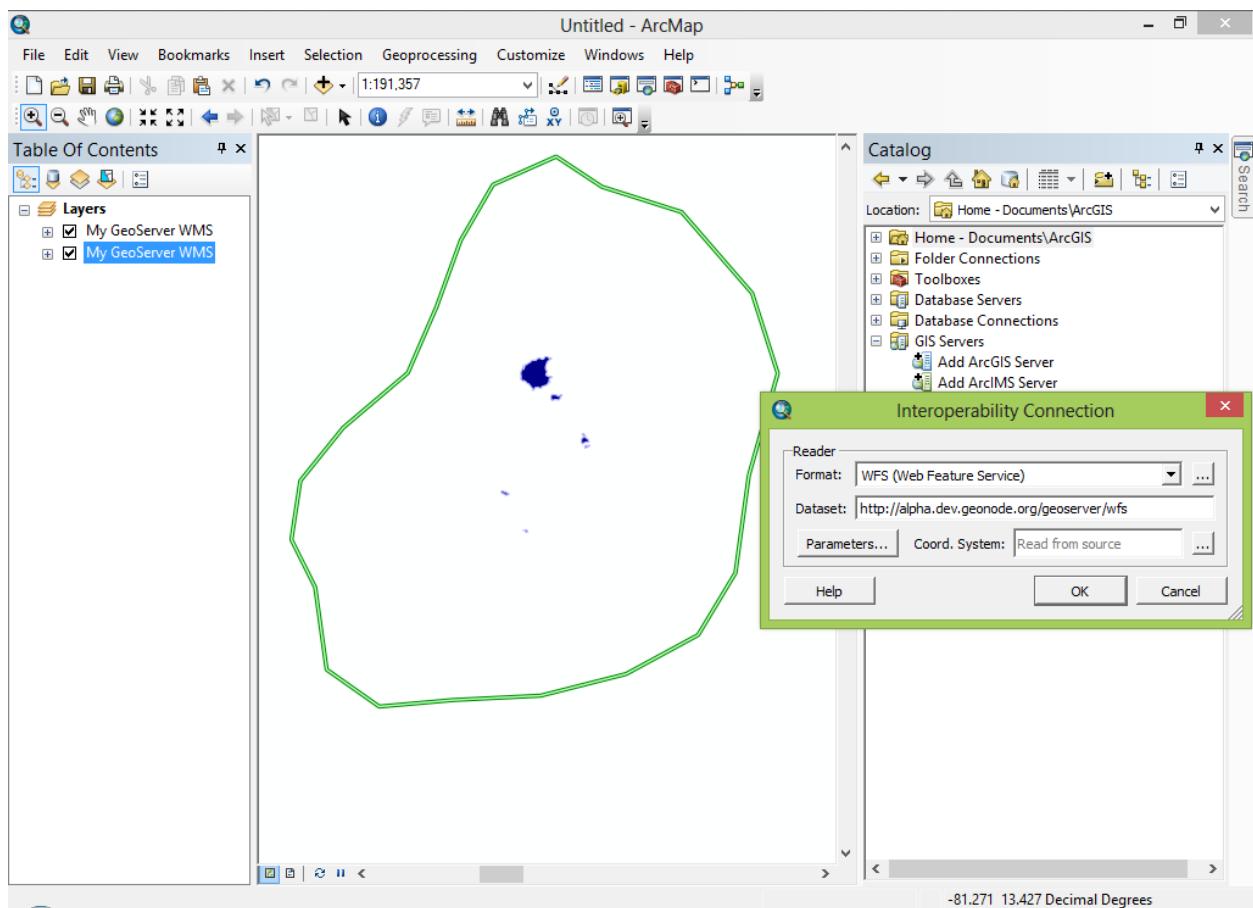
Select “WFS (Web Feature Service)” in the Format dropdown and enter the URL to the WFS endpoint for your GeoNode in the Dataset field. The WFS endpoint is your base URL + /geoserver/wfs

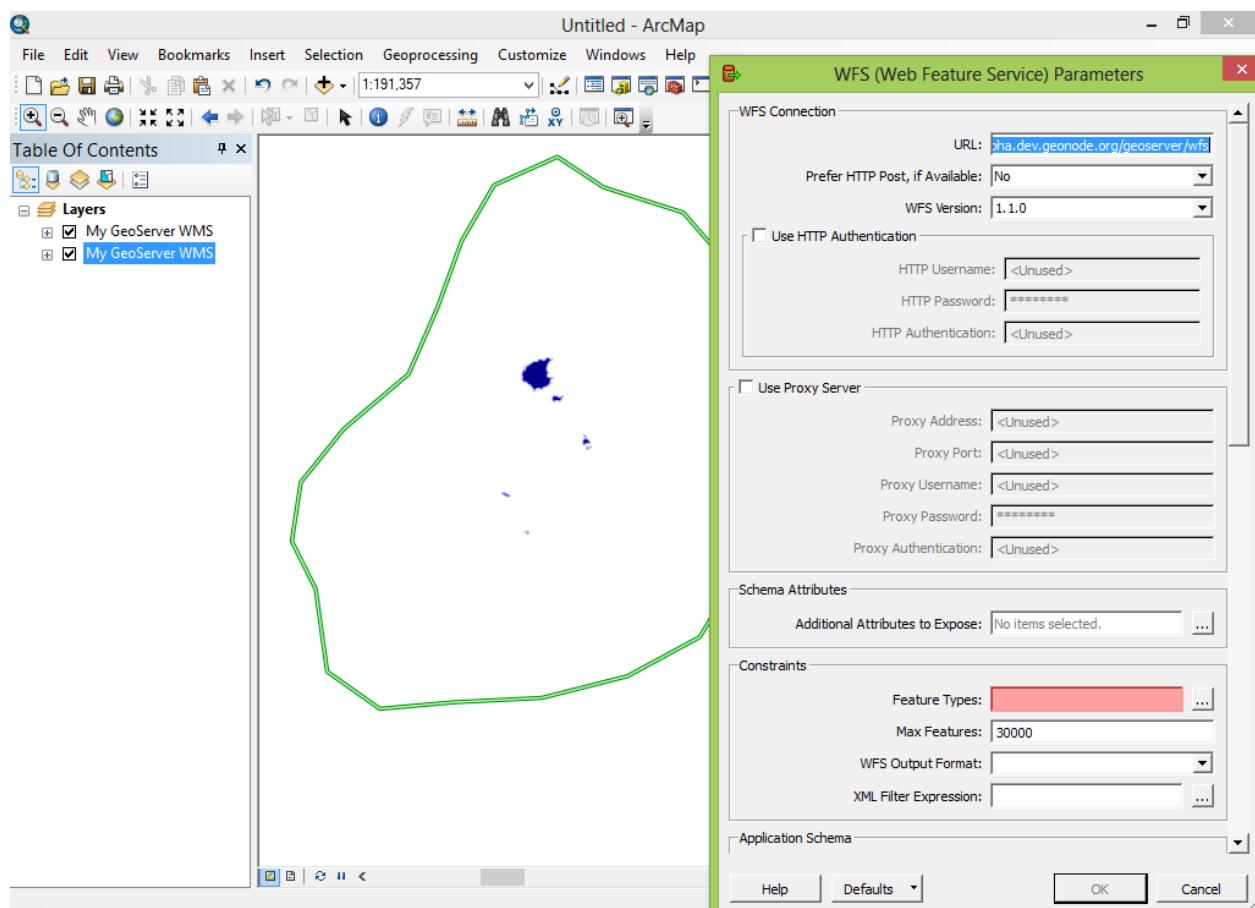
You will need to click the “Parameters” button to supply more connection information including your credentials which will give you the ability to use private layers that you have access to.

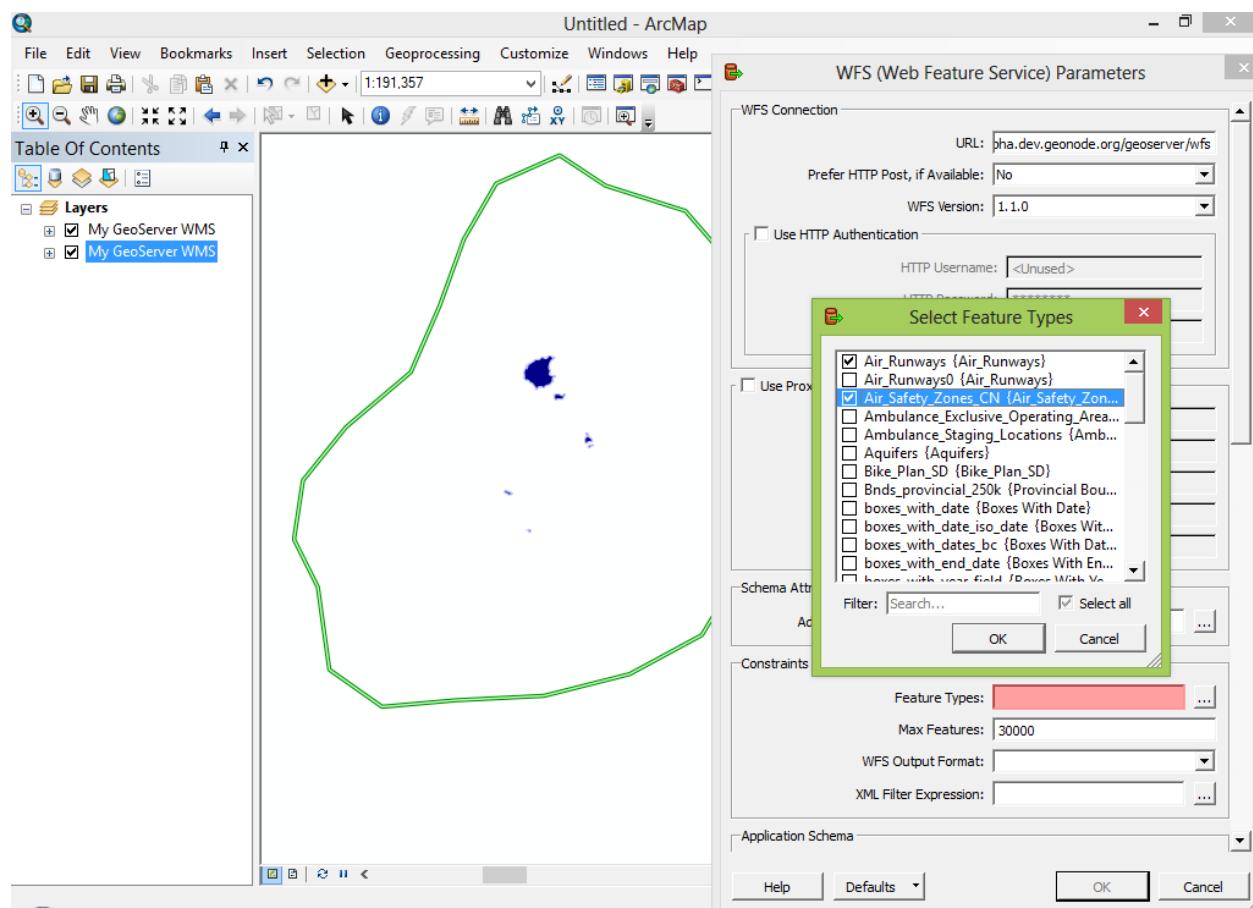
Select the Feature Types button to have ArcMap get a list of layers from the WFS Service of your GeoNode.

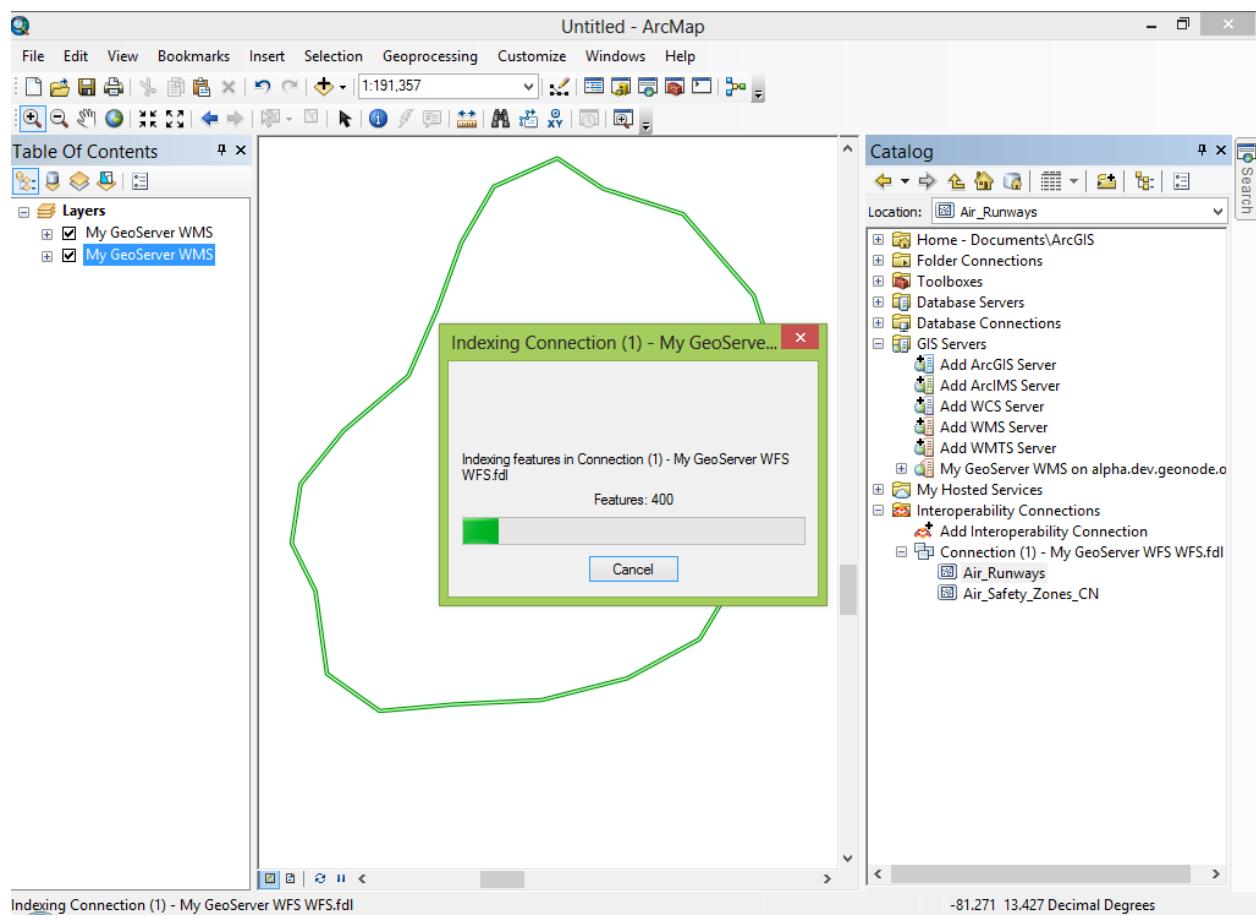
Select the layers that you want to add and click OK and ArcMap will import the features from your GeoNode into the system.



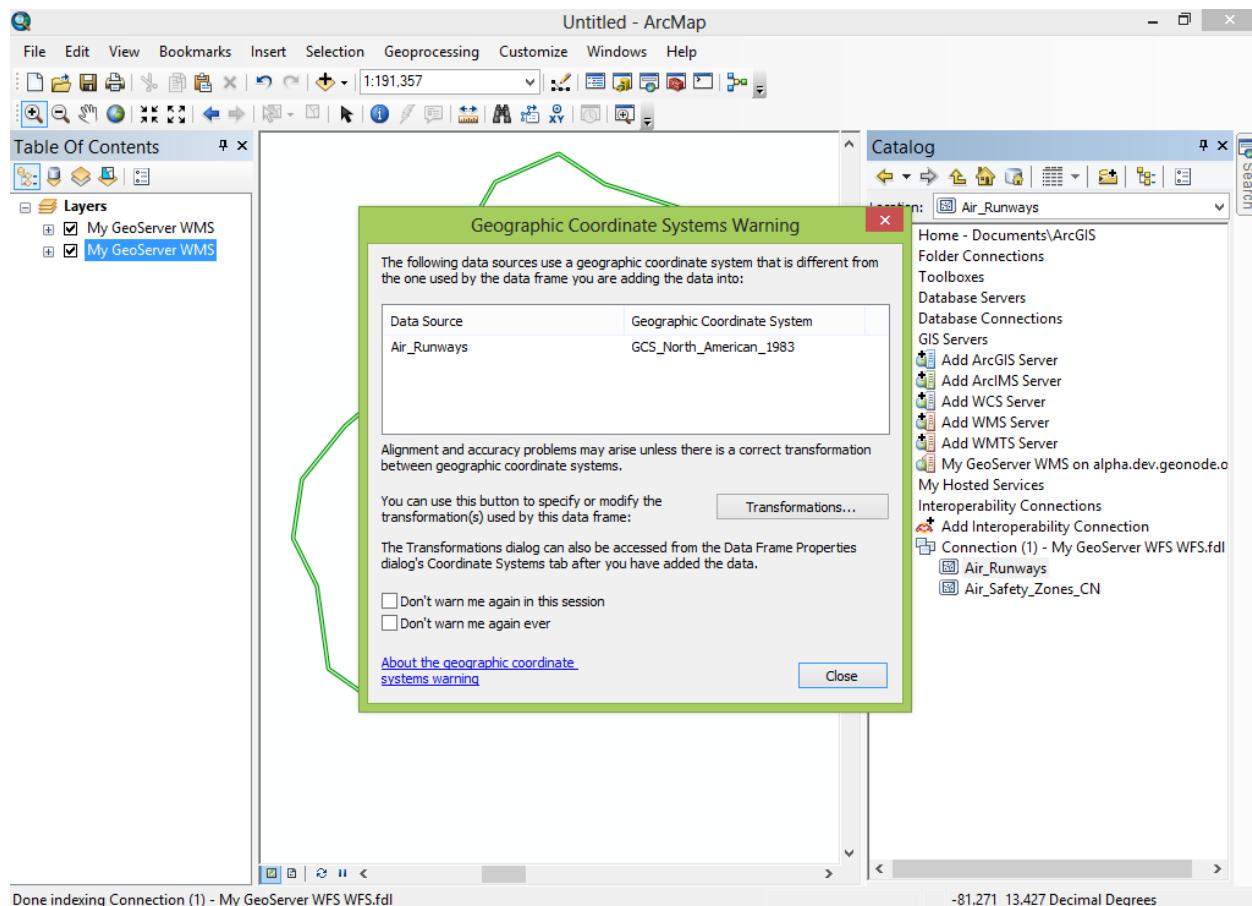








Depending on the projection of your data, you may receive a warning about Alignment and Accuracy of data transformations. You can specify the transformation manually or simply hit close to ignore this dialog. If you don't want to be warned again, use the checkboxes in this dialog to hide these warnings temporarily or permanently.



Your WFS Layer will be added to your map and you can view it in the Map Panel. If you need to, use the “Zoom to Layer Extent” or other zoom tools to zoom to the bounds of your layer.

You can now use the identify tool to inspect a feature in your layer, or perform any other function that you can normally use to work with Vector Layers in ArcMap.

Since your layer was imported as actual vector features, you can use normal ArcMap styling tools to style the layer to match how you want it to be displayed.

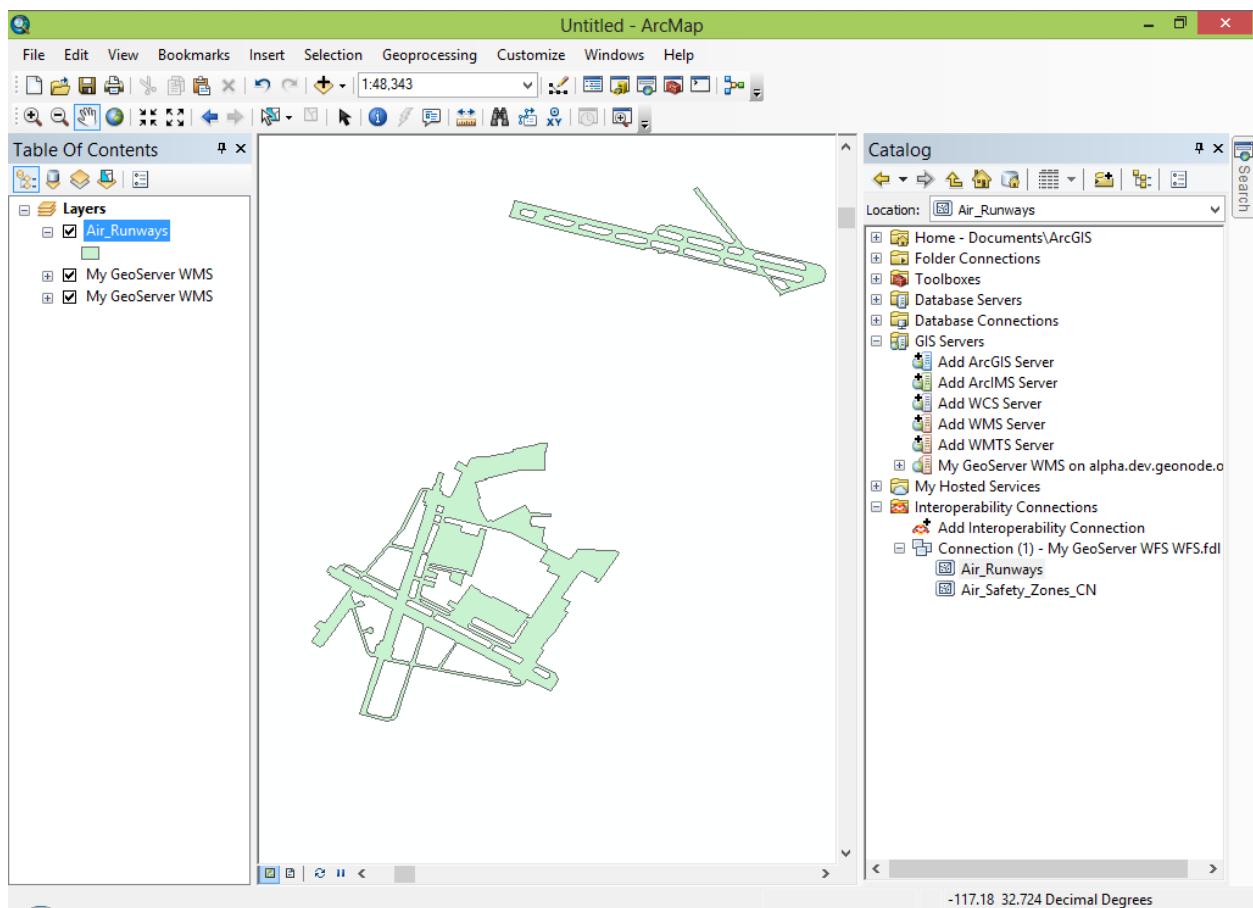
Now that you have added layers from your GeoNode as both WMS and WFS, you can explore the other options available to you with these layers within ArcMap.

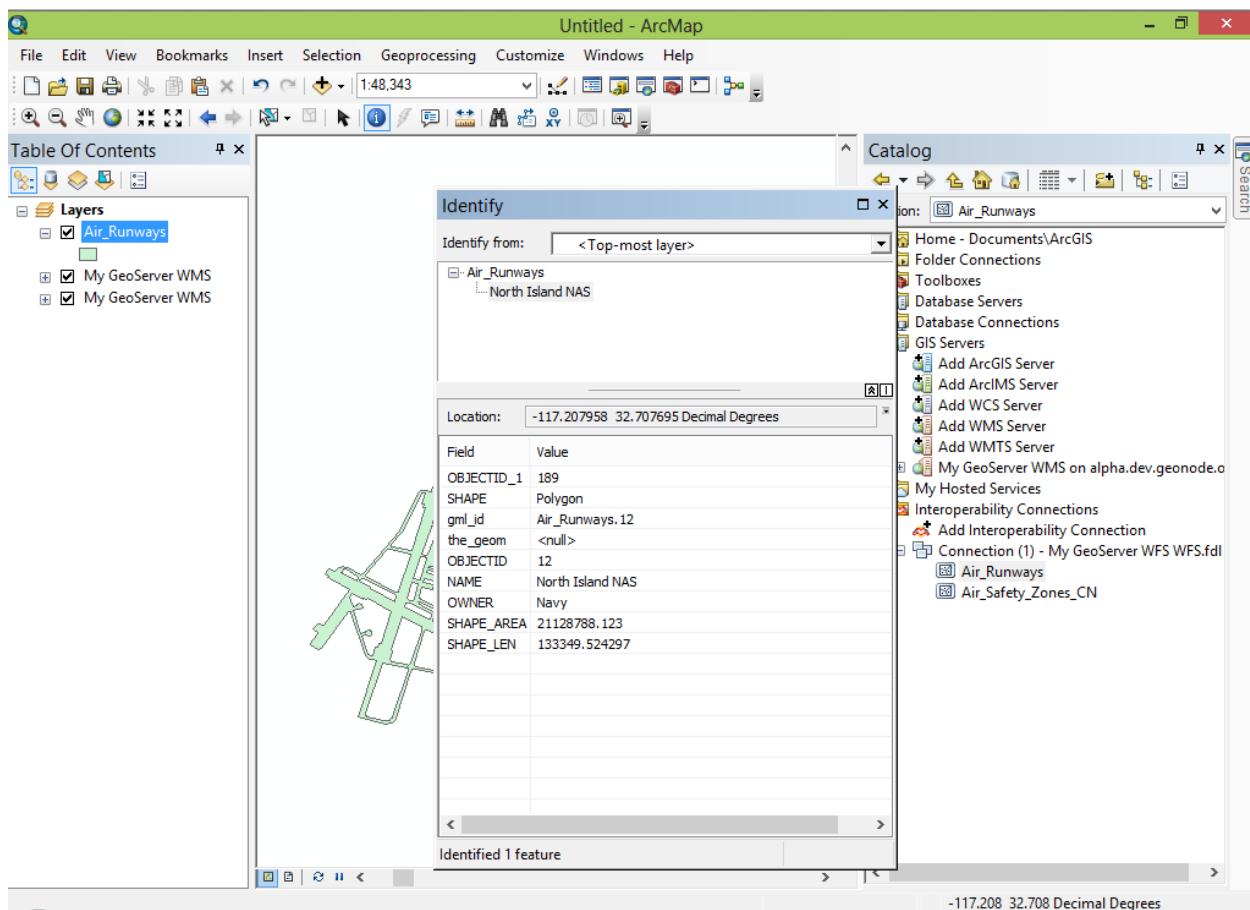
### 3.5.3 QGIS

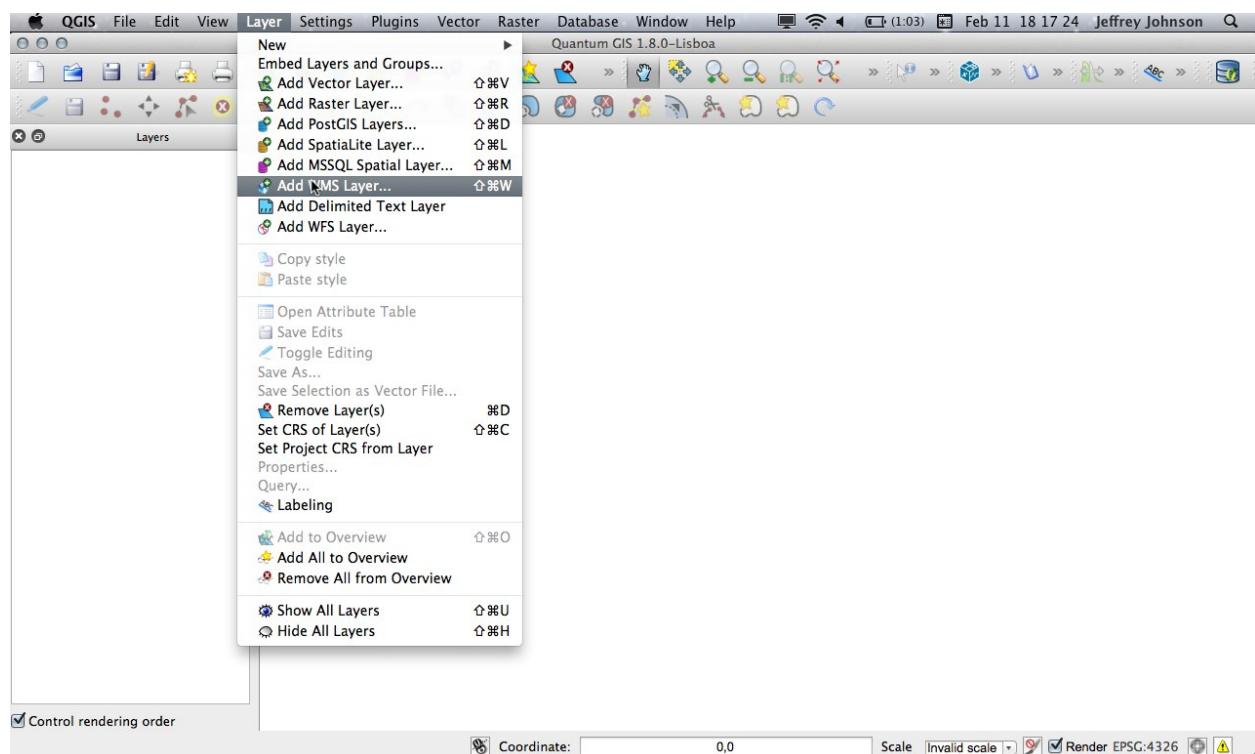
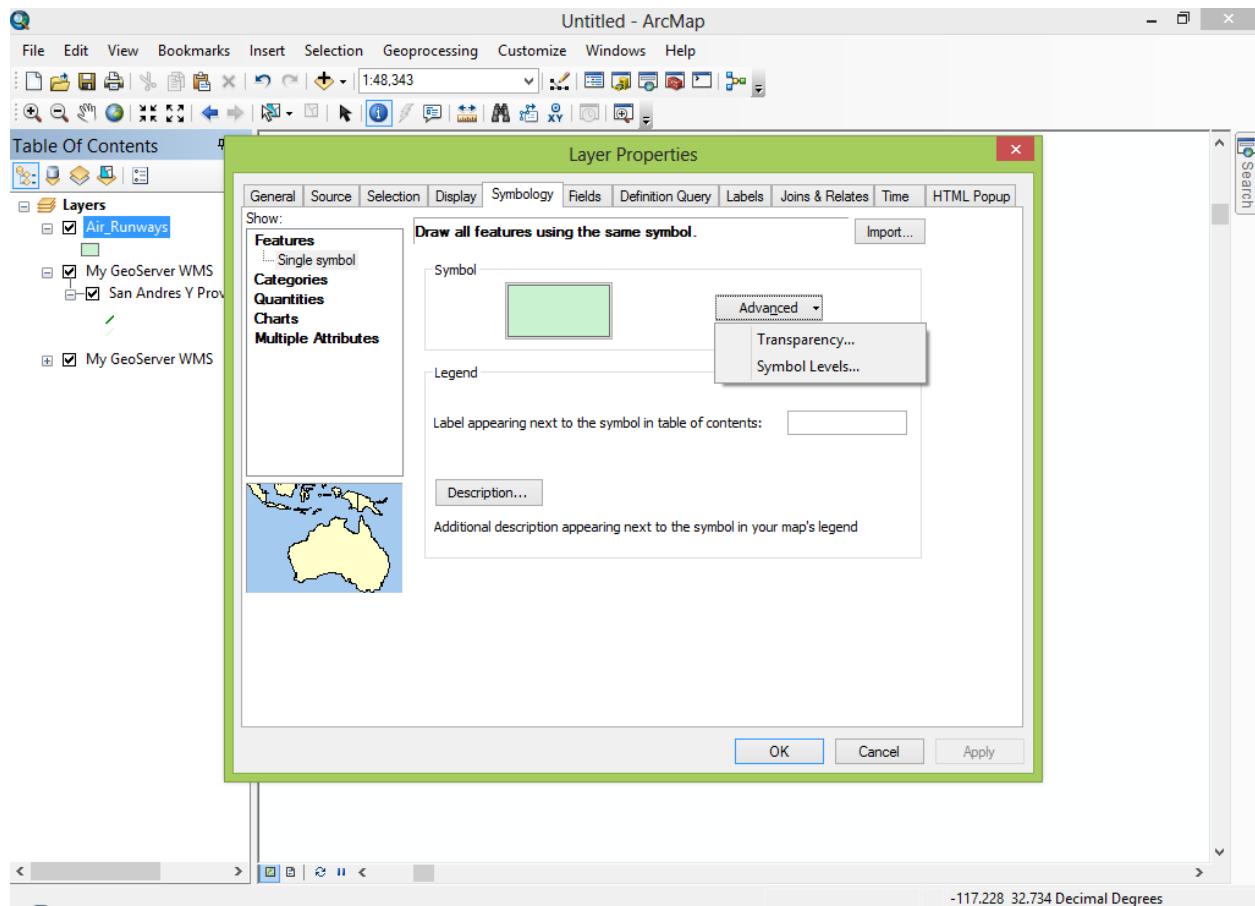
Quantum GIS or qGIS is an open source, cross platform desktop GIS app. It can also be used to add layers from your GeoNode instance as WMS or WFS. The process is very similar to how we add these same layers to ArcMap, and we will walk through the steps necessary in the following section.

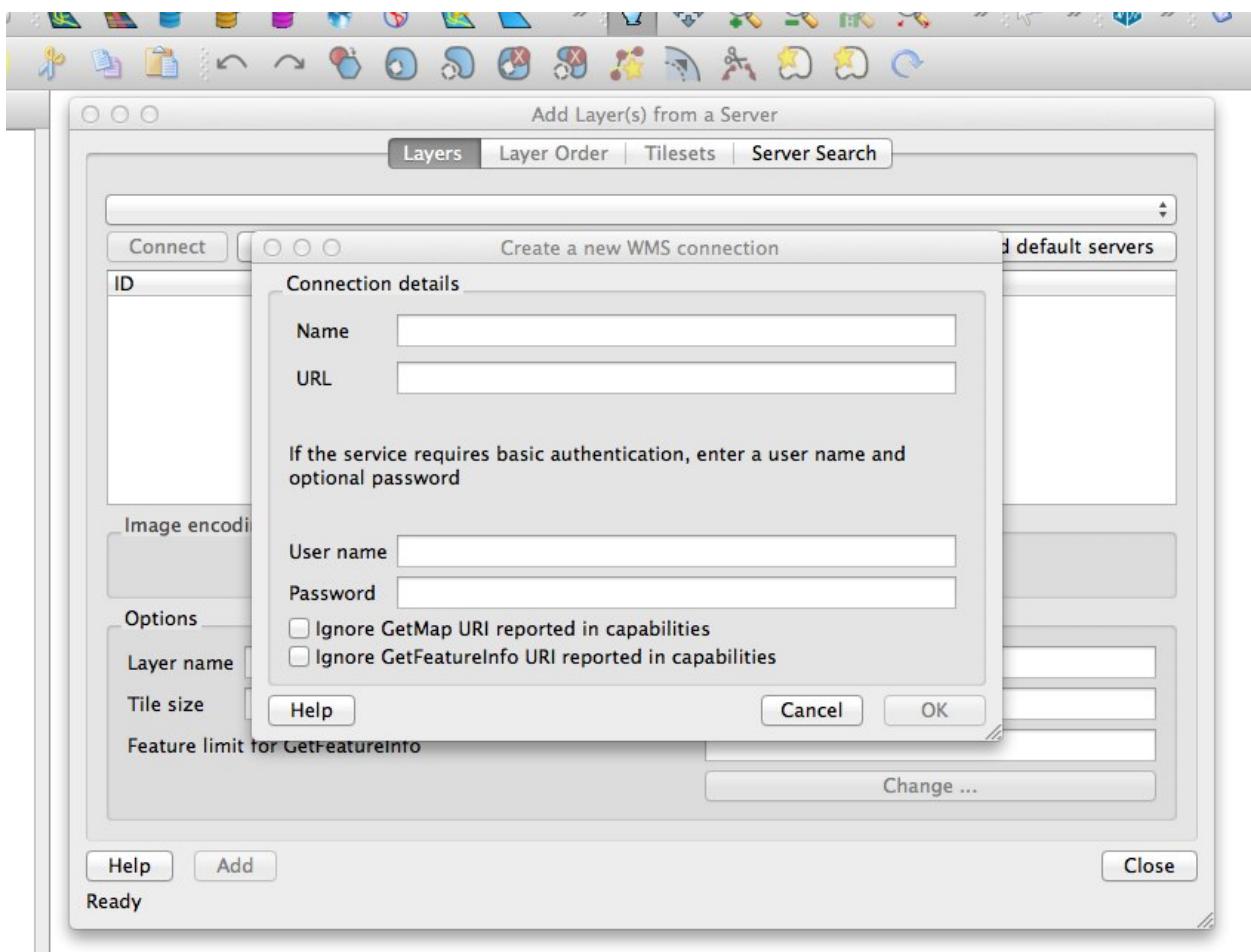
First, select “Add WMS Layer” from the Layer menu.

The Add WMS Layer Dialog will be displayed where you are able to specify the parameters to connect to your WMS server.

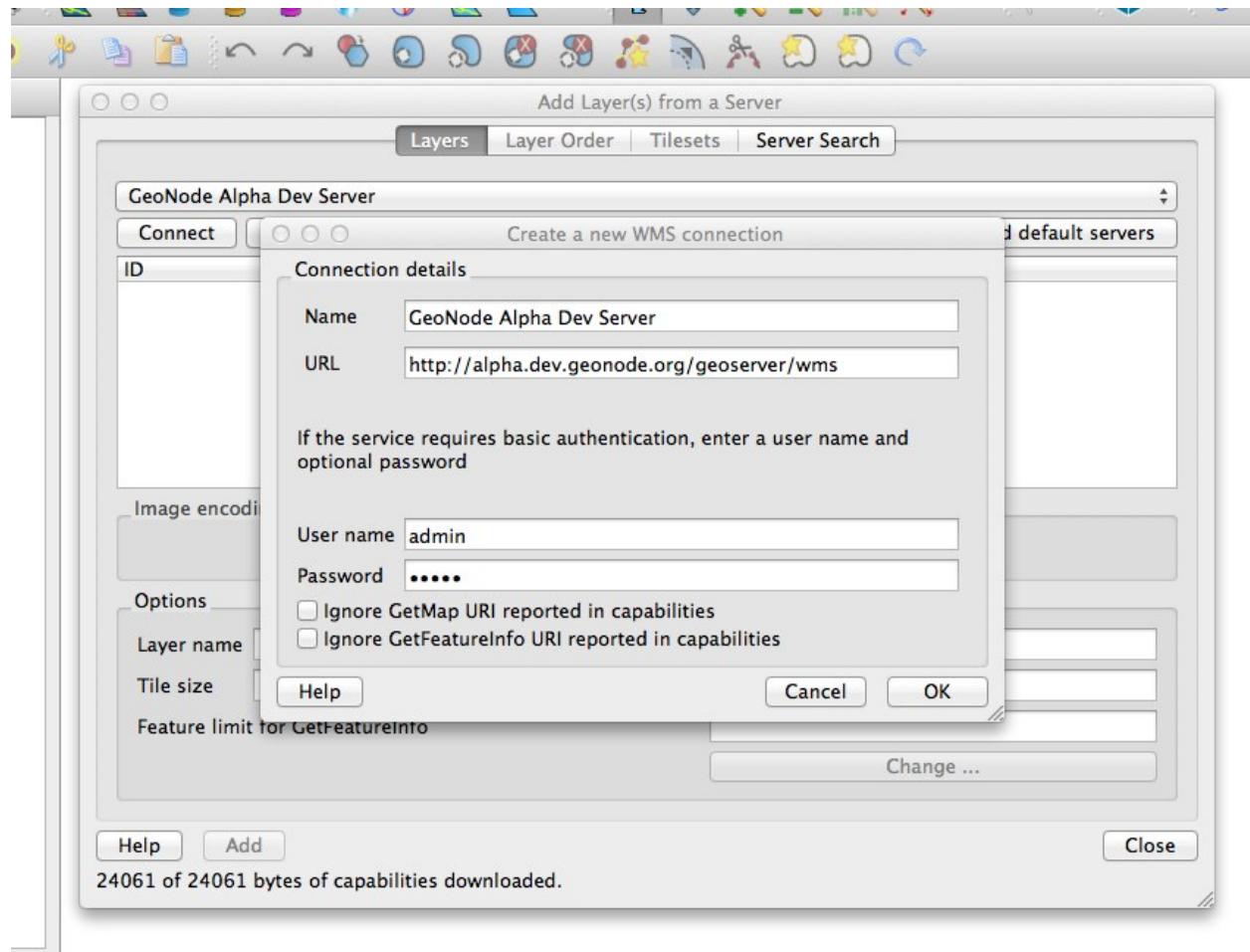








Next, you need to fill in the parameters to connect to your GeoNode instance. The URL for your GeoNode's WMS is the base URL + /geoserver/wms



After clicking the OK button, your server will show up in the list of servers. Make sure its selected, then, click the connect button to have QGIS retrieve the list of layers from your GeoNode.

Select the layers you want to add to your QGIS project and click "Add".

Your layer will be displayed in the map panel.

You can then zoom into your features in the Map.

From there, you can use the identify tool to inspect the attributes of one of the features on the map.

Or, you can look at the layer metadata by right clicking on the layer and selecting Layer Properties and selecting the metadata tab.

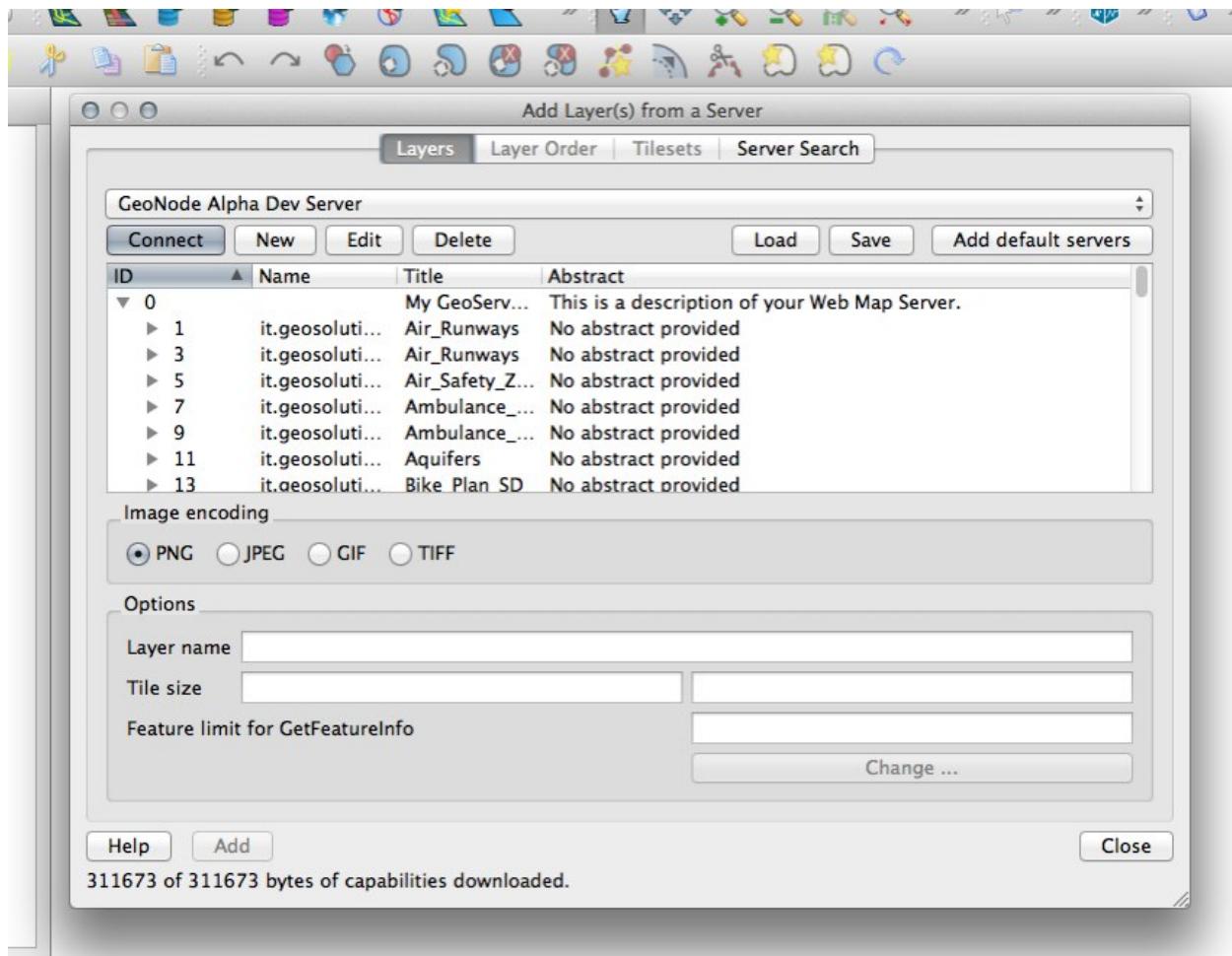
Adding WFS servers and layers to your QGIS project is very similar to adding WMS. Depending on your version of QGIS, you may need to add the WFS plugin. You can use the Plugin manager to add it.

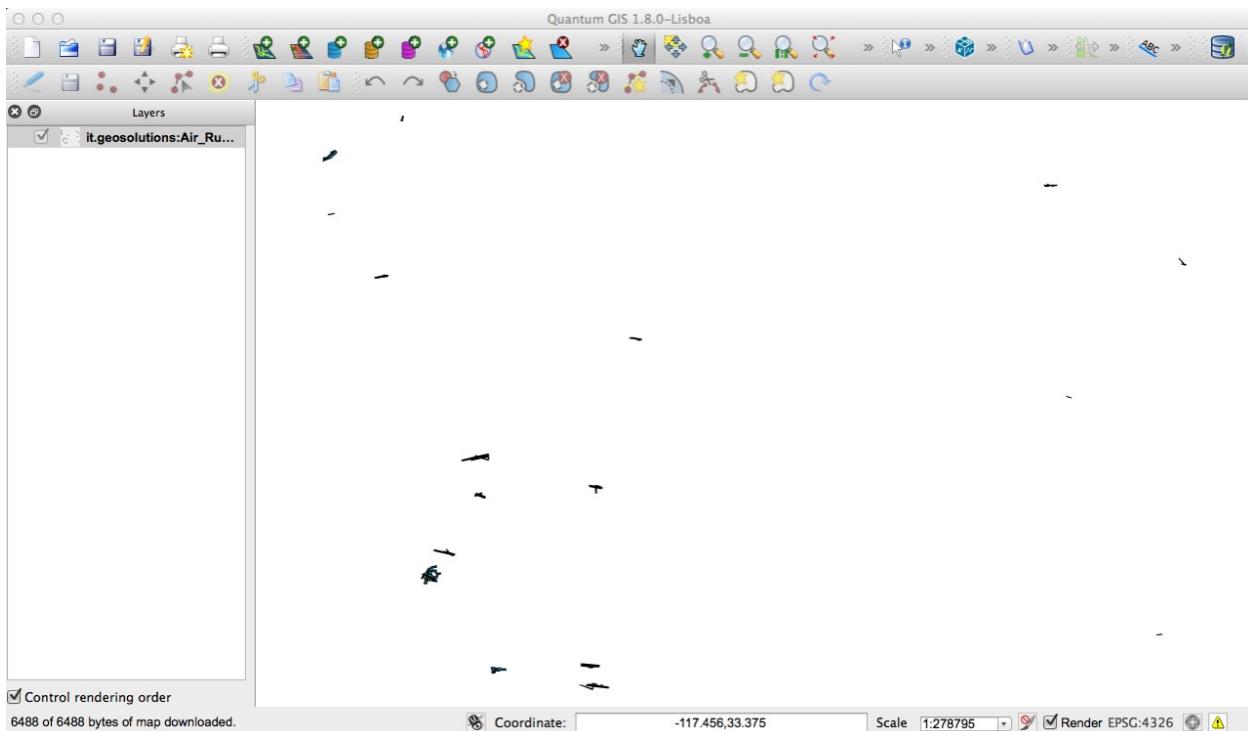
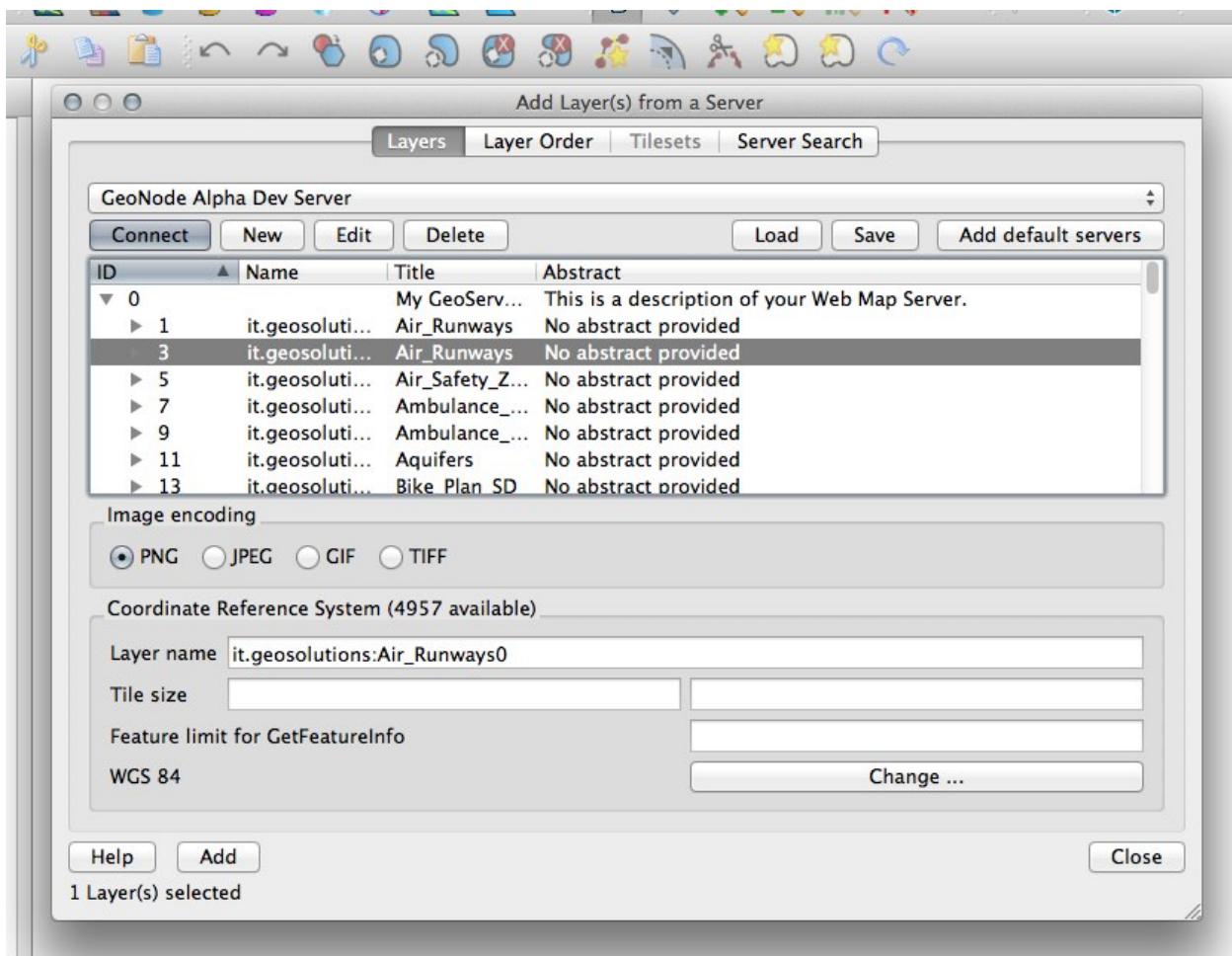
Once the plugin is installed, you can select the "Add WFS Layer" option from the Layer menu.

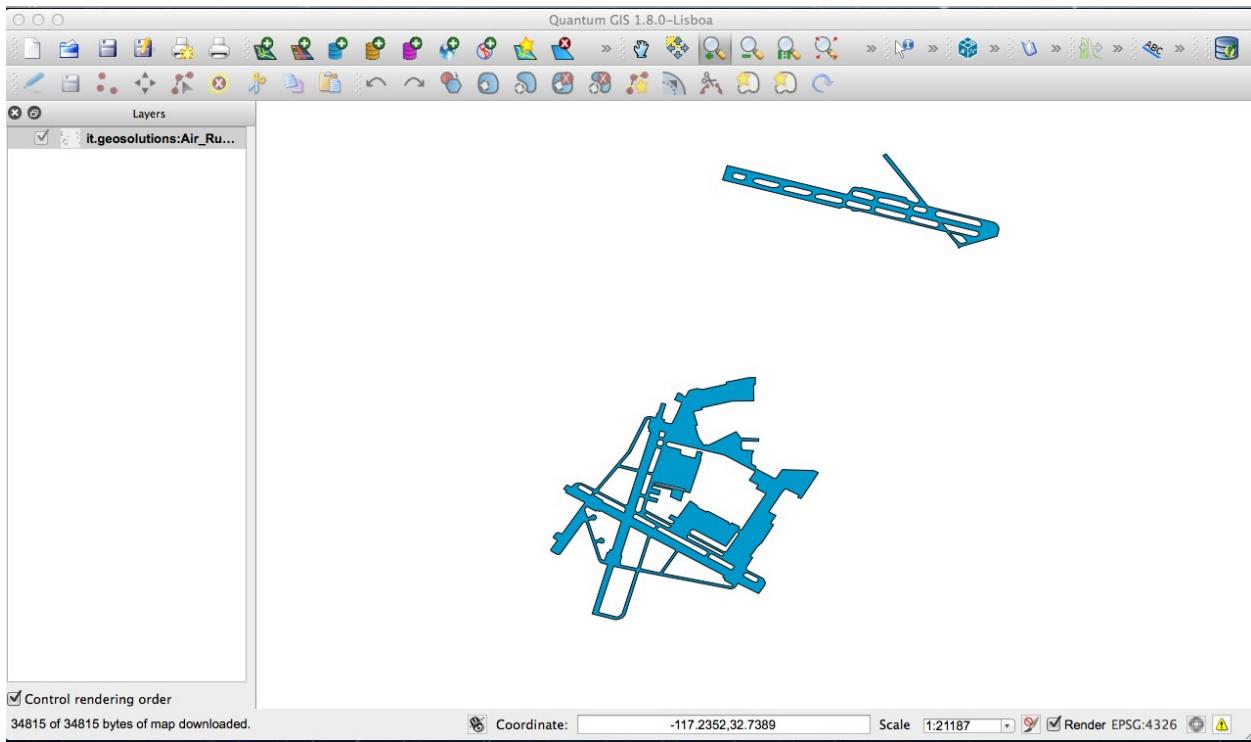
Step through the same process you did for WMS to create a new WFS connection. First specify server parameters and click OK.

Then click Connect to retrieve the list of layers on the server and select the layers you want to add and click Apply.

The layer(s) you selected will be displayed in the map panel.







You can use the same identify tool to inspect features in the map panel.

To look at more information about your layer, right click the layer in the Table of Contents and select Layer Properties. You can look at the list of fields.

... or set a style to match how you want your data to be displayed.

You now know how to add layers from your GeoNode instance to a QGIS project. You can explore all of the other options available to you in QGIS by consulting its documentation.

### 3.5.4 Google Earth

GeoNode's built in map interface lets you look at your layers and maps in the Google Earth plugin directly in your browser. You can switch to this 3D viewer directly in GeoNode by clicking the google earth icon in the map panel.

GeoServer will render your layer as an image until you are zoomed in sufficiently, and then it will switch to rendering it as a vector overlay that you can click on to view the attributes for the feature you clicked on.

You can also use this option in the GeoExplorer client by clicking the same button.

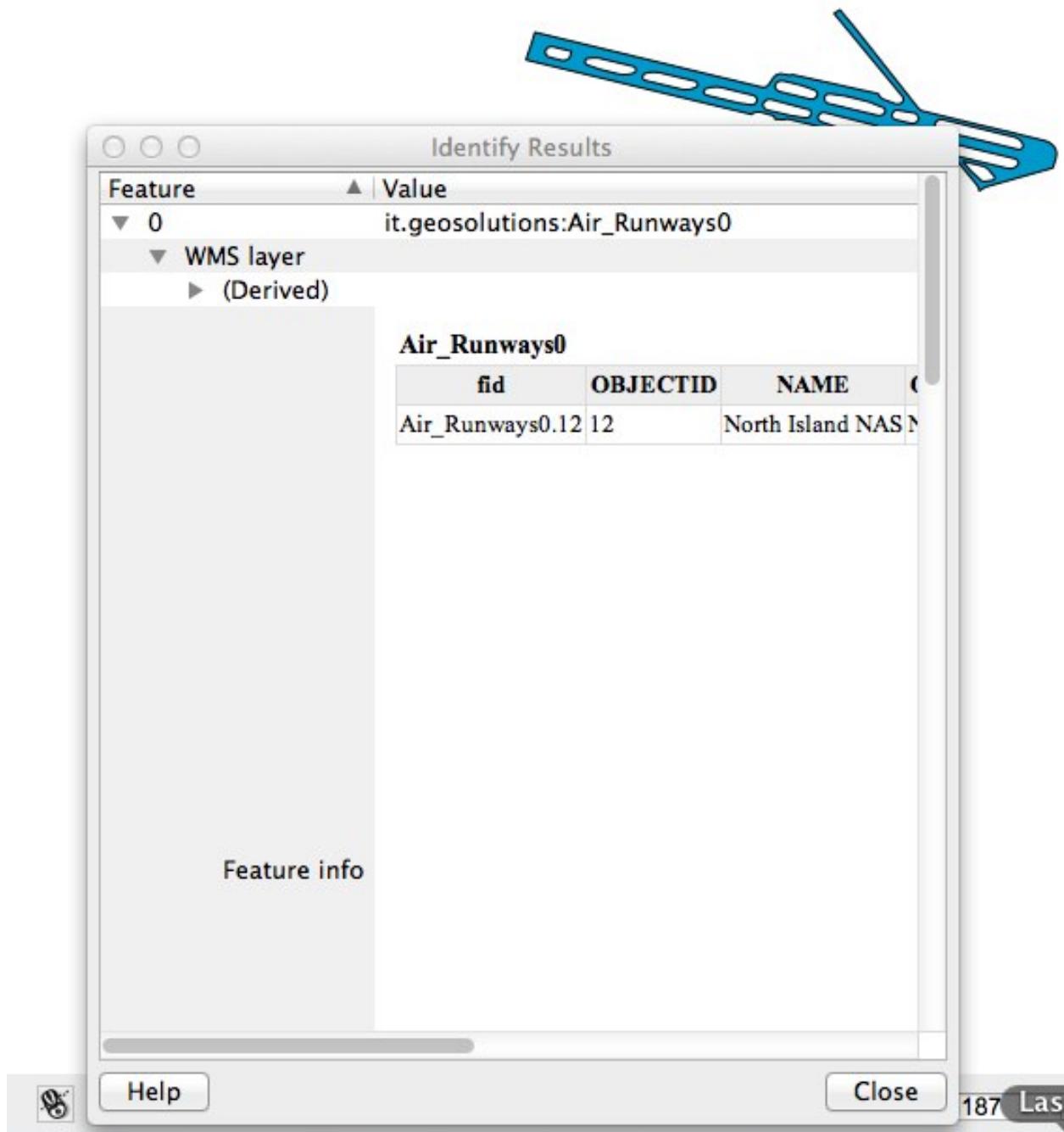
---

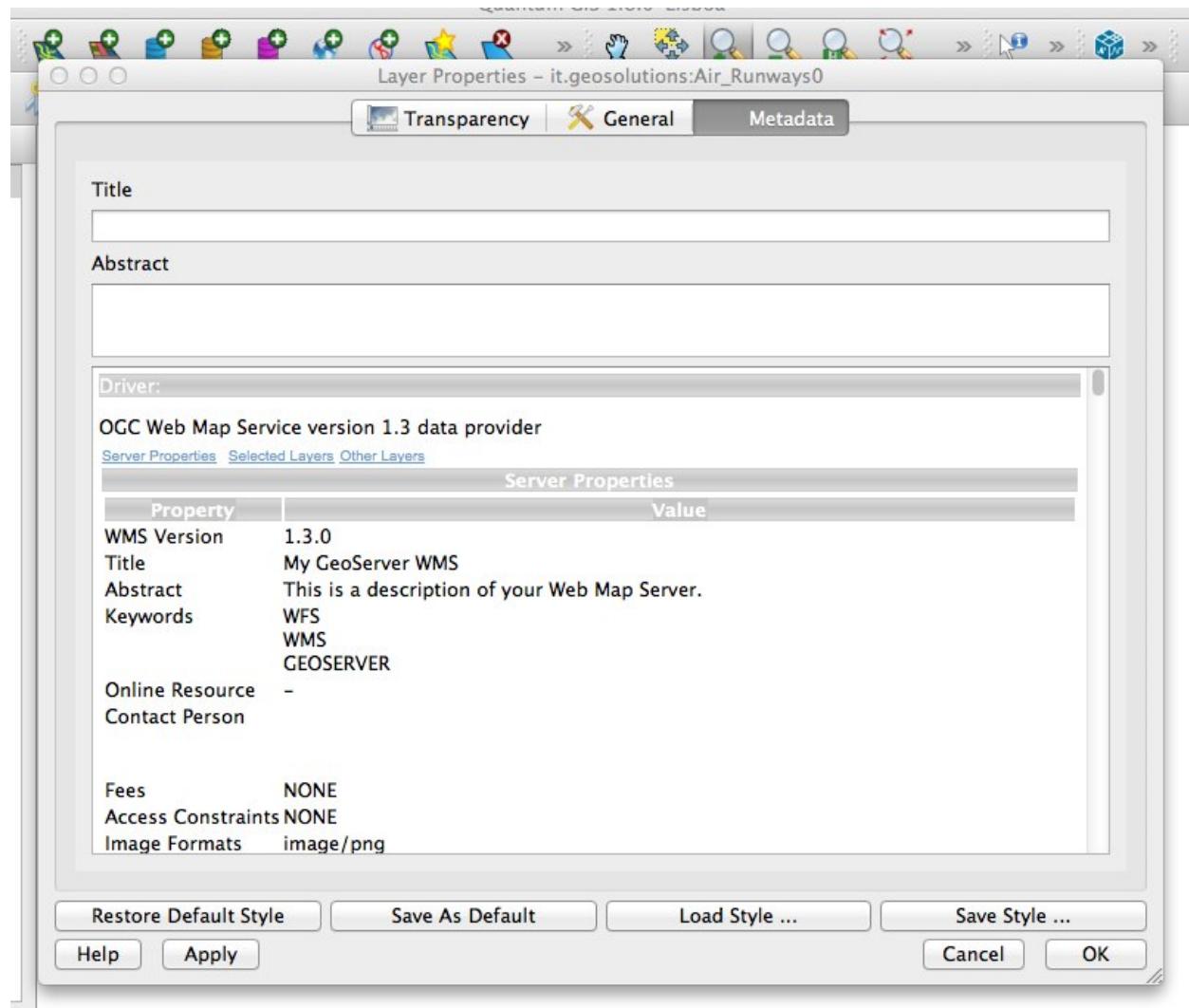
**Note:** Some of the GeoExplorer options will not be available to you when you are in this mode, they will be grayed out and inaccessible.

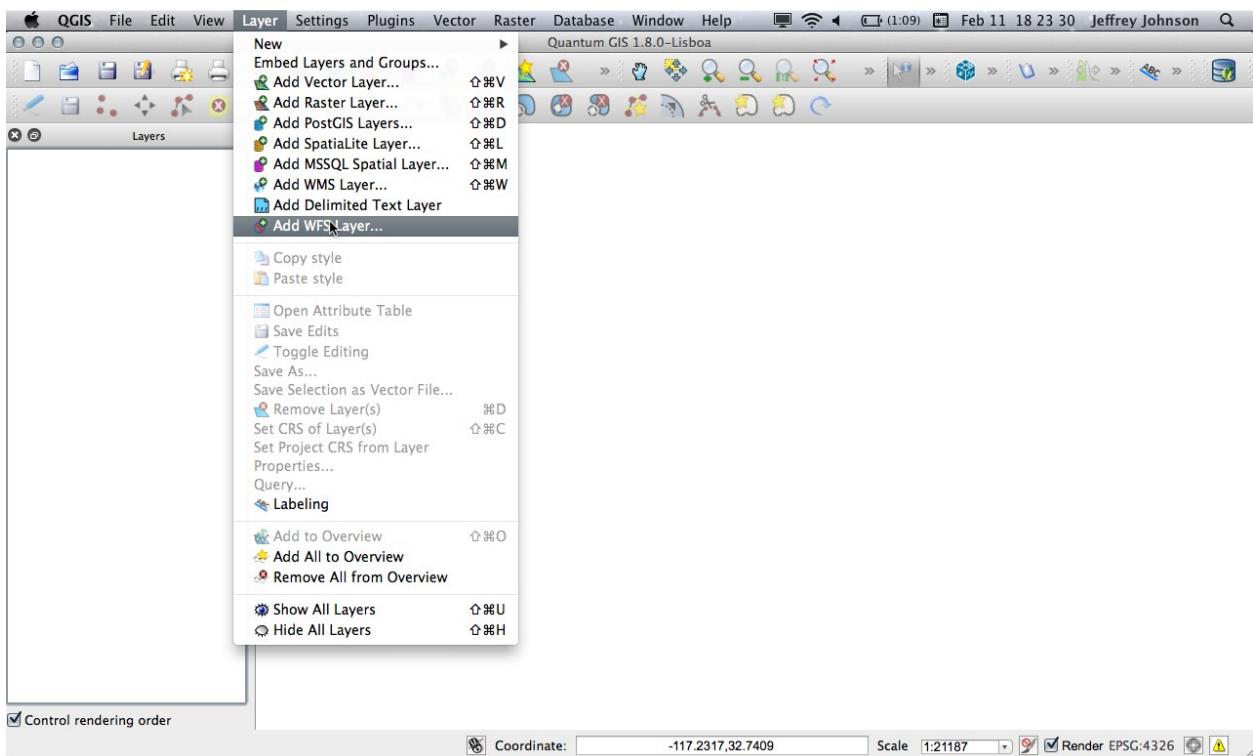
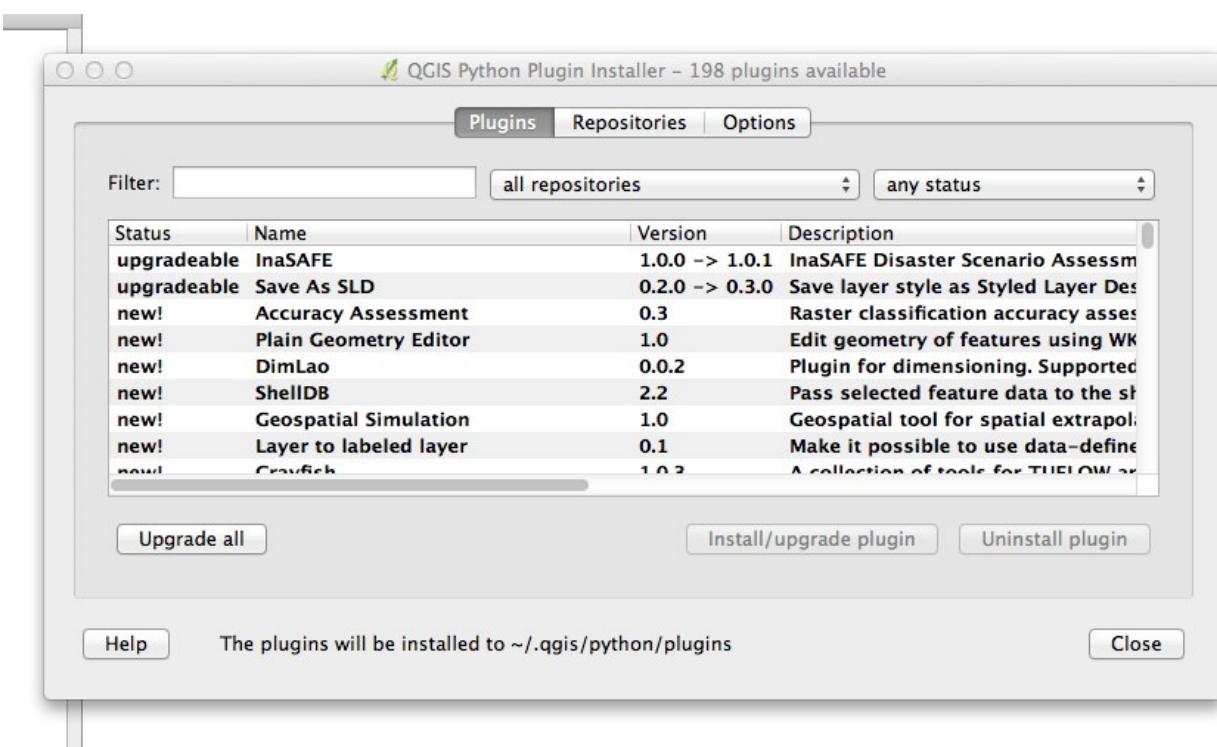
---

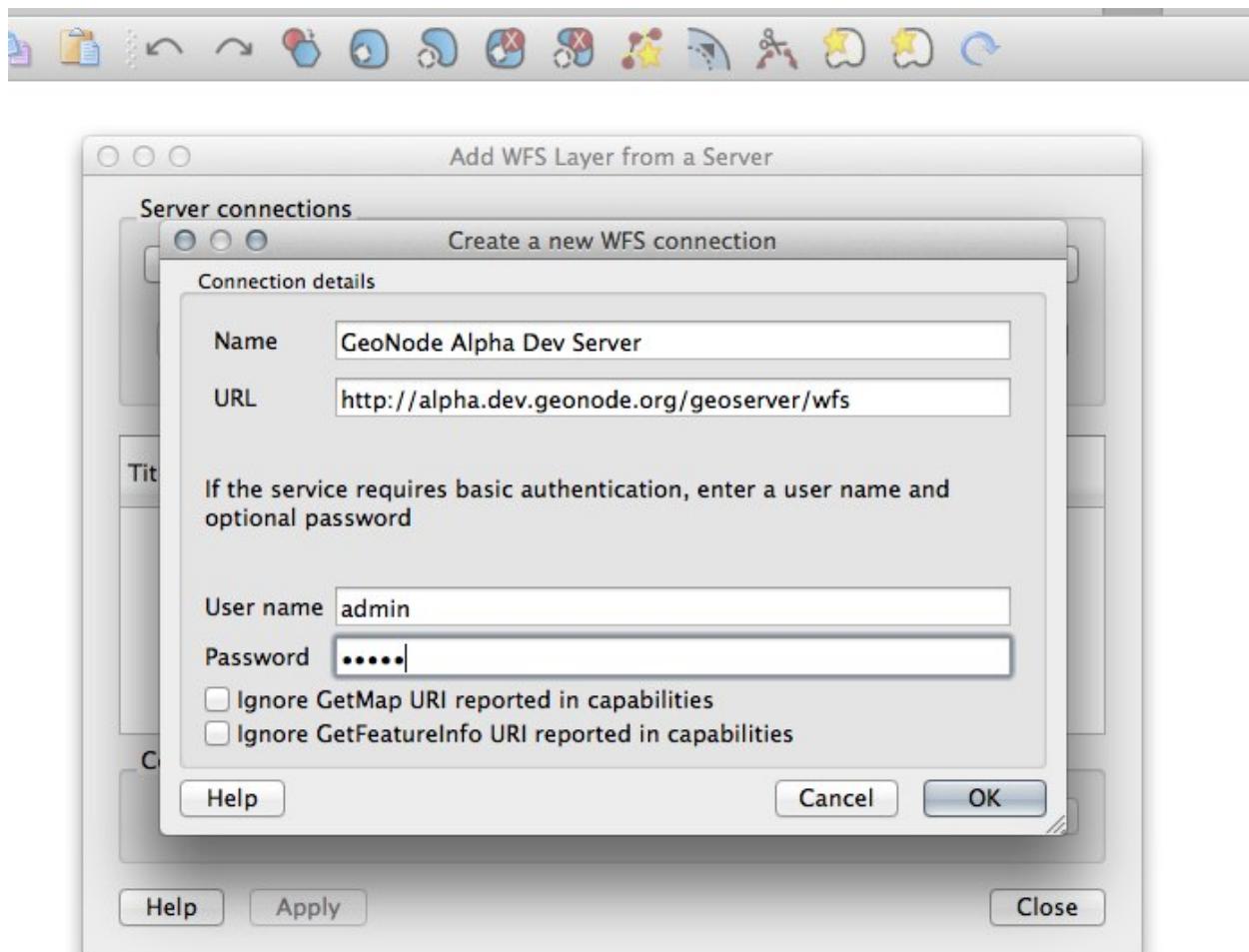
If instead you want to use layers from your GeoNode in the Google Earth client itself, you have a few options available to you.

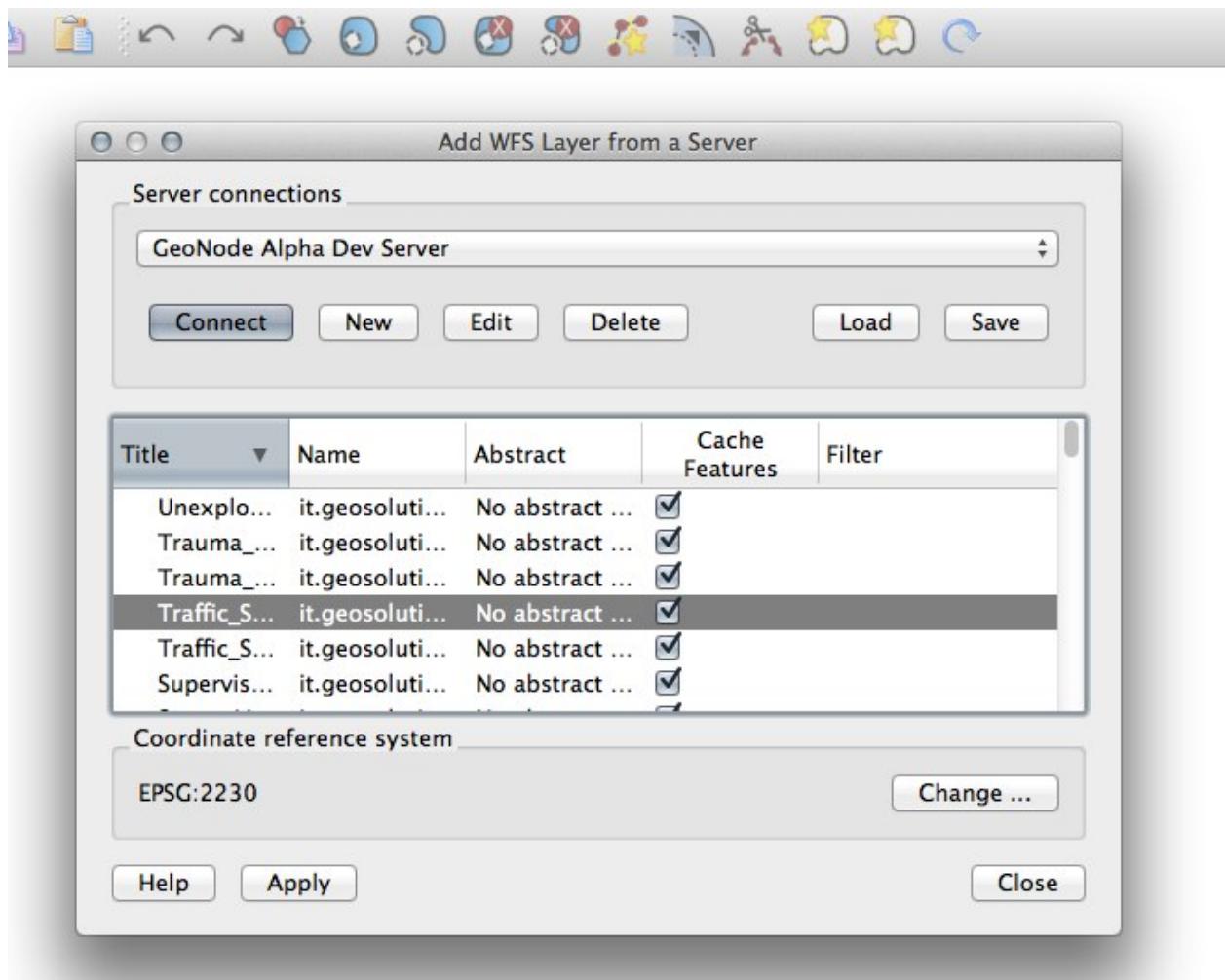
First, you can select the KML option from the Download Layer menu to download the entire layer in a single KML file. Depending on the size of the layer, your GeoNode could take several seconds or longer to generate this KML and return it to you.

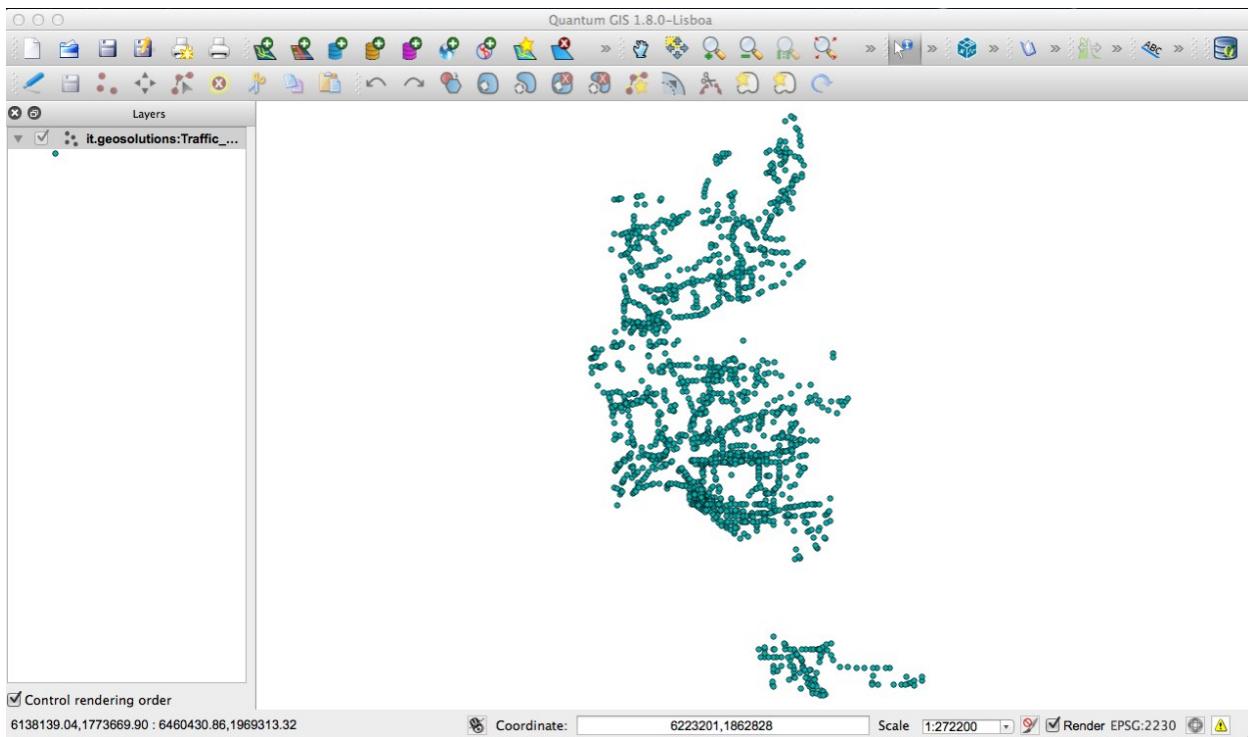












When the layer is generated, it will be downloaded to your desktop machine and you can simply double click it to open it in Google Earth.

Alternatively, you can use the “View in Google Earth” option in the Layer Download menu to view the layer in Google Earth using the same methodology described above depending on the zoom level.

This will download a small KMZ to your desktop that contains a reference to the layers on the server and you can double click it to open it in Google Earth.

---

**Note:** The basic difference between these two options is that the first downloads *all* of the data to your desktop at once and as such, the downloaded file can be used offline while the second is simply a Network Link to the layer on the server. Choose whichever method is best for your own needs and purposes.

---

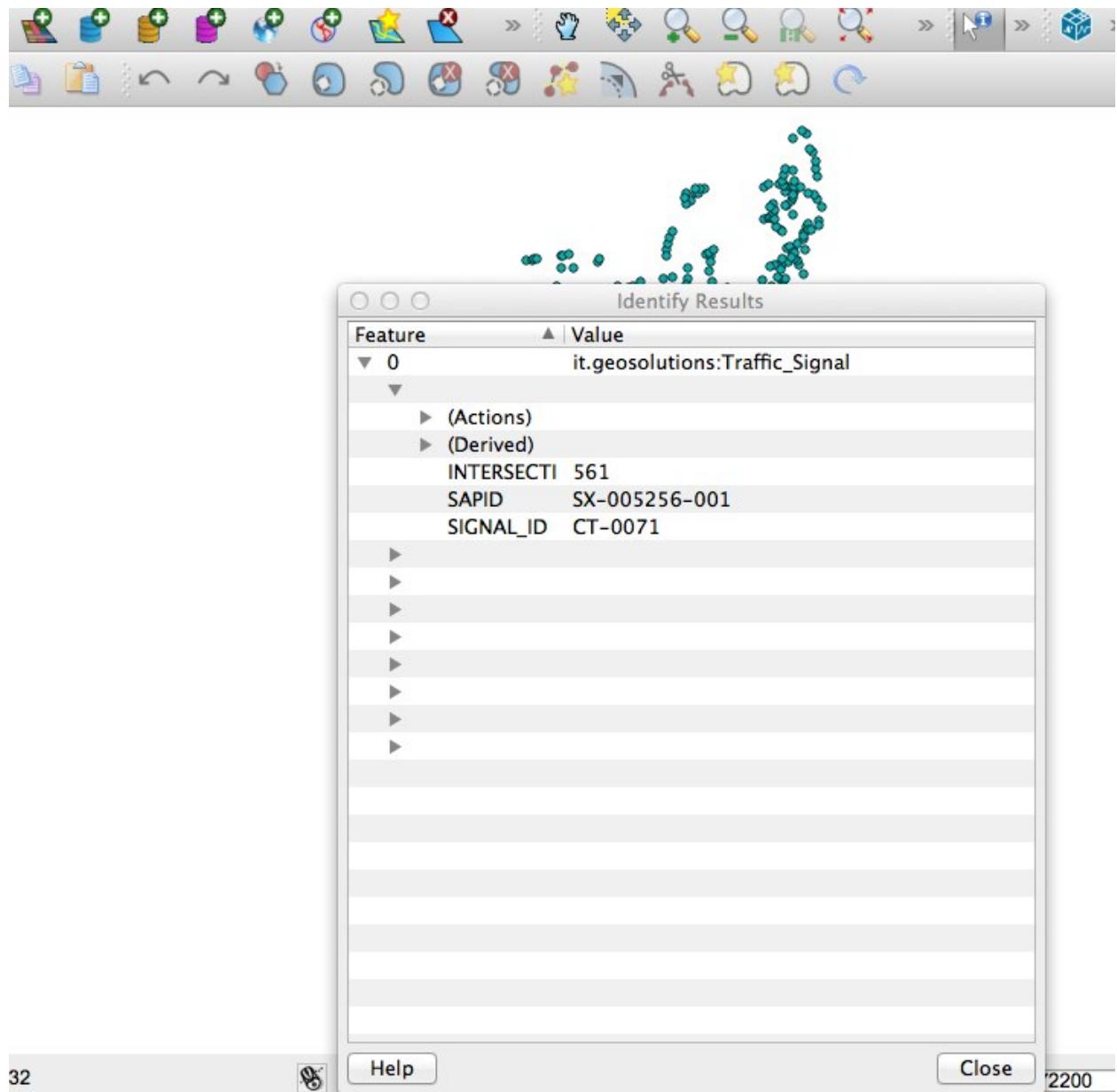
Once you have added your layers to the Places panel in Google Earth, you can move them from the Temporary Places section into My Places if you wish to use them after your current Google Earth session is complete. You can arrange them in folders and use Google Earth functionality to save your project to disk. Consult Google Earth's documentation for more information about how to do this.

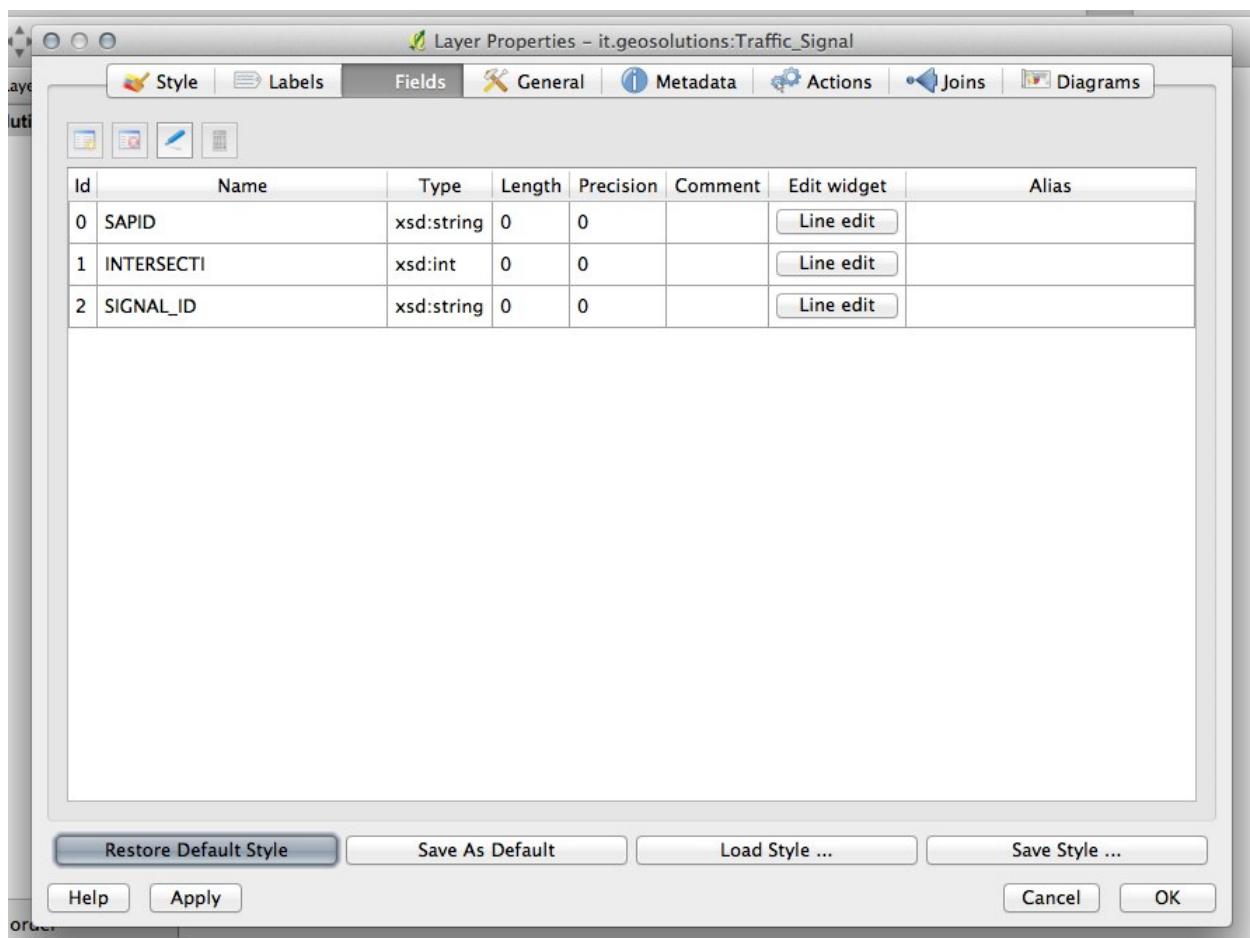
### 3.5.5 OpenStreetMap

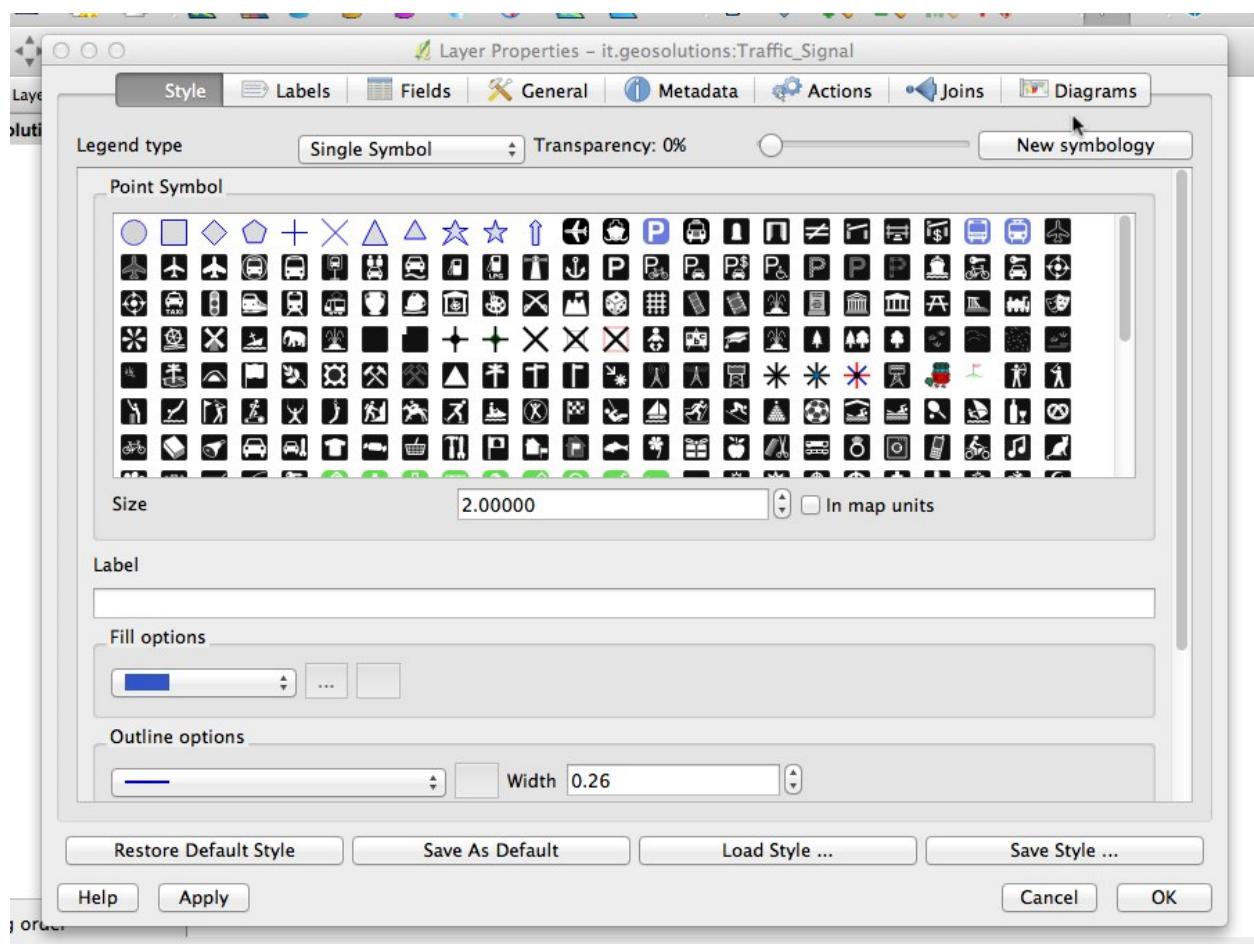
Data from OpenStreetMap is used to generate the map tiles which are the default base layer in your GeoNode. These are provided by MapQuest and are reasonably current with recent edits to the OpenStreetMap database. You can switch to an alternate set of map tiles by changing your base layer.

If you would like to change the default base layer to use the alternate OSM tile set, you can change this in the settings.py file for your project. In the MAP\_BASELAYERS dictionary, set the visibility setting to True for the gxp\_olsource and False for the gxp\_mapquestsource.

If instead of map tiles, you would like to work with OSM database itself, you should consult the section titled “Loading OSM Data into GeoNode” in this workshop.







GeoNode

HOME LAYERS MAPS DOCUMENTS PEOPLE SEARCH

Search... Sign in | ?

HAITI\_ADMINISTRATIVE Download Layer Download Metadata

Data SIO, NOAA, U.S. Navy, NGA, GEBCO  
© 2013 Cnes/Spot Image  
Image © 2013 TerraMetrics  
Image U.S. Geological Survey

Google earth Terms of Use

Info Attributes Share Ratings Comments

MAPS USING THIS LAYER

GeoNode

HOME LAYERS MAPS DOCUMENTS PEOPLE SEARCH

Search... Sign in | ?

HAITI\_ADMINISTRATIVE Download Layer Download Metadata

haiti\_administrative.1160

haiti\_administrative  
ADMIN\_LEVEL: 4

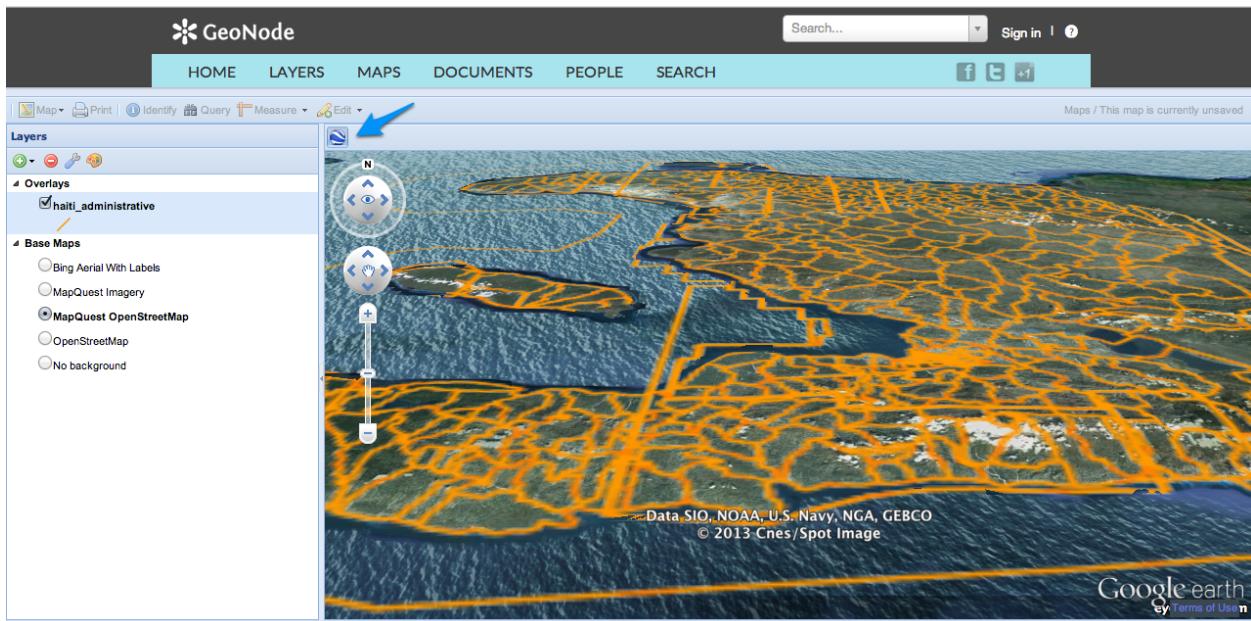
Image © 2013 GeoEye  
Image © 2013 DigitalGlobe  
© 2013 Cnes/Spot Image

Google earth Terms of Use

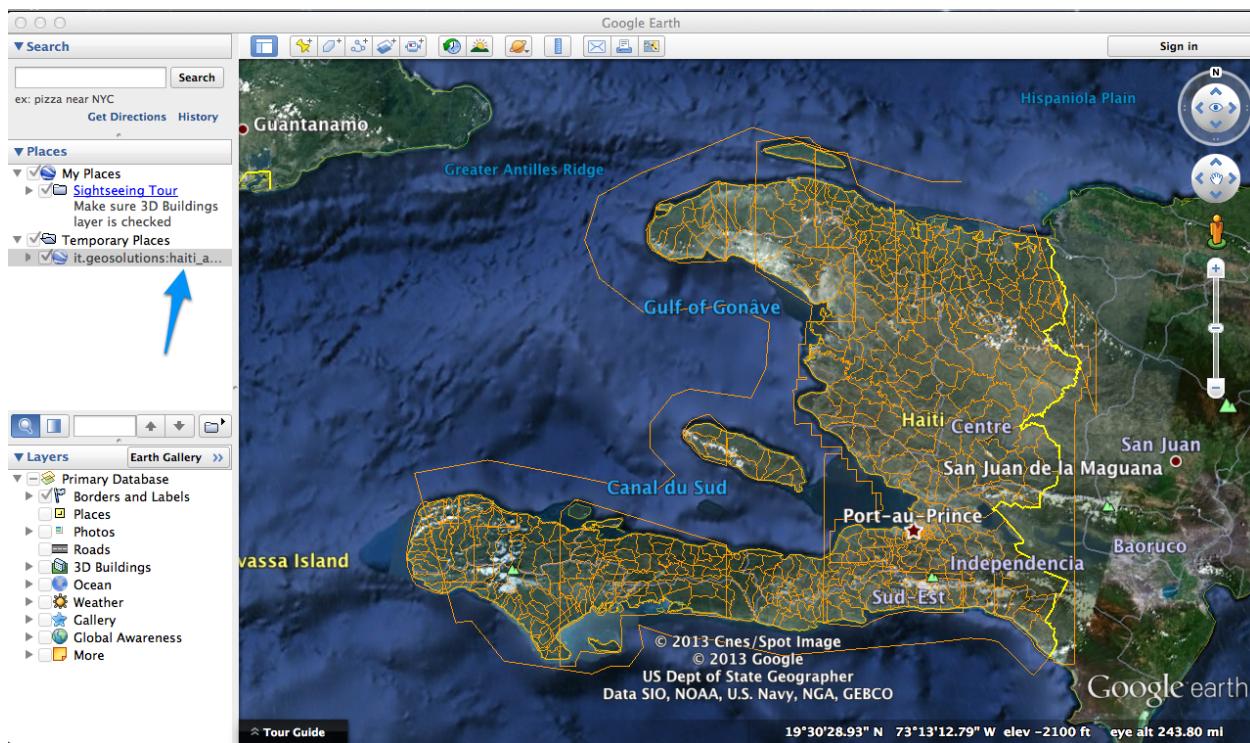
Info Attributes Share Ratings Comments

MAPS USING THIS LAYER

This layer is not currently used in any maps.



This screenshot shows the same GeoNode interface as the previous one, but with a context menu open over the map of Haiti. The menu items are 'Download Layer', 'Download Metadata', 'TILES &gt;', 'VIEW IN GOOGLE EARTH &gt;', 'KML &gt; (highlighted in blue)', 'PNG &gt;', 'PDF &gt;', and 'JPEG &gt;'. The map itself shows the same administrative boundaries as the first screenshot. Below the map, there's a legend with 'Tiles Courtesy of MapQuest' and a scale bar indicating '50 mi' and '1 : 4367821'. At the bottom of the page, there are buttons for 'Info', 'Attributes', 'Share', 'Ratings', and 'Comments', along with a URL: 'eoserver/wms/kml?layers=it.geosolutions%3ahaiti\_administrative&amp;mode=download'. To the right of the map, there's a box titled 'MAPS USING THIS LAYER'.



**GeoNode**

HOME LAYERS MAPS DOCUMENTS PEOPLE SEARCH [Sign in](#) | [?](#)

[Download Layer](#) [Download Metadata](#)

# HAITI\_ADMINISTRATIVE

[VIEW IN GOOGLE EARTH](#)

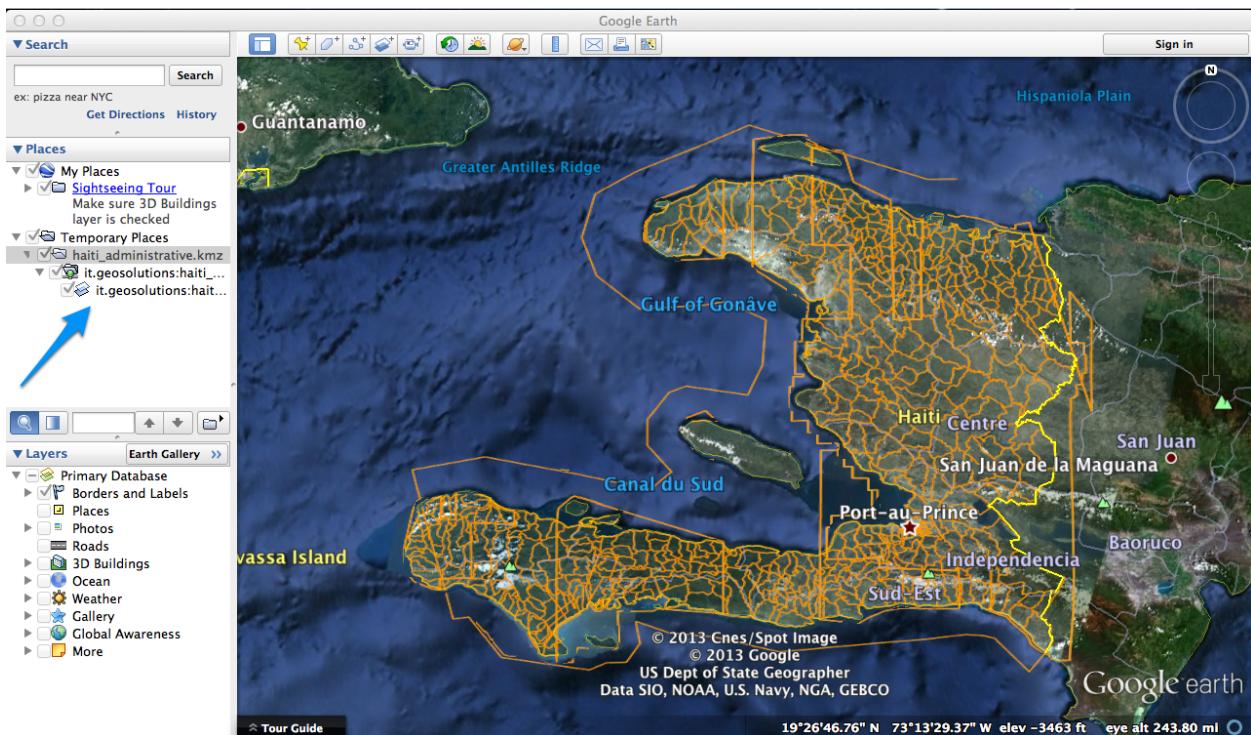
TILES >

- KML >
- PNG >
- PDF >
- JPEG >

Tiles Courtesy of MapQuest admin

MAPS USING THIS LAYER

Info Attributes Share Ratings Comments



This screenshot shows the GeoNode interface for the 'HAITI\_ADMINISTRATIVE' map. The main view displays a map of the Dominican Republic and parts of Haiti with orange administrative boundaries. A blue arrow on the left points to the 'MapQuest OpenStreetMap' option in the 'Layer' dropdown menu, demonstrating how multiple base map layers can be combined.

```
MAP_BASELAYERS = [{}
 "source": {
 "ptype": "gxp_wmscsource",
 "url": GEOSERVER_BASE_URL + "wms",
 "restUrl": "/gs/rest"
 }
,{
 "source": {"ptype": "gxp_olsource"},
 "type":"OpenLayers.Layer",
 "args":["No background"],
 "visibility": False,
 "fixed": True,
 "group":"background"
, {
 "source": {"ptype": "gxp_olsource"},
 "type":"OpenLayers.Layer.OSM",
 "args":["OpenStreetMap"],
 "visibility": True, ←
 "fixed": True,
 "group":"background"
, {
 "source": {"ptype": "gxp_mapquestsource"},
 "name":"osm",
 "group":"background",
 "visibility": False ←
, {
 "source": {"ptype": "gxp_mapquestsource"},
 "name":"naip",
 "group":"background",
 "visibility": False
, {
 "source": {"ptype": "gxp_bingsource"},
 "name": "AerialWithLabels",
 "fixed": True,
 "visibility": False,
 "group":"background"
,{
 "source": {"ptype": "gxp_mapboxsource"},
, {
 "source": {"ptype": "gxp_olsource"},
 "type":"OpenLayers.Layer.WMS",
```

# LOADING DATA INTO A GEONODE

This module will walk you through the various options available to load data into your GeoNode from GeoServer, on the command-line or programmatically. You can choose from among these techniques depending on what kind of data you have and how you have your geonode setup.

## 4.1 Using importlayers to import Data into GeoNode

The geonode.layers app includes 2 management commands that you can use to load or configure data in your GeoNode. Both of these are invoked by using the manage.py script. This section will walk you through how to use the importlayers management command and the subsequent section will lead you through the process of using updatelayers.

First, make sure the virtual environment for your project is activated. If you have installed from packages and followed the steps from Chapter 3, this can be accomplished by issuing the following command:

```
$ source /var/lib/geonode/bin/activate
```

Once your virtualenv is activated, the first thing to do is to use the –help option to the importlayers command to investigate the options to this management command. You can display this help by executing the following command:

```
$ python manage.py importlayers --help
```

This will produce output that looks like the following:

```
Usage: manage.py importlayers [options] path [path...]
```

```
Brings a data file or a directory full of data files into aGeoNode site. Layers are added to the Dj...
```

Options:

```
-v VERBOSITY, --verbosity=VERBOSITY
 Verbosity level; 0=minimal output, 1=normal output,
 2=verbose output, 3=very verbose output
--settings=SETTINGS
 The Python path to a settings module, e.g.
 "myproject.settings.main". If this isn't provided, the
 DJANGO_SETTINGS_MODULE environment variable will be
 used.
--pythonpath=PYTHONPATH
 A directory to add to the Python path, e.g.
 "/home/djangoprojects/myproject".
--traceback
 Print traceback on exception
-u USER, --user=USER
 Name of the user account which should own the imported
 layers
-i, --ignore-errors
 Stop after any errors are encountered.
```

```
-o, --overwrite Overwrite existing layers if discovered (defaults
 False)
-k KEYWORDS, --keywords=KEYWORDS
 The default keywords for the imported layer(s). Will
 be the same for all imported layers if multiple
 imports are done in one command
--version show program's version number and exit
-h, --help show this help message and exit
```

While the description of most of the options should be self explanatory, its worth reviewing some of the key options in a bit more detail.

- The `-i` option will force the command to stop when it first encounters an error. Without this option specified, the process will skip over errors that have layers and continue loading the other layers.
- The `-o` option specifies that layers with the same name as the base name will be loaded and overwrite the existing layer.
- The `-k` option is used to add keywords for all of the layers imported.

The import layers management command is invoked by specifying options as described above and specifying the path to a single layer file or to a directory that contains multiple files. For purposes of this exercise, lets use the default set of testing layers that ship with geonode. You can replace this path with the directory to your own shapefiles:

```
$ python manage.py importlayers -v 3 /var/lib/geonode/lib/python2.7/site-packages/gisdata/data/good/vec
```

This command will produce the following output to your terminal:

```
Verifying that GeoNode is running ...
Found 8 potential layers.
No handlers could be found for logger "pycsw"
[created] Layer for '/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vec...
```

Detailed report of failures:

```
Finished processing 8 layers in 30.0 seconds.
```

```
8 Created layers
0 Updated layers
0 Skipped layers
0 Failed layers
3.750000 seconds per layer
```

If you encounter errors while running this command, you can use the `-v` option to increase the verbosity of the output so you can debug the problem. The verbosity level can be set from 0-3 with 0 being the default. An example of what the output looks like when an error is encountered and the verbosity is set to 3 is shown below:

```
Verifying that GeoNode is running ...
Found 8 potential layers.
[failed] Layer for '/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vec...
[failed] Layer for '/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vec...
[failed] Layer for '/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vec...
```

```
[failed] Layer for '/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vector'
```

Detailed report of failures:

```
/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/gisdata/data/good/vector/san_andres_y_providence
=====
Traceback (most recent call last):
 File "/Users/jjohnson/projects/geonode/geonode/layers/utils.py", line 682, in upload
 keywords=keywords,
 File "/Users/jjohnson/projects/geonode/geonode/layers/utils.py", line 602, in file_upload
 keywords=keywords, title=title)
 File "/Users/jjohnson/projects/geonode/geonode/layers/utils.py", line 305, in save
 store = cat.get_store(name)
 File "/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/geoserver/catalog.py", line 176, in save
 for ws in self.get_workspaces():
 File "/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/geoserver/catalog.py", line 489, in get_workspaces
 description = self.get_xml("%s/workspaces.xml" % self.service_url)
 File "/Users/jjohnson/.venvs/geonode/lib/python2.7/site-packages/geoserver/catalog.py", line 136, in get_xml
 response, content = self.http.request(rest_url)
 File "/Library/Python/2.7/site-packages/httplib2/__init__.py", line 1445, in request
 (response, content) = self._request(conn, authority, uri, request_uri, method, body, headers, redirections, connection_pool)
 File "/Library/Python/2.7/site-packages/httplib2/__init__.py", line 1197, in _request
 (response, content) = self._conn_request(conn, request_uri, method, body, headers)
 File "/Library/Python/2.7/site-packages/httplib2/__init__.py", line 1133, in _conn_request
 conn.connect()
 File "/Library/Python/2.7/site-packages/httplib2/__init__.py", line 799, in connect
 raise socket.error, msg
error: [Errno 61] Connection refused
```

---

**Note:** This last section of output will be repeated for all layers, and only the first one is show above.

This error indicates that GeoNode was unable to connect to GeoServer to load the layers. To solve this, you should make sure GeoServer is running and re-run the command.

If you encounter errors with this command that you cannot solve, you should bring them up on the geonode users mailing list.

You should now have the knowledge necessary to import layers into your GeoNode project from a directory on the servers filesystem and can use this to load many layers into your GeoNode at once.

---

**Note:** The ownership of the imported layers will be assigned to the primary superuser in your system. You can use GeoNodes Django Admin interface to modify this after the fact if you want them to be owned by another user.

## 4.2 GeoServer Data Configuration

While it is possible to import layers directly from your servers filesystem into your GeoNode, you may have an existing GeoServer that already has data in it, or you may want to configure data from a GeoServer which is not directly supported by uploading data. GeoServer supports a wide range of data formats and connections to database,

and while many of them are not supported as GeoNode upload formats, if they can be configured in GeoServer, you can add them to your GeoNode by following the procedure described below.

GeoServer supports 3 types of data: Raster, Vector and Databases. For a list of the supported formats for each type of data, consult the following pages.

- <http://docs.geoserver.org/latest/en/user/data/vector/index.html#data-vector>
  - <http://docs.geoserver.org/latest/en/user/data/raster/index.html>
  - <http://docs.geoserver.org/latest/en/user/data/database/index.html>
- 

**Note:** Some of these raster or vector formats or database types require that you install specific plugins in your GeoServer in order to use them. Please consult the GeoServer documentation for more information.

---

Lets walk through an example of configuring a PostGIS database in GeoServer and then configuring those layers in your GeoNode.

First visit the GeoServer administration interface on your server. This is usually on port 8080 and is available at <http://localhost:8080/geoserver/web/>

You should login with the superuser credentials you setup when you first configured your GeoNode instance.

Once you are logged in to the GeoServer Admin interface, you should see the following.

The screenshot shows the GeoServer administration interface. At the top right, it says "Logged in as admin." and has a "Logout" button. The main area is titled "Welcome". It displays the following information:

- About & Status:** Server Status, GeoServer Logs, Contact Information, About GeoServer.
- Data:** Layer Preview, Import Data, Workspaces, Stores, Layers, Layer Groups.
- Services:** WPS.
- Settings:** Global, JAI, Coverage Access.
- Security:** Settings, Authentication, Passwords, Users, Groups, Roles, Data, Services.
- Demos:** None.

**Welcome**

Welcome

This GeoServer belongs to .

10 Layers	<a href="#">Add layers</a>
10 Stores	<a href="#">Add stores</a>
3 Workspaces	<a href="#">Create workspaces</a>

**Service Capabilities**

WCS	1.0.0 1.1.1
WFS	1.0.0 1.1.0 2.0.0
WMS	1.1.1 1.3.0
WPS	1.0.0

**Notes:**

- Please read the file /Users/jjohnson/projects/geonode/geoserver/data/security/masterpw.info and remove it afterwards. This file is a **security risk**.
- The default user/group service should use digest password encoding.
- The administrator password for this server has not been changed from the default. It is **highly** recommended that you change it now. [Change it](#)
- Strong cryptography available

This GeoServer instance is running version **2.2**. For more information please contact the administrator.

**Note:** The number of stores, layers and workspaces may be different depending on what you already have configured in your GeoServer.

---

Next you want to select the “Stores” option in the left hand menu, and then the “Add new Store” option. The following screen will be displayed.

**New data source**

Choose the type of data source you wish to configure

### Vector Data Sources

- CSV - Comma delimited text file
- Directory of spatial files (shapefiles) - Takes a directory of shapefiles and exposes it as a data store
- PostGIS - PostGIS Database
- PostGIS (JNDI) - PostGIS Database (JNDI)
- Properties - Allows access to Java Property files containing Feature information
- Shapefile - ESRI(tm) Shapefiles (\*.shp)
- Web Feature Server - The WFSDataStore represents a connection to a Web Feature Server. This connection provides access to the Features published by the server, and the ability to perform transactions on the server (when supported / allowed).

### Raster Data Sources

- ArcGrid - Arc Grid Coverage Format
- GeoTIFF - Tagged Image File Format with Geographic information
- Gtopo30 - Gtopo30 Coverage Format
- ImageMosaic - Image mosaicking plugin
- WorldImage - A raster file accompanied by a spatial data file

### Other Data Sources

- WMS - Cascades a remote Web Map Service

In this case, we want to select the PostGIS store type to create a connection to our existing database. On the next screen you will need to enter the parameters to connect to your PostGIS database (alter as necessary for your own database).

---

**Note:** If you are unsure about any of the settings, leave them as the default.

---

The next screen lets you configure the layers in your database. This will of course be different depending on the layers in your database.

Select the “Publish” button for one of the layers and the next screen will be displayed where you can enter metadata for this layer. Since we will be managing this metadata in GeoNode, we can leave these alone for now.

The things that *must* be specified are the Declared SRS and you must select the “Compute from Data” and “Compute from native bounds” links after the SRS is specified.

Click save and this layer will now be configured for use in your GeoServer.

The next step is to configure these layers in GeoNode. The updatelayers management command is used for this purpose. As with importlayers, its useful to look at the command line options for this command by passing the –help option:

```
$ python manage.py updatelayers --help
```

This help option displays the following:

```
Usage: manage.py updatelayers [options]
```

```
Update the GeoNode application with data from GeoServer
```

The screenshot shows the GeoServer interface with the title 'New Vector Data Source'. On the left, there is a sidebar with sections: 'About & Status' (Server Status, GeoServer Logs, Contact Information, About GeoServer), 'Data' (Layer Preview, Import Data, Workspaces, Stores, Layers, Layer Groups), 'Services' (WPS), 'Settings' (Global, JAI, Coverage Access), 'Security' (Settings, Authentication, Passwords, Users, Groups, Roles, Data, Services), and 'Demos'. The main content area has a heading 'Add a new vector data source' and a sub-section 'PostGIS PostGIS Database'. It contains a form for 'Basic Store Info' with fields: 'Workspace \*' (geonode), 'Data Source Name \*' (workshop\_postgis), 'Description' (empty), and a checked checkbox 'Enabled'. Below this is a section 'Connection Parameters' with fields: 'host \*' (localhost), 'port \*' (5432), 'database' (workshop), 'schema' (public), 'user \*' (workshop), 'passwd' (redacted), and a '...' button.

The screenshot shows the GeoServer interface with the title 'New Layer'. The sidebar is identical to the previous screenshot. The main content area has a heading 'Add a new layer'. It includes instructions: 'You can create a new feature type by manually configuring the attribute names and types. [Create new feature type...](#). On databases you can also create a new feature type by configuring a native SQL statement. [Configure new SQL view...](#)'. Below this is a table showing resources in the 'workshop' store:

Published	Layer name	action
	boundaries_I	<a href="#">Publish</a>
	ontdrainage	<a href="#">Publish</a>
	popplaces	<a href="#">Publish</a>
	qcdrainage	<a href="#">Publish</a>
	roads	<a href="#">Publish</a>

At the bottom of the table are navigation buttons: '<<', '<', '1', '>', '>>' and the text 'Results 1 to 5 (out of 5 items)'.

The screenshot shows the GeoServer interface with the title 'Edit Layer'. The left sidebar contains navigation links for 'About & Status', 'Data' (with options like Layer Preview, Import Data, Workspaces, Stores, Layers, Layer Groups), 'Services' (WPS), 'Settings' (Global, JAI, Coverage Access), and 'Security' (Settings, Authentication, Passwords, Users, Groups, Roles, Data, Services). The main content area is titled 'Edit Layer' and shows configuration for the 'geonode:ontdrainage' layer. It includes tabs for 'Data' (selected), 'Publishing', and 'Dimensions'. Under 'Basic Resource Info', fields are filled with 'Name: ontdrainage', 'Title: ontdrainage', and an empty 'Abstract' field. The 'Keywords' section shows 'Current Keywords: ontdrainage features' with a 'Remove selected' button and a 'New Keyword' input field. The 'Options:' section at the bottom lists command-line arguments for managing layers.

#### Options:

```

-v VERBOSITY, --verbosity=VERBOSITY
 Verbosity level; 0=minimal output, 1=normal output,
 2=verbose output, 3=very verbose output
--settings=SETTINGS
 The Python path to a settings module, e.g.
 "myproject.settings.main". If this isn't provided, the
 DJANGO_SETTINGS_MODULE environment variable will be
 used.
--pythonpath=PYTHONPATH
 A directory to add to the Python path, e.g.
 "/home/djangoprojects/myproject".
--traceback
 Print traceback on exception
-i, --ignore-errors
 Stop after any errors are encountered.
-u USER, --user=USER
 Name of the user account which should own the imported
 layers
-w WORKSPACE, --workspace=WORKSPACE
 Only update data on specified workspace
--version
 show program's version number and exit
-h, --help
 show this help message and exit

```

In this case, we can use the default options. So enter the following command to configure the layers from our GeoServer into our GeoNode:

```
$ python manage.py updatelayers
```

The output will look something like the following:

```
No handlers could be found for logger "pycsw"
[created] Layer Adult_Day_Care (1/11)
[created] Layer casinos (2/11)
[updated] Layer san_andres_y_providencia_administrative (3/11)
```

[Add Keyword](#)

### Metadata links

No metadata links so far

[Add link](#) Note only FGDC and TC211 metadata links show up in WMS 1.1.1 capabilities

### Coordinate Reference Systems

#### Native SRS

...

#### Declared SRS

[Find...](#) EPSG:NAD83 / Canada Atlas Lambert...

#### SRS handling

### Bounding Boxes

#### Native Bounding Box

Min X	Min Y	Max X	Max Y
1,362,796.5	-323,704.125	1,751,462.75	63,159.9765625

[Compute from data](#)

#### Lat/Lon Bounding Box

Min X	Min Y	Max X	Max Y
-78.0029900468	43.46292555508	-71.8184077161	47.79032394627

[Compute from native bounds](#)

### Feature Type Details

Property	Type	Nillable	Min/Max Occurrences
gid	Integer	false	1/1
area	BigDecimal	true	0/1
perimeter	BigDecimal	true	0/1
oncart_	BigDecimal	true	0/1

The screenshot shows the GeoServer 'Layers' management interface. The left sidebar contains navigation links for 'About & Status', 'Data' (with options like Layer Preview, Import Data, Workspaces, Stores, Layers, Layer Groups), 'Services' (WPS), 'Settings' (Global, JAI, Coverage Access), and 'Security' (Settings, Authentication, Passwords, Users, Groups, Roles, Data). The main content area is titled 'Layers' and displays a table of 11 layers. The table columns are Type, Workspace, Store, Layer Name, Enabled?, and Native SRS. The layers listed are: Adult\_Day\_Care, casinos, san\_andres\_y\_providencia\_administrative, san\_andres\_y\_providencia\_coastline, san\_andres\_y\_providencia\_highway, san\_andres\_y\_providencia\_location, san\_andres\_y\_providencia\_natural, san\_andres\_y\_providencia\_poi, san\_andres\_y\_providencia\_water, single\_point, and ontdrainage. The 'ontdrainage' layer is highlighted with a blue arrow pointing to it.

Type	Workspace	Store	Layer Name	Enabled?	Native SRS
geonode	Adult_Day_Care	Adult_Day_Care	Adult_Day_Care	✓	EPSG:2230
geonode	casinos	casinos	casinos	✓	EPSG:2230
geonode	san_andres_y_providencia_administrative	san_andres_y_providencia_administrative	san_andres_y_providencia_administrative	✓	EPSG:4326
geonode	san_andres_y_providencia_coastline	san_andres_y_providencia_coastline	san_andres_y_providencia_coastline	✓	EPSG:4326
geonode	san_andres_y_providencia_highway	san_andres_y_providencia_highway	san_andres_y_providencia_highway	✓	EPSG:4326
geonode	san_andres_y_providencia_location	san_andres_y_providencia_location	san_andres_y_providencia_location	✓	EPSG:4326
geonode	san_andres_y_providencia_natural	san_andres_y_providencia_natural	san_andres_y_providencia_natural	✓	EPSG:4326
geonode	san_andres_y_providencia_poi	san_andres_y_providencia_poi	san_andres_y_providencia_poi	✓	EPSG:4326
geonode	san_andres_y_providencia_water	san_andres_y_providencia_water	san_andres_y_providencia_water	✓	EPSG:4326
geonode	single_point	single_point	single_point	✓	EPSG:4326
geonode	workshop	ontdrainage	ontdrainage	✓	EPSG:3978

```
[updated] Layer san_andres_y_providencia_coastline (4/11)
[updated] Layer san_andres_y_providencia_highway (5/11)
[updated] Layer san_andres_y_providencia_location (6/11)
[updated] Layer san_andres_y_providencia_natural (7/11)
[updated] Layer san_andres_y_providencia_poi (8/11)
[updated] Layer san_andres_y_providencia_water (9/11)
[updated] Layer single_point (10/11)
[created] Layer ontdrainage (11/11)
```

Finished processing 11 layers in 45.0 seconds.

```
3 Created layers
8 Updated layers
0 Failed layers
4.090909 seconds per layer
```

---

**Note:** This example picked up 2 additional layers that were already in our GeoServer, but were not already in our GeoNode.

---

For layers that already exist in your GeoNode, they will be updated and the configuration synchronized between GeoServer and GeoNode.

You can now view and use these layers in your GeoNode.

## 4.3 Using GDAL and OGR to convert your Data for use in GeoNode

GeoNode supports uploading data in shapefiles, csv, kml and GeoTiff formats. If your data is in other formats, you will need to convert it into one of these formats for use in GeoNode. This section will walk you through the steps necessary to convert your data into formats suitable for uploading into GeoNode.

You will need to make sure that you have the gdal library installed on your system. On Ubuntu you can install this package with the following command:

```
$ sudo apt-get install gdal-bin
```

### 4.3.1 OGR (Vector Data)

OGR is used to manipulate vector data. In this example, we will use MapInfo .tab files and convert them to shapefiles with the ogr2ogr command. We will use sample MapInfo files from the website linked below.

<http://services.land.vic.gov.au/landchannel/content/help?name=sampledatal>

You can download the Admin;(Postcode) layer by issuing the following command:

```
$ wget http://services.land.vic.gov.au/sampledatal/mif/admin_postcode_vm.zip
```

You will need to unzip this dataset by issuing the following command:

```
$ unzip admin_postcode_vm.zip
```

This will leave you with the following files in the directory where you executed the above commands:

```
|-- ANZVI0803003025.htm
|-- DSE_Data_Access_Licence.pdf
|-- VMADMIN.POSTCODE_POLYGON.xml
|-- admin_postcode_vm.zip
--- vicgrid94
 --- mif
 --- lga_polygon
 --- macedon\ ranges
 |-- EXTRACT_POLYGON.mid
 |-- EXTRACT_POLYGON.mif
 --- VMADMIN
 |-- POSTCODE_POLYGON.mid
 --- POSTCODE_POLYGON.mif
```

First, lets inspect this file set using the following command:

```
$ ogrinfo -so vicgrid94/mif/lga_polygon/macedon\ ranges/VMADMIN/POSTCODE_POLYGON.mid POSTCODE_POLYGON
```

The output will look like the following:

```
Had to open data source read-only.
INFO: Open of 'vicgrid94/mif/lga_polygon/macedon ranges/VMADMIN/POSTCODE_POLYGON.mid'
 using driver 'MapInfo File' successful.
```

```
Layer name: POSTCODE_POLYGON
Geometry: 3D Unknown (any)
Feature Count: 26
Extent: (2413931.249367, 2400162.366186) - (2508952.174431, 2512183.046927)
Layer SRS WKT:
PROJCS["unnamed",
```

```

GEOGCS["unnamed",
 DATUM["GDA94",
 SPHEROID["GRS 80", 6378137, 298.257222101],
 TOWGS84[0, 0, 0, -0, -0, -0, 0]],
 PRIMEM["Greenwich", 0],
 UNIT["degree", 0.0174532925199433]],
PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1", -36],
PARAMETER["standard_parallel_2", -38],
PARAMETER["latitude_of_origin", -37],
PARAMETER["central_meridian", 145],
PARAMETER["false_easting", 2500000],
PARAMETER["false_northing", 2500000],
UNIT["Meter", 1]]
PFI: String (10.0)
POSTCODE: String (4.0)
FEATURE_TYPE: String (6.0)
FEATURE_QUALITY_ID: String (20.0)
PFI_CREATED: Date (10.0)
UFI: Real (12.0)
UFI_CREATED: Date (10.0)
UFI_OLD: Real (12.0)

```

This gives you information about the number of features, the extent, the projection and the attributes of this layer.

Next, lets go ahead and convert this layer into a shapefile by issuing the following command:

```
$ ogr2ogr postcode_polygon.shp vicgrid94/mif/lga_polygon/macedon\ ranges/VMADMIN/POSTCODE_POLYGON.mif
```

The output of this command will look like the following:

```

Warning 6: Normalized/laundered field name: 'FEATURE_TYPE' to 'FEATURE_TY'
Warning 6: Normalized/laundered field name: 'FEATURE_QUALITY_ID' to 'FEATURE_QU'
Warning 6: Normalized/laundered field name: 'PFI_CREATED' to 'PFI_CREATE'
Warning 6: Normalized/laundered field name: 'UFI_CREATED' to 'UFI_CREATE'

```

This output indicates that some of the field names were truncated to fit into the constraint that attributes in shapefiles are only 10 characters long.

You will now have a set of files that make up the postcode\_polygon.shp shapefile set. We can inspect them by issuing the following command:

```
$ ogrinfo -so postcode_polygon.shp postcode_polygon
```

The output will look similar to the output we saw above when we inspected the MapInfo file we converted from:

```

INFO: Open of 'postcode_polygon.shp'
 using driver 'ESRI Shapefile' successful.

```

```

Layer name: postcode_polygon
Geometry: 3D Polygon
Feature Count: 26
Extent: (2413931.249367, 2400162.366186) - (2508952.174431, 2512183.046927)
Layer SRS WKT:
PROJCS["Lambert_Conformal_Conic",
 GEOGCS["GCS_Unknown",
 DATUM["GDA94",
 SPHEROID["GRS_80", 6378137, 298.257222101]],
 PRIMEM["Greenwich", 0],
 UNIT["Degree", 0.017453292519943295]],

```

```

PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1",-36],
PARAMETER["standard_parallel_2",-38],
PARAMETER["latitude_of_origin",-37],
PARAMETER["central_meridian",145],
PARAMETER["false_easting",2500000],
PARAMETER["false_northing",2500000],
UNIT["Meter",1]]
PFI: String (10.0)
POSTCODE: String (4.0)
FEATURE_TY: String (6.0)
FEATURE_QU: String (20.0)
PFI_CREATE: Date (10.0)
UFI: Real (12.0)
UFI_CREATE: Date (10.0)
UFI_OLD: Real (12.0)

```

These files can now be loaded into your GeoNode instance via the normal uploader.

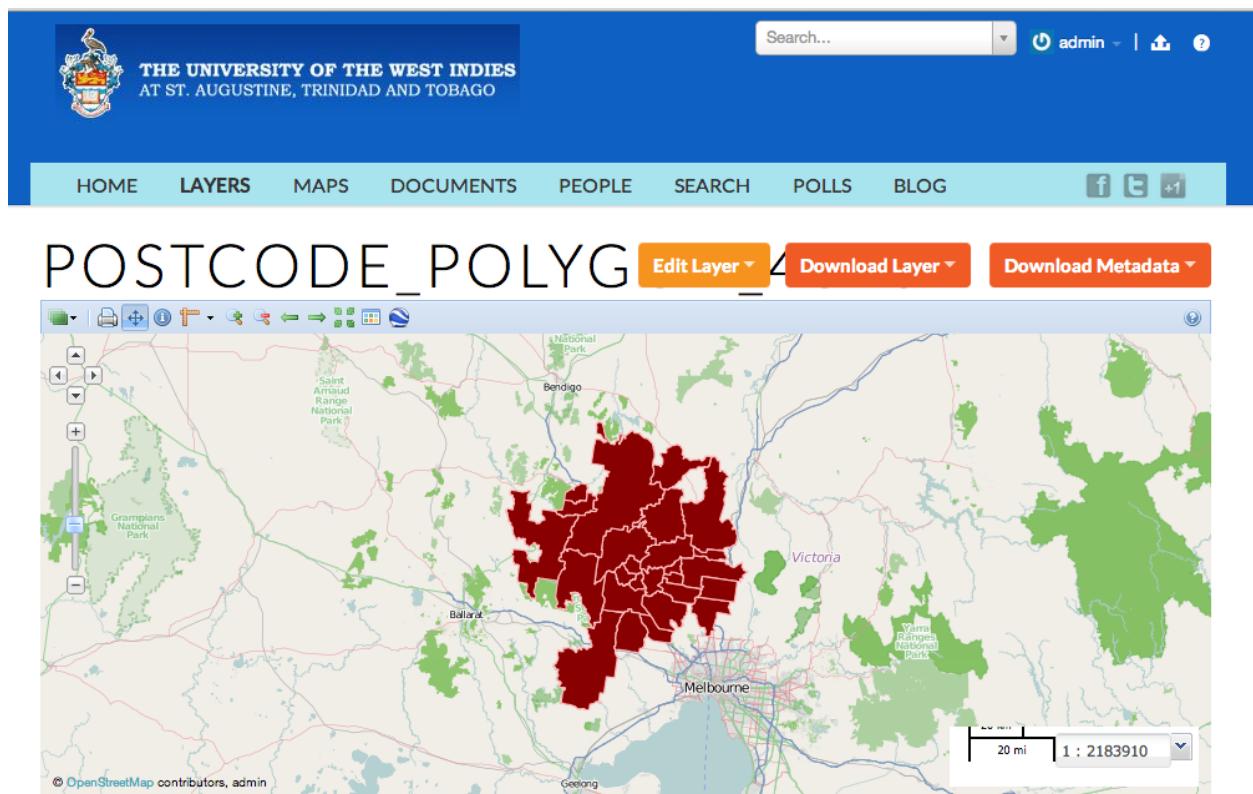
Visit the upload page in your GeoNode.

The screenshot shows the 'UPLOAD LAYERS' page of a GeoNode instance. At the top, there's a navigation bar with links for HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, SEARCH, POLLS, and BLOG. Below the navigation bar, there's a search bar and user authentication information ('admin'). The main content area has tabs for EXPLORE LAYERS, SEARCH LAYERS, and UPLOAD LAYERS (the latter is active). The UPLOAD LAYERS section contains fields for 'Title', 'Data' (with sub-fields for DBF, SHX, PRJ), 'SLD', 'XML', and 'Abstract'. To the right, there are 'PERMISSIONS' settings for 'Who can view and download this data?' (radio buttons for 'Anyone', 'Any registered user', or 'Only users who can edit'), 'Who can edit this data?' (radio buttons for 'Any registered user' or 'Only the following users or groups:' with a dropdown menu for 'Add user...'), and 'Who can manage and edit this data?' (radio buttons for 'Any registered user' or 'Only the following users or groups:' with a dropdown menu for 'Add user...').

You can edit the metadata for the layer and then click “Update” and you will see the Layer Info page for this layer.

### 4.3.2 GDAL (Raster Data)

Now that we have seen how to convert vector layers into shapefiles using ogr2ogr, we will walk through the steps necessary to perform the same operation with Raster layers. For this example, we will work with Arc/Info Binary and ASCII Grid data and convert it into GeoTiff format for use in GeoNode.



First, you need to download the sample data to work with it. You can do this by executing the following command:

```
$ wget http://dev.opengeo.org/~jjohnson/sample_asc.tgz
```

You will need to uncompress this file by executing this command:

```
$ tar -xvzf sample_asc.tgz
```

You will be left with the following files on your filesystem:

```
|-- batemans_ele
| |-- dblbnd.adf
| |-- hdr.adf
| |-- metadata.xml
| |-- prj.adf
| |-- sta.adf
| |-- w001001.adf
| |-- w001001x.adf
|-- batemans_elevation.asc
```

The file batemans\_elevation.asc is an Arc/Info ASCII Grid file and the files in the batemans\_ele directory are an Arc/Info Binary Grid file.

You can use the gdalinfo command to inspect both of these files by executing the following command:

```
$ gdalinfo batemans_elevation.asc
```

The output should look like the following:

```
Driver: AAIGrid/Arc/Info ASCII Grid
Files: batemans_elevation.asc
Size is 155, 142
Coordinate System is ''
Origin = (239681.0000000000000000,6050551.0000000000000000)
Pixel Size = (100.0000000000000,-100.00000000000000)
Corner Coordinates:
Upper Left (239681.000, 6050551.000)
Lower Left (239681.000, 6036351.000)
Upper Right (255181.000, 6050551.000)
Lower Right (255181.000, 6036351.000)
Center (247431.000, 6043451.000)
Band 1 Block=155x1 Type=Float32, ColorInterp=Undefined
 NoData Value=-9999
```

You can then inspect the batemans\_ele files by executing the following command:

```
Driver: AIG/Arc/Info Binary Grid
Files: batemans_ele
 batemans_ele/dblbnd.adf
 batemans_ele/hdr.adf
 batemans_ele/metadata.xml
 batemans_ele/prj.adf
 batemans_ele/sta.adf
 batemans_ele/w001001.adf
 batemans_ele/w001001x.adf
Size is 155, 142
Coordinate System is:
PROJCS["unnamed",
 GEOGCS["GDA94",
 DATUM["Geocentric_Datum_of_Australia_1994",
 SPHEROID["GRS 1980", 6378137, 298.257222101,
 AUTHORITY["EPSG", "7019"]],
 TOWGS84[0, 0, 0, 0, 0, 0, 0],
 AUTHORITY["EPSG", "6283"]],
 PRIMEM["Greenwich", 0,
 AUTHORITY["EPSG", "8901"]],
 UNIT["degree", 0.0174532925199433,
 AUTHORITY["EPSG", "9122"]],
 AUTHORITY["EPSG", "4283"]],
 PROJECTION["Transverse_Mercator"],
 PARAMETER["latitude_of_origin", 0],
 PARAMETER["central_meridian", 153],
 PARAMETER["scale_factor", 0.9996],
 PARAMETER["false_easting", 500000],
 PARAMETER["false_northing", 10000000],
 UNIT["METERS", 1]]
Origin = (239681.0000000000000000,6050551.0000000000000000)
Pixel Size = (100.0000000000000,-100.0000000000000)
Corner Coordinates:
Upper Left (239681.000, 6050551.000) (150d 7'28.35"E, 35d39'16.56"S)
Lower Left (239681.000, 6036351.000) (150d 7'11.78"E, 35d46'56.89"S)
Upper Right (255181.000, 6050551.000) (150d17'44.07"E, 35d39'30.83"S)
Lower Right (255181.000, 6036351.000) (150d17'28.49"E, 35d47'11.23"S)
Center (247431.000, 6043451.000) (150d12'28.17"E, 35d43'13.99"S)
Band 1 Block=256x4 Type=Float32, ColorInterp=Undefined
 Min=-62.102 Max=142.917
 NoData Value=-3.4028234663852886e+38
```

You will notice that the batemans\_elevation.asc file does *not* contain projection information while the batemans\_ele file does. Because of this, lets use the batemans\_ele files for this exercise and convert them to a GeoTiff for use in GeoNode. We will also reproject this file into WGS84 in the process. This can be accomplished with the following command.

```
$ gdalwarp -t_srs EPSG:4326 batemans_ele batemans_ele.tif
```

The output will show you the progress of the conversion and when it is complete, you will be left with a batemans\_ele.tif file that you can upload to your GeoNode.

You can inspect this file with the gdalinfo command:

```
$ gdalinfo batemans_ele.tif
```

Which will produce the following output:

```
Driver: GTiff/GeoTIFF
Files: batemans_ele.tif
Size is 174, 130
Coordinate System is:
GEOGCS["WGS 84",
 DATUM["WGS_1984",
 SPHEROID["WGS 84",6378137,298.257223563,
 AUTHORITY["EPSG","7030"]],
 AUTHORITY["EPSG","6326"]],
 PRIMEM["Greenwich",0],
 UNIT["degree",0.0174532925199433],
 AUTHORITY["EPSG","4326"]]
Origin = (150.119938943722502,-35.654598806259330)
Pixel Size = (0.001011114155919,-0.001011114155919)
Metadata:
 AREA_OR_POINT=Area
Image Structure Metadata:
 INTERLEAVE=BAND
Corner Coordinates:
Upper Left (150.1199389, -35.6545988) (150d 7'11.78"E, 35d39'16.56"S)
Lower Left (150.1199389, -35.7860436) (150d 7'11.78"E, 35d47' 9.76"S)
Upper Right (150.2958728, -35.6545988) (150d17'45.14"E, 35d39'16.56"S)
Lower Right (150.2958728, -35.7860436) (150d17'45.14"E, 35d47' 9.76"S)
Center (150.2079059, -35.7203212) (150d12'28.46"E, 35d43'13.16"S)
Band 1 Block=174x11 Type=Float32, ColorInterp=Gray
```

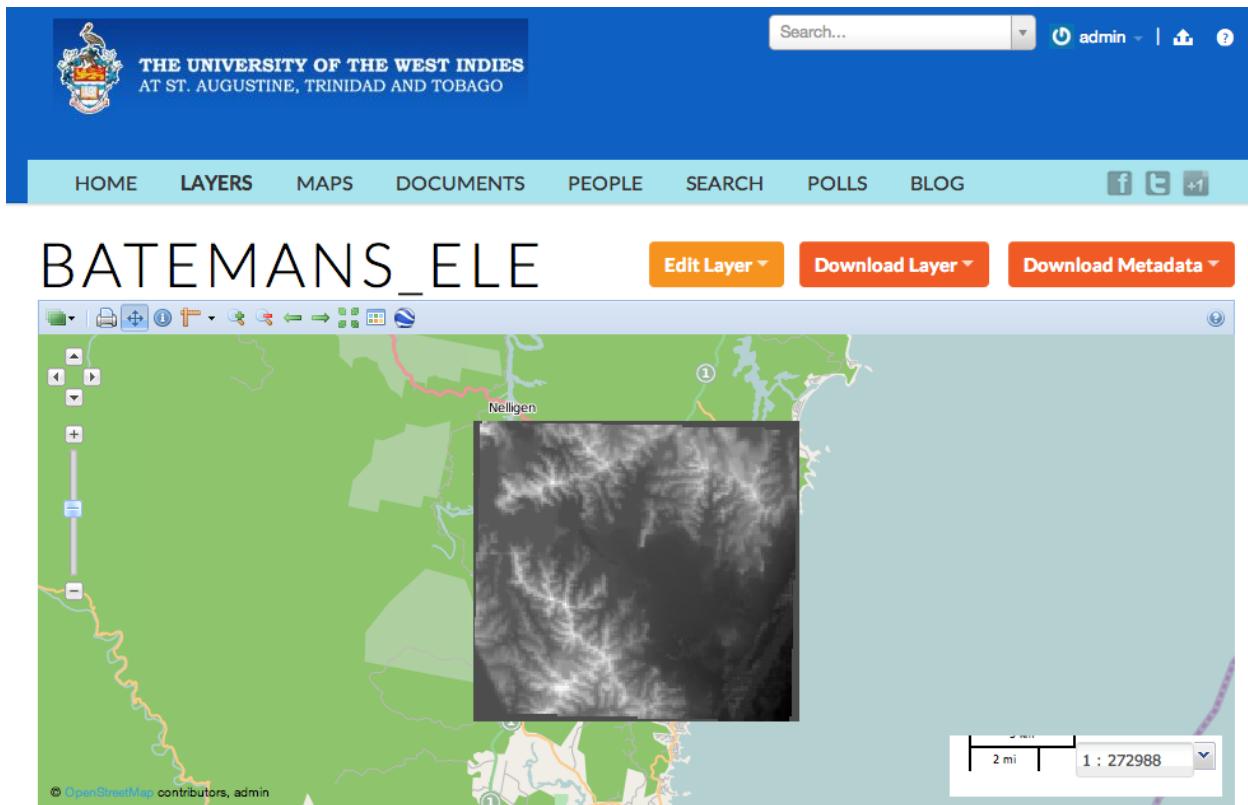
You can then follow the same steps we used above to upload the GeoTiff file we created into the GeoNode, and you will see your layer displayed in the Layer Info page.

Now that you have seen how to convert layers with both OGR and GDAL, you can use these techniques to work with your own data and get it prepared for inclusion in your own GeoNode.

## 4.4 Loading OSM Data into GeoNode

In this section, we will walk through the steps necessary to load OSM data into your GeoNode project. As discussed in previous sections, your GeoNode already uses OSM tiles from MapQuest and the main OSM servers as some of the available base layers. This session is specifically about extracting actual data from OSM and converting it for use in your project and potentially for Geoprocessing tasks.

The first step in this process is to get the data from OSM. We will be using the OSM Overpass API since it lets us do more complex queries than the OSM API itself. You should refer to the OSM Overpass API documentation to learn



about all of its features. It is an extremely powerful API that lets you extract data from OSM using a very sophisticated API.

- [http://wiki.openstreetmap.org/wiki/Overpass\\_API](http://wiki.openstreetmap.org/wiki/Overpass_API)
- [http://wiki.openstreetmap.org/wiki/Overpass\\_API/Language\\_Guide](http://wiki.openstreetmap.org/wiki/Overpass_API/Language_Guide)

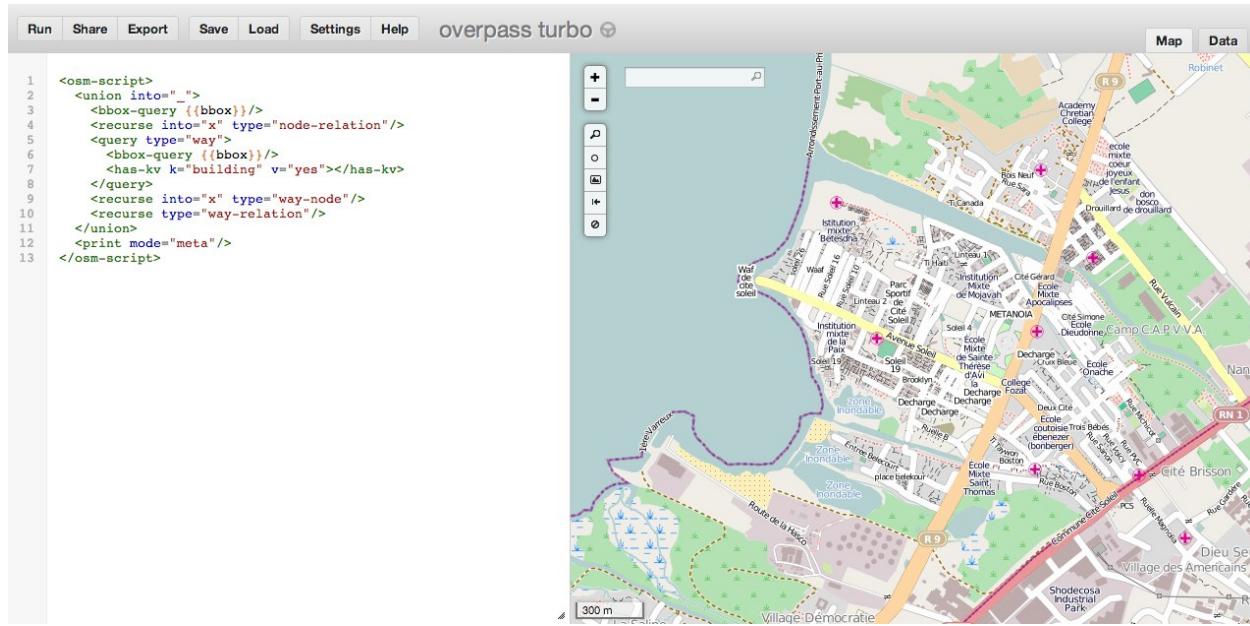
In this example, we will be extracting building footprint data around Port au Prince in Haiti. To do this we will use an interactive tool that makes it easy construct a Query against the Overpass API. Point your browser at <http://overpass-turbo.eu/> and use the search tools to zoom into Port Au Prince and Cite Soleil specifically.

You will need to cut and paste the query specified below to get all of the appropriate data under the bbox:

```
<osm-script>
 <union into="_">
 <bbox-query {{bbox}}/>
 <recurse into="x" type="node-relation"/>
 <query type="way">
 <bbox-query {{bbox}}/>
 <has-kv k="building" v="yes"/></has-kv>
 </query>
 <recurse into="x" type="way-node"/>
 <recurse type="way-relation"/>
 </union>
 <print mode="meta"/>
</osm-script>
```

This should look like the following.

When you have the bbox and query set correctly, click the “Export” button on the menu to bring up the export menu,



and then click the API interpreter link to download the OSM data base on the query you have specified.

This will download a file named ‘interpreter’ on your file system. You will probably want to rename it something else more specific. You can do that by issuing the following command in the directory where it was downloaded:

```
$ mv interpreter cite_soleil_buildings.osm
```

**Note:** You can also rename the file in your Operating Systems File management tool (Windows Explorer, Finder etc).

Now that we have osm data on our filesystem, we will need to convert it into a format suitable for uploading into your GeoNode. There are many ways to accomplish this, but for purposes of this example, we will use an OSM QGIS plugin that makes it fairly easy. Please consult the wiki page that explains how to install this plugin and make sure it is installed in your QGIS instance. Once it's installed, you can use the Web Menu to load your file.

This will bring up a dialog box that you can use to find and convert the osm file we downloaded.

When the process has completed, you will see your layers in the Layer Tree in QGIS.

Since we are only interested in the polygons, we can turn the other 2 layers off in the Layer Tree.

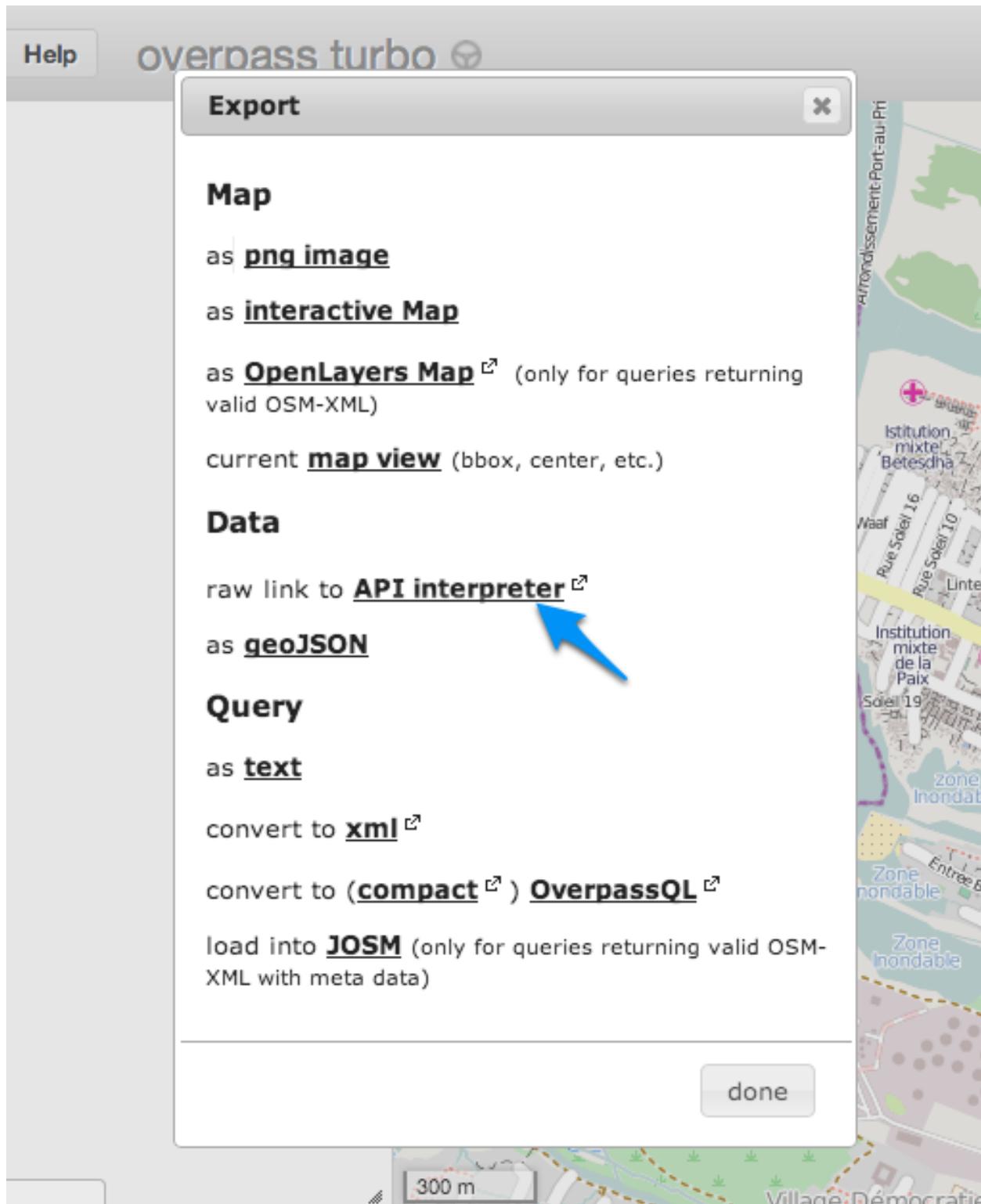
The next step is to use QGIS to convert this layer into a Shapefile so we can upload it into GeoNode. To do this, select the layer in the Layer tree, right click and then select the Save As option.

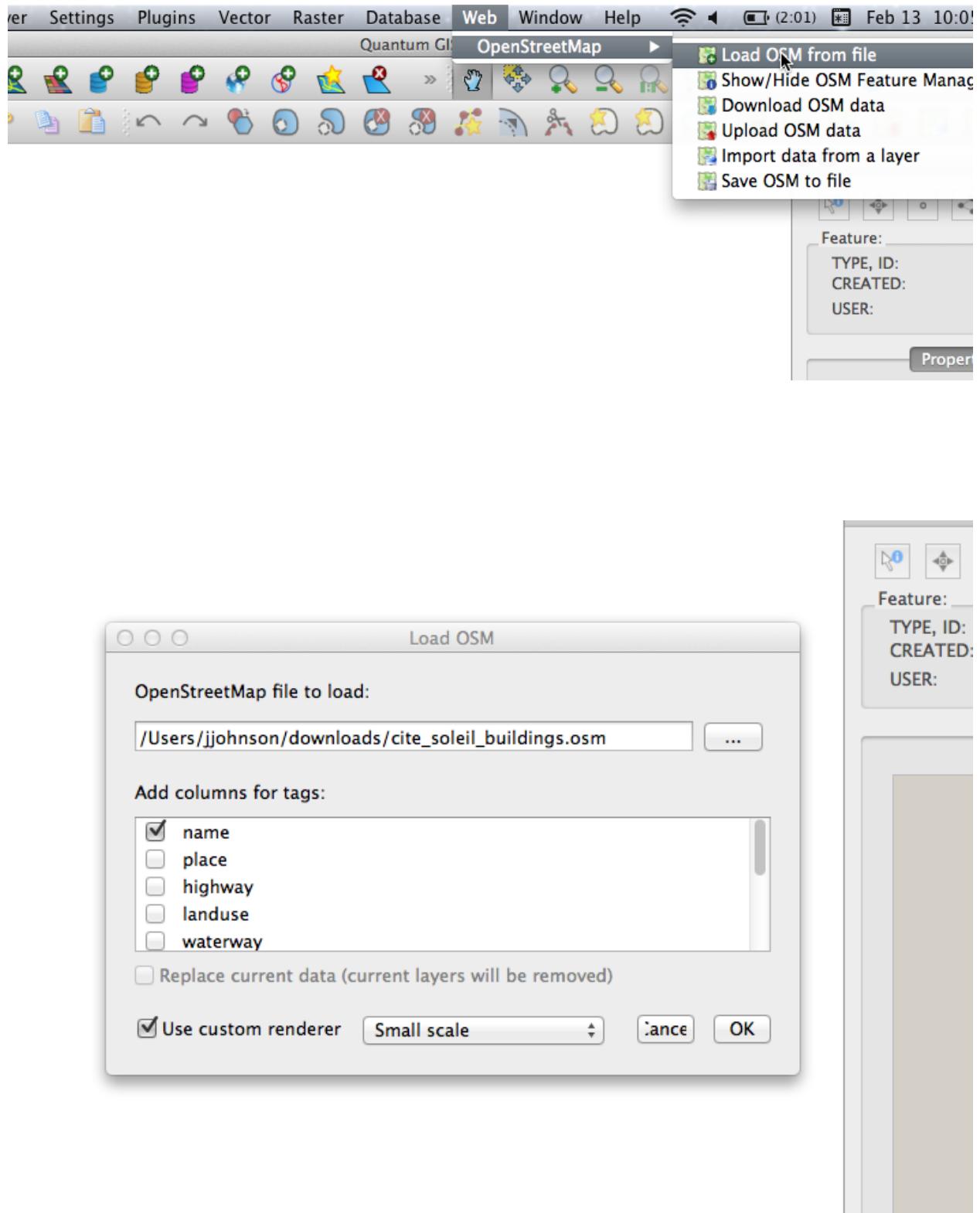
This will bring up the Save Vector Layer as Dialog.

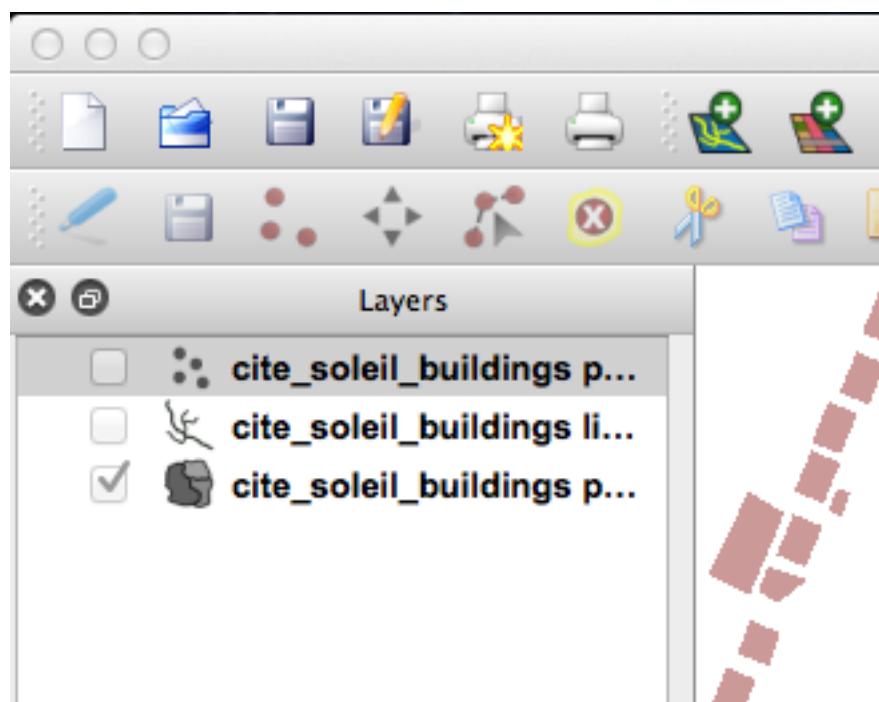
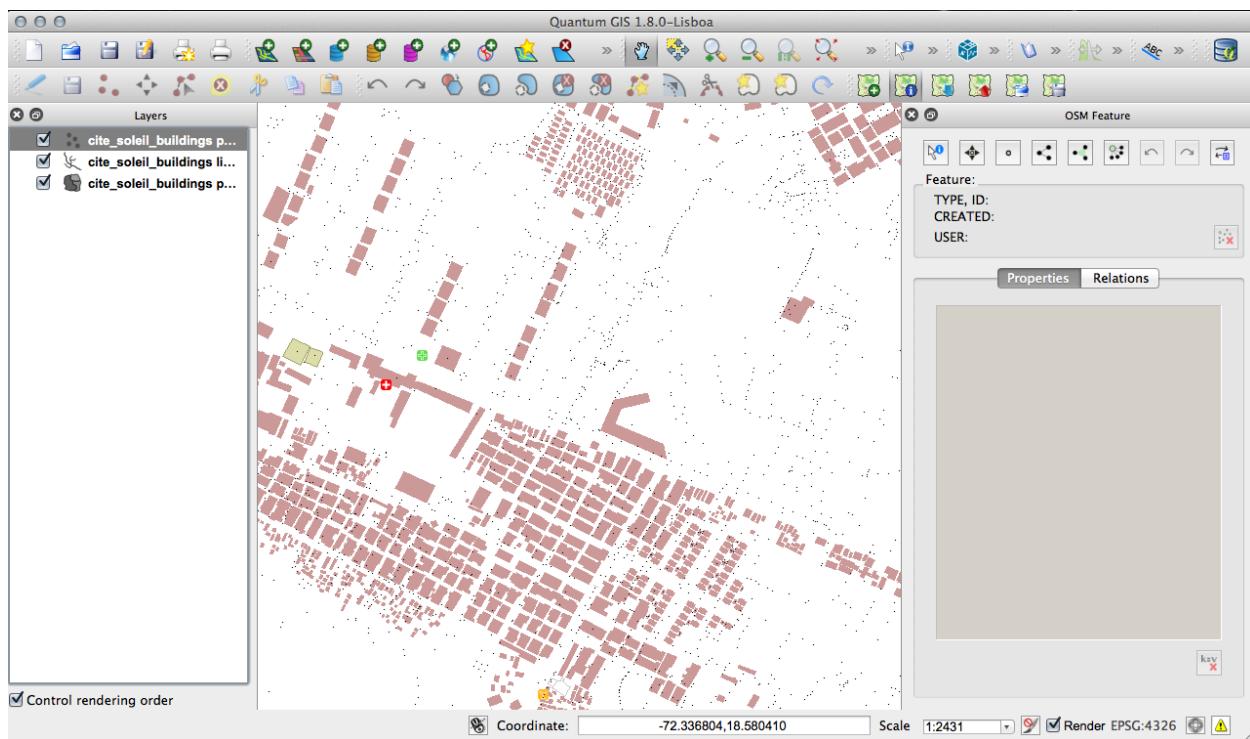
Specify where on disk you want your file saved, and hit Save then OK.

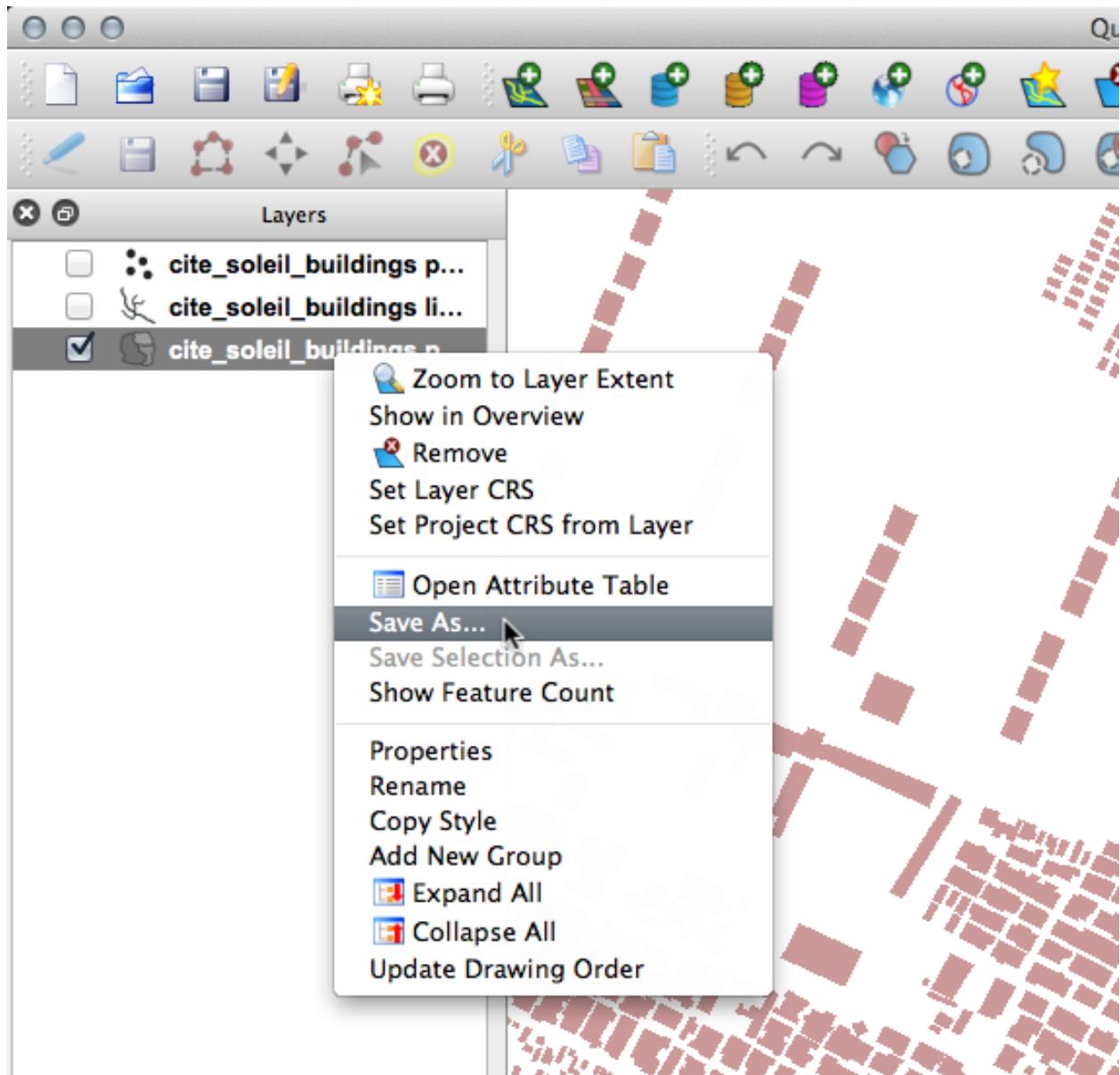
You now have a shapefile of the data you extracted from OSM that you can use to load into GeoNode. Use the GeoNode Layer Upload form to load the Shapefile parts into your GeoNode, and optionally edit the metadata and then you can view your layer in the Layer Info page in your geonode.

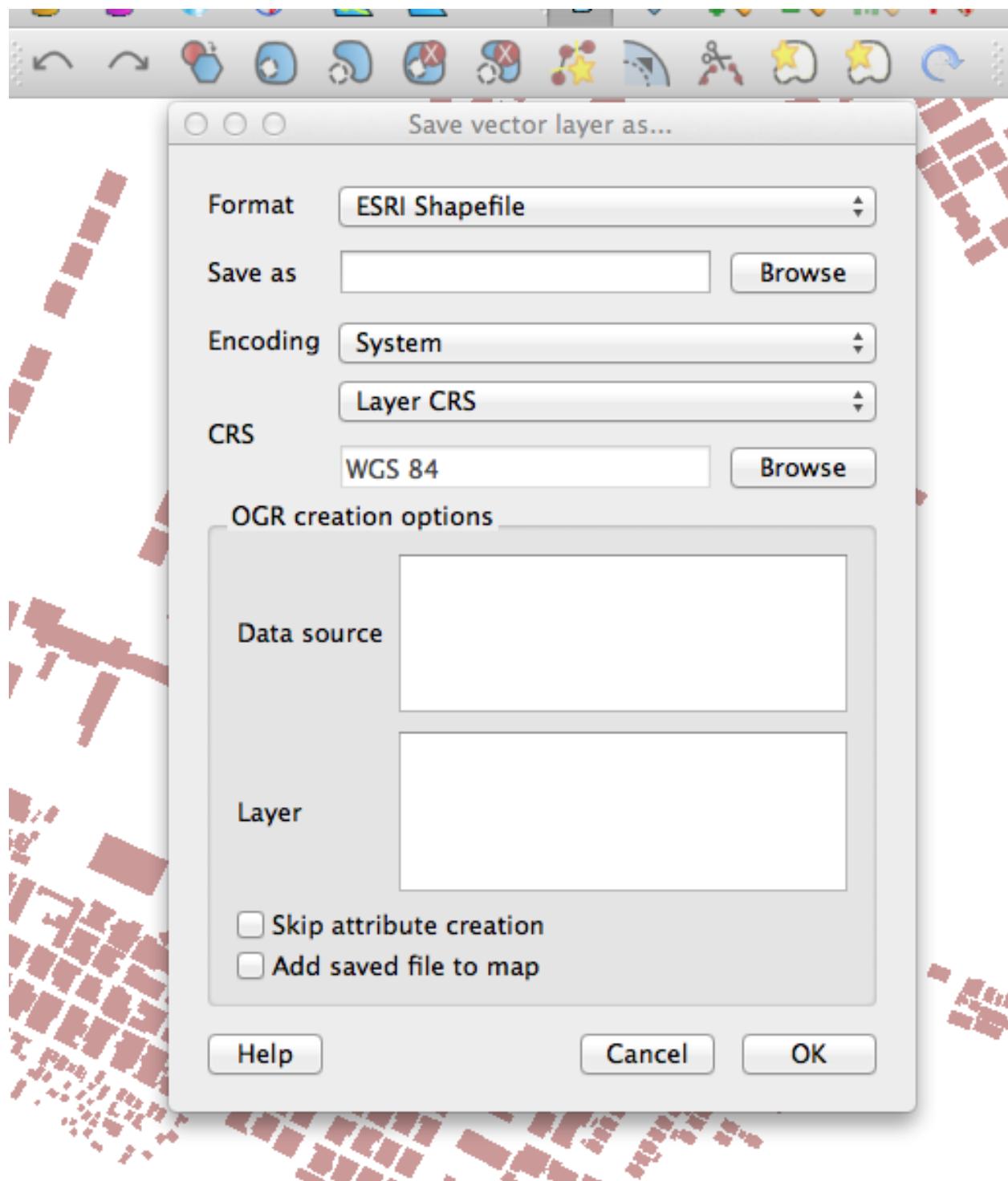
**Note:** You may want to switch to an imagery layer in order to more easily see the buildings on the OSM background.

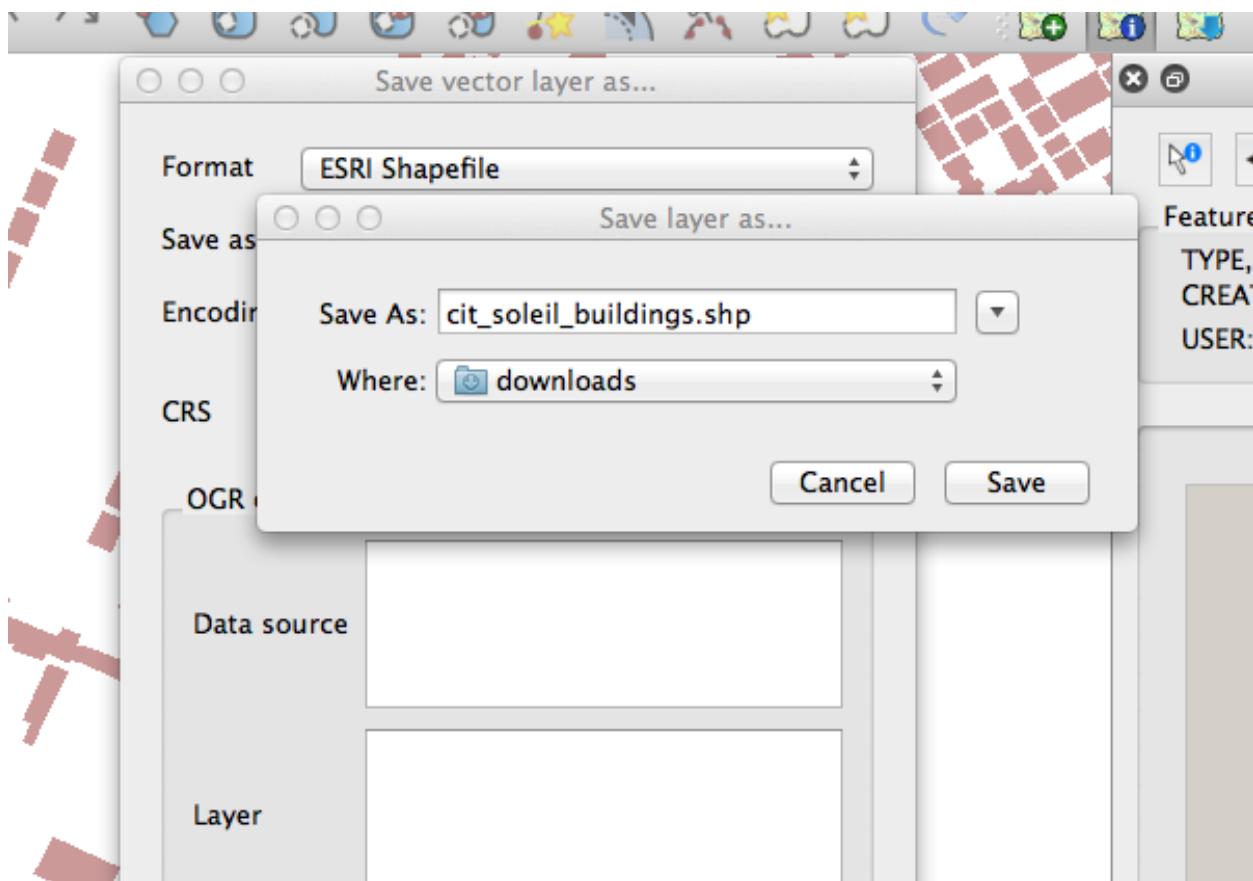












A screenshot of the GeoNode interface. The top navigation bar includes 'HOME', 'LAYERS', 'MAPS', 'DOCUMENTS', 'PEOPLE', 'SEARCH', 'POLLS', 'BLOG', and social media links. The main title is 'CIT\_SOLEIL\_BUILD'. Below it is an 'Edit Layer' button, a 'Download Layer' button, and a 'Download Metadata' button. A 'Feature Info' window is open over a map showing buildings in red. The window displays the following data:

Name	Value
Timestamp	2010-01-15T0...
User	ceyockey
Tags	"building"="yes..."
Name	

The map shows a coastal area with buildings highlighted in red. A scale bar indicates 1000 ft and 1 : 34123. The bottom left corner shows the 'bing' logo.



# GEONODE DEBUGGING TECHNIQUES

GeoNode can be difficult to debug as there are several different components involved:

- Browser - includes HTML/CSS issues, JavaScript, etc.
- Django - GeoNode HTML views and web APIs
- GeoServer - Core Wxx services and Platform REST APIs

When attempting to diagnose a specific problem, often the order of investigation mirrors the order above - that is, start with the client: Is this a bug in code running on the browser. If not, step to the next level: the Django responses to client requests. Often this is possible via the browser using the correct tools. Many requests require Django communications with GeoServer. This is the next stage of investigation if a specific bug does not appear to originate in Django or the client.

The following section covers techniques to help diagnose and debug errors.

## 5.1 Debugging GeoNode in the Browser

This section covers some techniques for debugging browser and Django related response bugs using the Firefox web browser extension named Firebug. The concepts covered apply to other browser's tools but may vary in terminology.

Another Firefox extension worth noting is ‘jsonview’. This extension supports formatted viewing of JSON responses and integrates well with Firebug.

References:

- <https://getfirebug.com/faq/>
- <http://jsonview.com/>

### 5.1.1 Net Tab

The net tab allows viewing all of the network traffic from the browser. The subtabs (like the selected “Images” tab) allow filtering by the type of traffic.

In this screen-shot, the mouse hover displays the image content and the full URL requested. One can right-click to copy-paste the URL or view in a separate tab. This is useful for obtaining test URLs. The grayed out entries show that the resource was cached via conditional-get (the 304 not modified). Other very useful advanced information includes the size of the response and the loading indicator graphics on the right. At the bottom, note the total size and timing information.

The screenshot shows the GeoNode website at [alpha.dev.geonode.org](http://alpha.dev.geonode.org). The main content includes:

- WELCOME**: A large heading.
- GeoNode**: The logo and navigation menu with links to HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, and SEARCH.
- Explore Layer** and **Explore Map** buttons.
- LATEST LAYERS** section:
  - A thumbnail image of a map labeled "irrigated\_areas".
  - The layer name "irrigated\_areas".
  - Details: "from admin, 10 hours, 13 minutes ago".
  - A "Download" button.
  - No abstract provided.
  - 0 views | Average rating ★★★★☆
- LATEST MAPS** section:
  - A thumbnail image labeled "San Diego School Districts Map".
  - The map title "San Diego School Districts Map".
  - Details: "No Image Available".
  - A "Download" button.

Below the browser window, the Firebug Net tab displays network activity:

URL	Status	Domain	Size	Remote IP	Timeline
<a href="http://alpha.dev.geonode.org/geoserver/wms/reflect?layers=it.geosolutions:irrigated_areas&amp;width=159&amp;height=63&amp;format=image/png8">http://alpha.dev.geonode.org/geoserver/wms/reflect?layers=it.geosolutions:irrigated_areas&amp;width=159&amp;height=63&amp;format=image/png8</a>	200 OK	alpha.dev.geonode.org	4.1 KB	54.235.204.189:80	1.24s
GET reflect_layer	200 OK	alpha.dev.geonode.org	985 B	54.235.204.189:80	1.25s
GET reflect_layer	200 OK	alpha.dev.geonode.org	2.4 KB	54.235.204.189:80	1.24s
GET logo	200 OK	alpha.dev.geonode.org	2.9 KB	54.235.204.189:80	102ms
GET facebook.png	304 Not Modified	alpha.dev.geonode.org	2.7 KB	54.235.204.189:80	203ms
GET twitter.png	304 Not Modified	alpha.dev.geonode.org	2.9 KB	54.235.204.189:80	306ms
GET google_plus.	304 Not Modified	alpha.dev.geonode.org	2.7 KB	54.235.204.189:80	411ms
GET arrows_gr_sm	304 Not Modified	alpha.dev.geonode.org	1.2 KB	54.235.204.189:80	624ms
GET select2.png	304 Not Modified	alpha.dev.geonode.org	396 B	54.235.204.189:80	562ms

Summary: 10 requests, 24.3 KB (12.8 KB from cache), 1.44s ( onload: 2.18s)

Figure 5.1: Firebug Net Tab

### **Net Tab Exercises**

1. Go to layers/maps/search pages and look at the various requests. Note the XHR subtab. Look at the various request specific tabs: headers, params, etc.
1. Use the ‘disable browser cache’ option and see how it affects page loads. Discuss advantages/challenges of caching.

### **5.1.2 DOM Tab**

The DOM tab displays all of the top-level window objects. By drilling down, this can be a useful way to find out what’s going on in a page.

In this example, the mouse is hovering over the app object. Note the high level view of objects and their fields. The console tab allows interacting with the objects.

### **DOM Tab Exercises**

1. Drill down in the DOM tab.
2. Use the console to interactively exercise jquery.
3. Use the console to interact with the app/map or other page objects

### **5.1.3 Script Tab**

The script tab allows viewing scripts and debugging.

The screen-shot displays a breakpoint set at line 3, the current code is stopped at line 8 and the mouse hover is displaying the value of the variable ‘class\_list’. On the right, the ‘Watch’ tab displays the various variables and scopes and offers a drill down view similar to the DOM view. The stack tab displays the execution stack context outside the current frame.

### **Script Tab Exercises**

1. Step through some code
2. Look at various features: variables, scopes, DOM drill-down

### **5.1.4 HTML Tab**

The HTML tag allows viewing and drilling down into the DOM. This is an incredibly useful feature when doing CSS or HTML work.

The screen-shot displays a search result ‘article’ element highlighted with padding and margin in yellow and purple. The DOM structure is displayed on the left and the right panel displays the specific style rules while the computed tab displays the effective style rules. The layout tab displays rulers and property values while the DOM tab displays a debug/DOM-like view of the actual object’s properties.

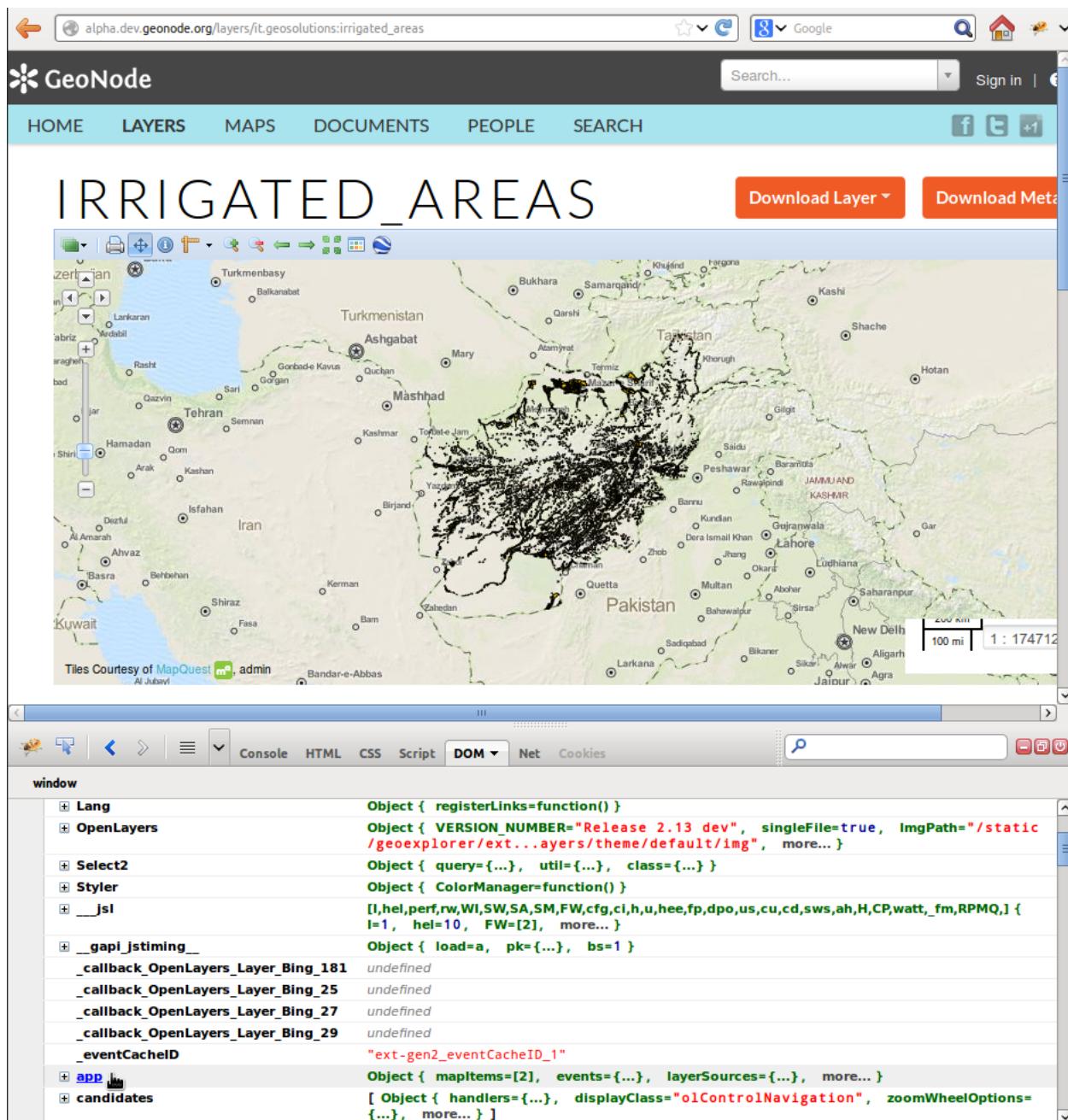


Figure 5.2: Firebug DOM Tab

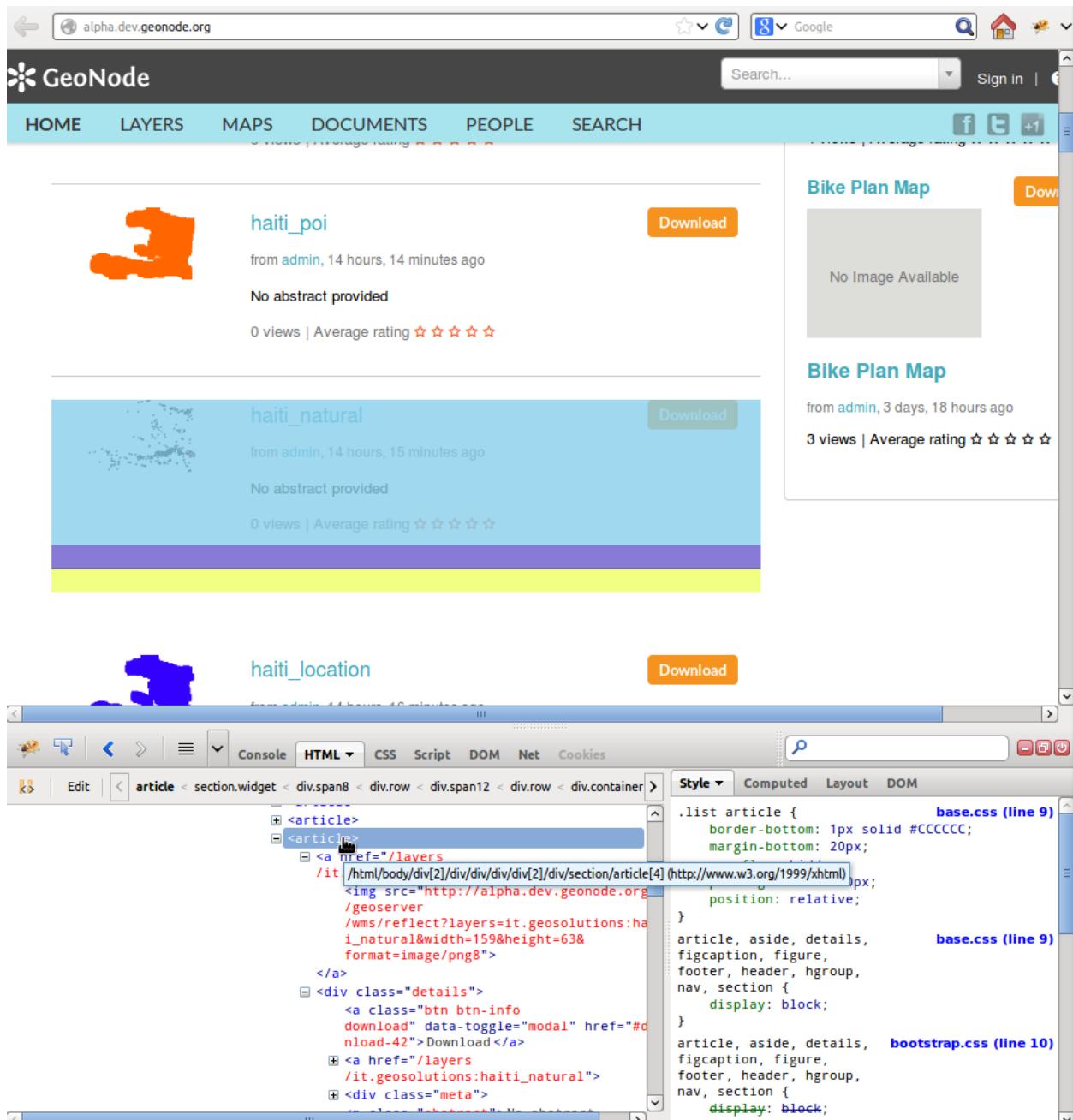
The screenshot shows the GeoNode search interface and the browser developer tools (Chrome DevTools) side-by-side.

**GeoNode Search Interface:**

- Header:** Shows the URL `alpha.dev.geonode.org/search/form/`, a Google search bar, and a sign-in link.
- Navigation Bar:** Includes links for HOME, LAYERS, MAPS, DOCUMENTS, PEOPLE, and SEARCH, along with social media sharing icons.
- Search Form:**
  - Search for:** A dropdown menu set to "All of the words" with a search input field and a "Search" button.
  - Exclude words from your search:** An empty input field.
  - Category Selection:** Radio buttons for "All categories" (selected), "Maps only", "Layers only", and "Users only".
- Metadata Filters:**
  - Since this date:** An input field with placeholder "yyyy-mm-dd" and a calendar icon.
  - Until this date:** An input field with placeholder "yyyy-mm-dd" and a calendar icon.

**Browser Developer Tools (Chrome DevTools):**

- Script Panel:** Shows the JavaScript code for the search functionality. The code handles topbar active tab support, removes the "current" class from the main navigation, adds a tooltip to certain elements, and handles a click event on the login link.
- Watch Panel:** Displays the current state of variables:
  - this:** Document /search/form/
  - class\_list:** [ "adv-search", "search" ]
  - arguments:** [ function() ]
  - Window:** Window /search/form/



## HTML Tab Exercises

1. Identify elements, look at the tabs on the right
2. Change styles, add new rules and styles
3. Edit existing HTML elements via the raw and tree-view

## 5.2 Debugging GeoNode's Python Components

### 5.2.1 Logging

References:

- <http://docs.python.org/2/library/logging.html>
- <https://docs.djangoproject.com/en/1.4/topics/logging/>

Logging is controlled by the contents of the logging data structure defined in the `settings.py`. The default settings distributed with GeoNode are configured to only log errors. During development, it's a good idea to override the logging data structure with something a bit more verbose.

### Output

In production, logging output will go into the apache error log. This is located in `/var/log/apache2/error.log`. During development, logging output will, by default, go to standard error.

### Configuring

- Ensure the ‘console’ handler is at the appropriate level. It will ignore log messages below the set level.
- Ensure the specific logger you’d like to use is set at the correct level.
- If attempting to log SQL, ensure `DEBUG=True` in your `local_settings.py`.

### Debugging SQL

- To trace all SQL in django, configure the `django.db.backends` logger to `DEBUG`
- To examine a specific query object, you can use the `query` field: `str(Layer.objects.all().query)`
- You can gather more information by using `django.db.connection.queries`. When `DEBUG` is enabled, query SQL and timing information is stored in this list.

### Hints

- Don’t use print statements. They are easy to use in development mode but in production they will cause failure.
- Take advantage of python. Instead of:

```
logging.info('some var ' + x + ' is not = ' + y)
```

Use:

```
logging.info('some var %s is not = %s', x, y)
```

### Excercises:

1. Enable logging of all SQL statements. Visit some pages and view the logging output.
2. Using the python shell, use the `queries` object to demonstrate the results of specific queries.

## 5.2.2 PDB

Reference:

- <http://docs.python.org/2/library/pdb.html>

For the adventurous, `pdb` allows for an interactive debugging session. This is only possible when running in a shell via `manage.py runserver` or `paver runserver`.

To set a breakpoint, insert the following code before the code to debug.

```
..code-block:: python
 import pdb; pdb.set_trace()
```

When execution reaches this statement, the debugger will activate. The commands are noted in the link above. In addition to those debugger specific commands, general python statements are supported. For example, typing the name of a variable in scope will yield the value via string coercion.

## 5.3 Debugging GeoServer

Resources:

- <http://docs.geoserver.org/stable/en/user/advanced/logging.html>
- <http://docs.geoserver.org/stable/en/user/production/troubleshooting.html>

This section does not attempt to cover developer-level debugging in GeoServer as this is a much larger topic involving many more tools. The goal here is to provide ‘black-box’ techniques to help resolve and report problems.

### 5.3.1 Logging

GeoServer logging, while sometimes containing too much information, is the best way to start diagnosing an issue in GeoNode once the other. To create a proper error report for use in requesting support, providing any contextual logging information is critical.

When using a standard geoserver installation, the GeoServer logs are located at `/usr/share/geoserver/data/logs/geoserver.log`. The properties files that control the varying rules are also located here.

### Exercises

1. Switch logging levels for various loggers.
2. Look at the different logging profiles and discuss the loggers and levels.
3. Learn how to read stacktraces, nested or otherwise.

### 5.3.2 Advanced Troubleshooting

JVM diagnostics and advanced troubleshooting techniques are covered in the GeoServer documents linked to above. When providing information for a bug report, these can be helpful but in-depth Java knowledge is required to fully comprehend the output from some of these tools.

#### Exercises

1. Look at jstack output

### 5.3.3 Using Django to Help Debug

The gsconfig library provides a rich interface to interacting with GeoServer's REST API. This allows high-level functions as well as viewing raw REST responses.

```
cat = Layer.objects.gs_catalog
cat.get_layers() # list of gsconfig layer objects
OR, for a specific layer
lyr = Layer.objects.get(id=1)
lyr.resource # specific gsconfig layer object
lyr.resource.fetch() # get the XML from REST
lyr.resource.dom # reference to the parsed XML
from xml.etree.ElementTree import tostring
tostring(lyr.resource.dom)
```



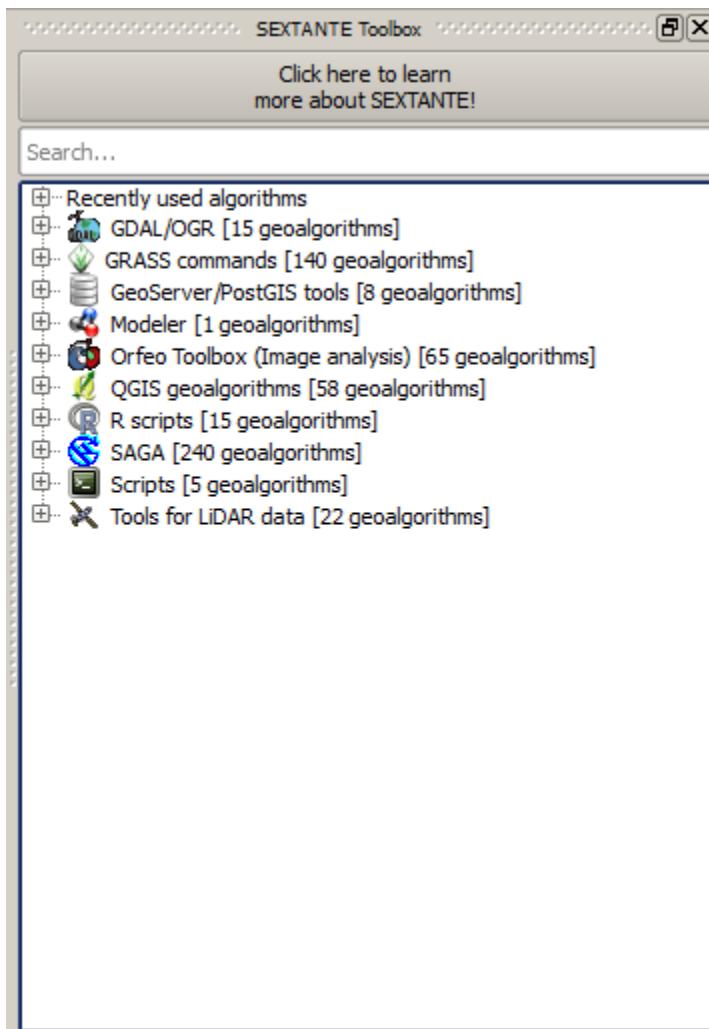
# SPATIAL PROCESSING WITH GEONODE

## 6.1 Spatial Processing with Sextante

Once you have connected to a GeoNode service and its data is available from QGIS, analysis can be performed on it, just as if you were using local data.

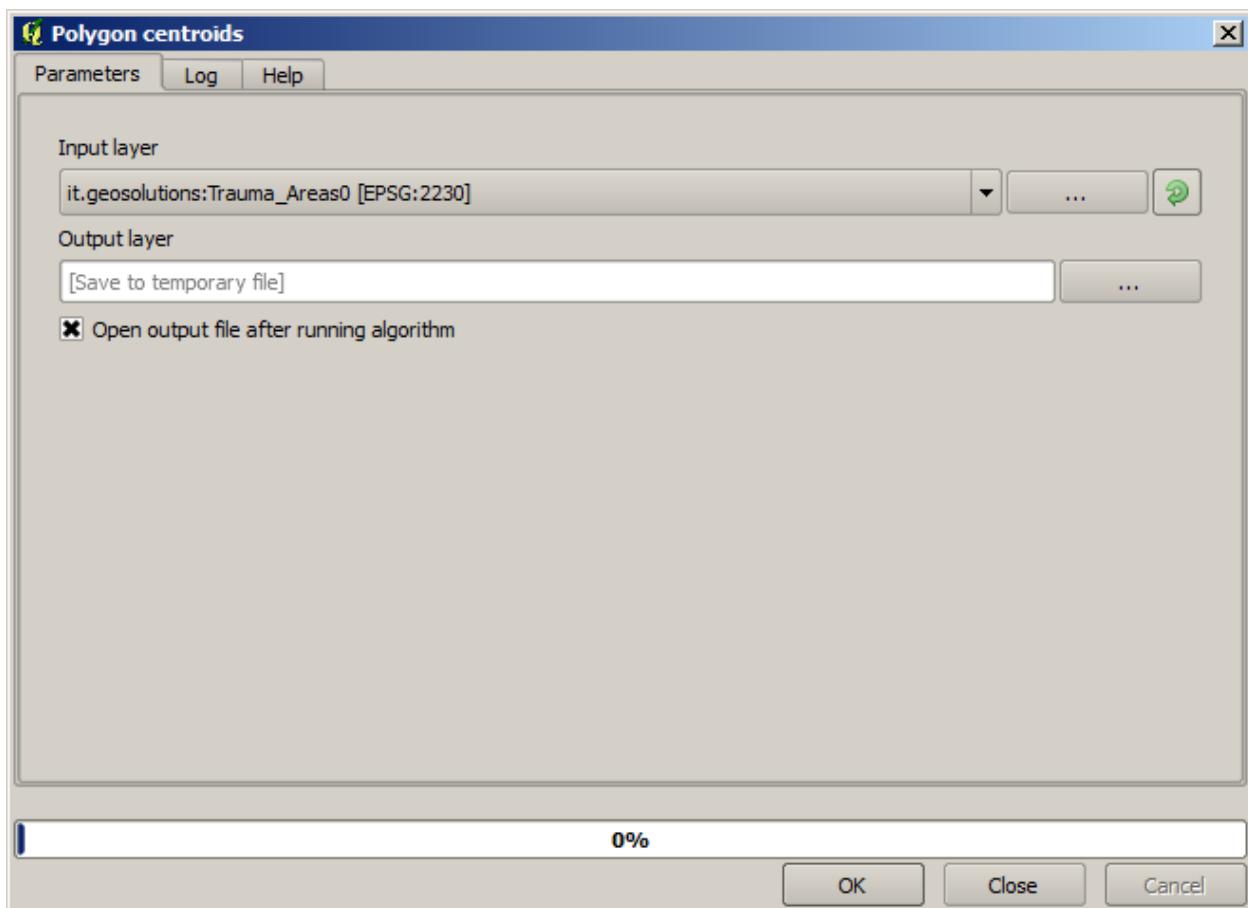
SEXTANTE is the analysis and data processing framework of QGIS, and it can be used to run a large number of different analysis algorithms for both raster and vector data. Both WCS and WFS connections can be used to get data that can be processes through SEXTANTE.

The SEXTANTE toolbox is the main component to call processing algorithms, and it contains a list all of available ones, organized by providers.



The *QGIS algorithms* group contains native python algorithms. Most of the remaining ones represent algorithms that depend on a third-party application. From the point of view of the user, however, there is no difference in the way these algorithms are executed, since they share a common UI and SEXTANTE takes care of the communication between the application and QGIS.

To run an algorithm, just click on its name in the toolbox, and a dialog will appear to define the inputs and outputs of the selected algorithm.



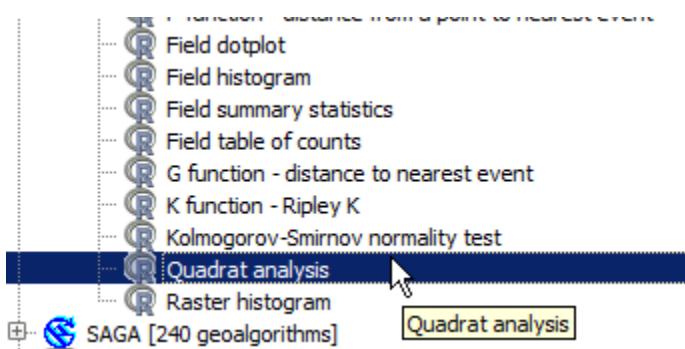
All dialogs used to entering the parameters needed for an algorithm are created on-the-fly, and they all share the same look and feel, no matter which application the algorithm relies on.

If the selected algorithm requires vector layers, all loaded vector layers will be available, including those from WFS connections. If it requires raster layers, all loaded raster layers will be available, including those from WCS connections.

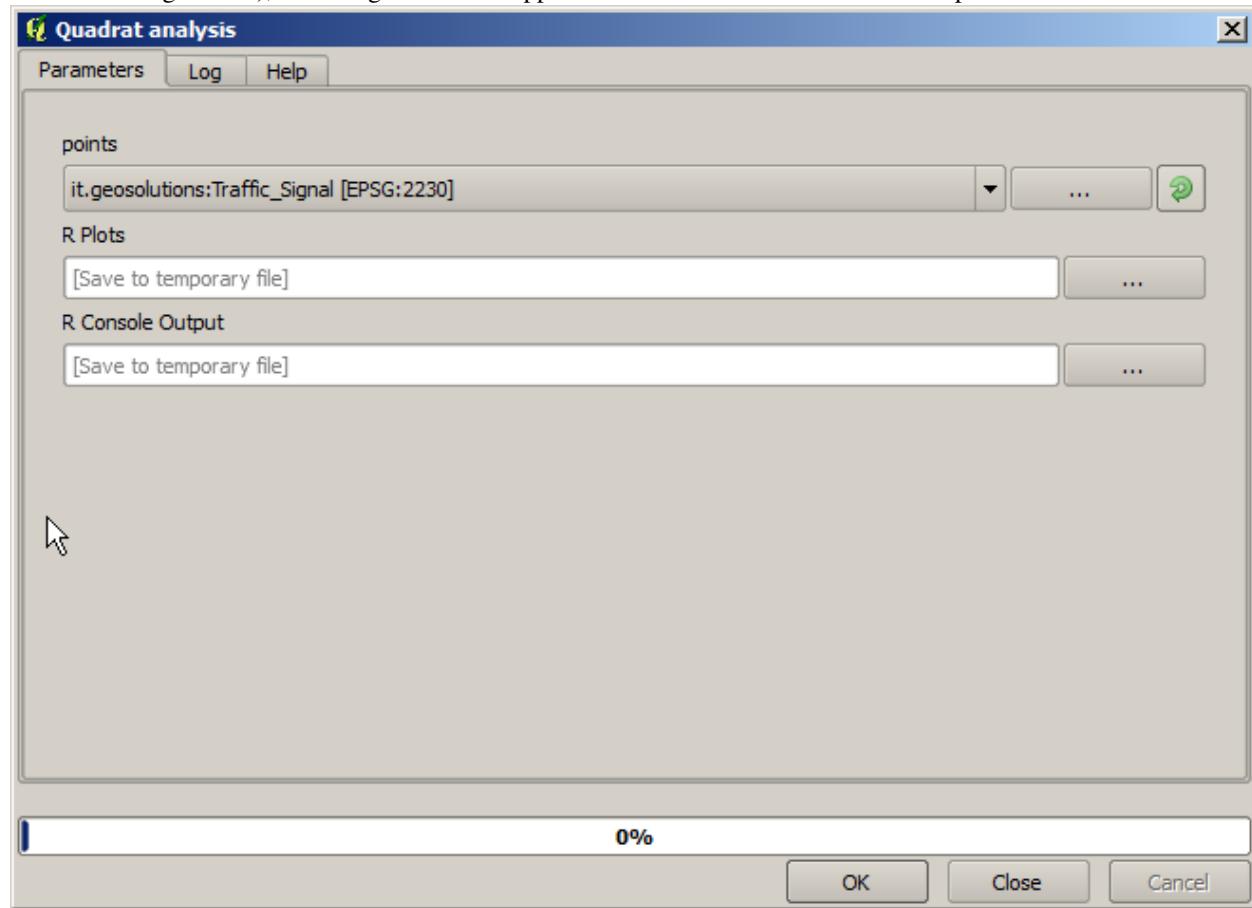
Click on *Ok* and the algorithm will be run and its outputs loaded in the QGIS canvas.

Algorithm depending on third-party application can be called in the same way. WFS and WMS layers will be available as well, even if the application does not support web services. SEXTANTE will take care of creating an intermediate file or selecting a compatible way of feeding the data into the application, performing all necessary import operations under the hood.

For instance, you can run algorithm that uses the R statistical computing software to perform a statistical analysis on the data loaded from a WFS connection.



The interface to define the input parameters is very similar to the one we saw in the previous example (and to those of all the other algorithms), and using an external application makes no difference from the point of view of the user.



SEXTANTE algorithms are aware of the state of layers used for input. That means that they can take into account whether there is a selection in a vector layer, even in the case of calling an external application. In the SEXTANTE configuration menu, in the *General* group, check the “Use selected features” option to enable this behavior.

image:: use\_selected.png

Now you can make a selection and call the R algorithm used before. It will just use those features that you selected.

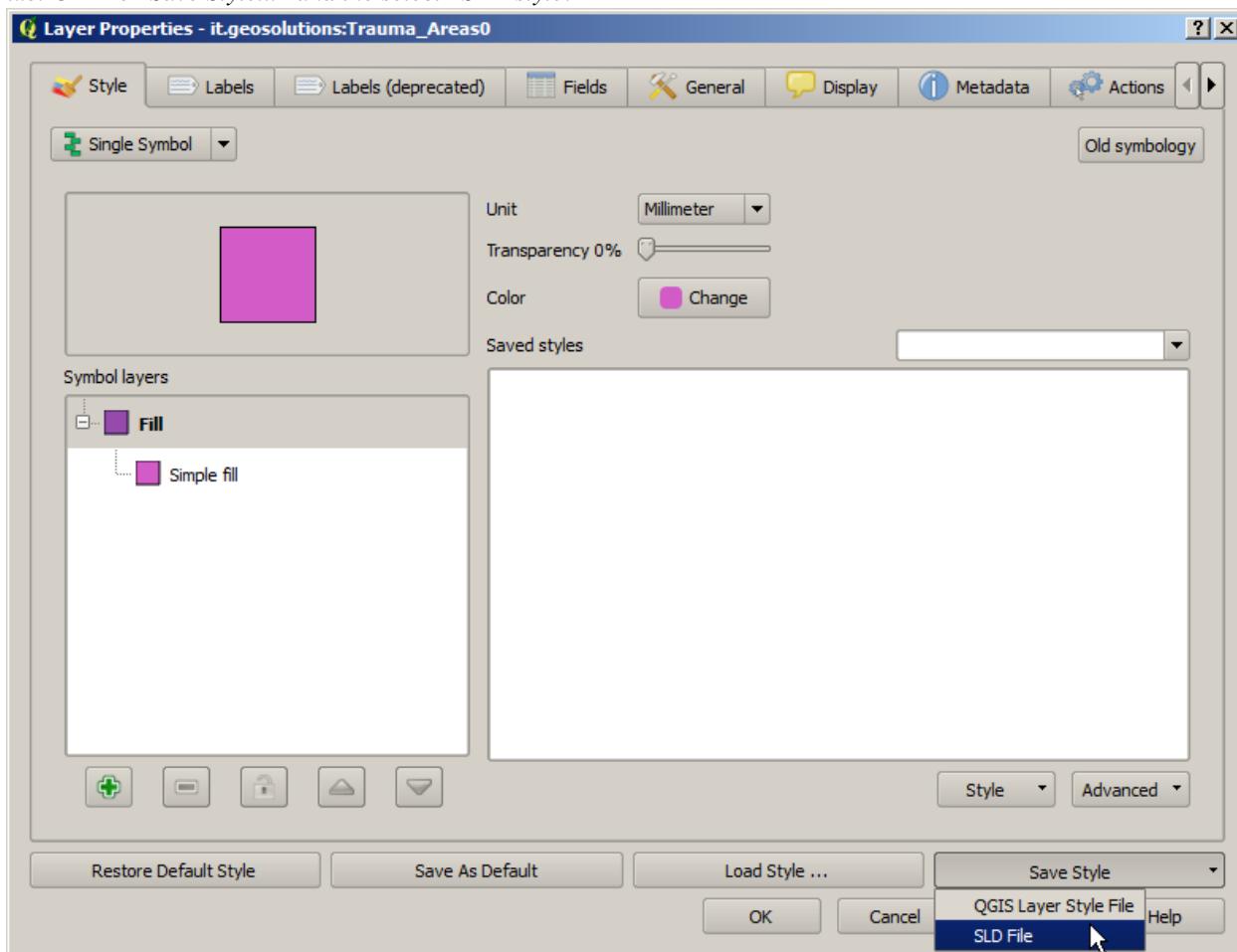
Notice that SEXTANTE provides the context for seamlessly integrating all the pieces and allowing to easily work with all of them together. In this case, GeoServer is providing the data, QGIS is providing the interface where we perform the selection, and R is providing the processing. SEXTANTE is just the mediator between these elements.

Using SEXTANTE we can interact with a GeoServer instance not just to consume its data, but to import into it, having a bidirectional connection.

In the *GeoServer/PostGIS tools* group, you will find some tools that you can use to create a new workspace, import a layer or import a style, among others.

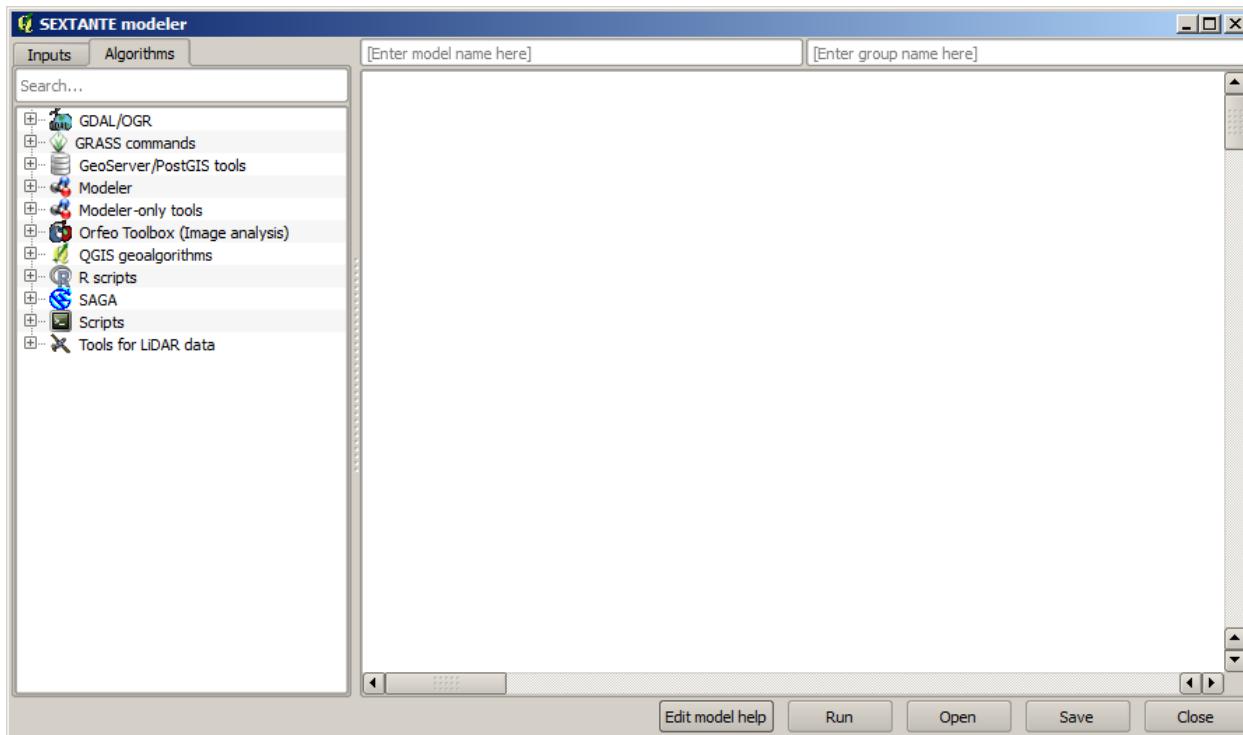


Styles are imported using an SLD file. Since QGIS supports exporting the style of a layer to SLD, you can create your styling using QGIS, then export it, and then use the corresponding SEXTANTE algorithm to add it to your GeoServer. To create and export a style, just right-click on a layer name in the TOC, select *Properties*, and then move to the *Style* tab. Click on *Save Style...* and the select *\*SLD style*.



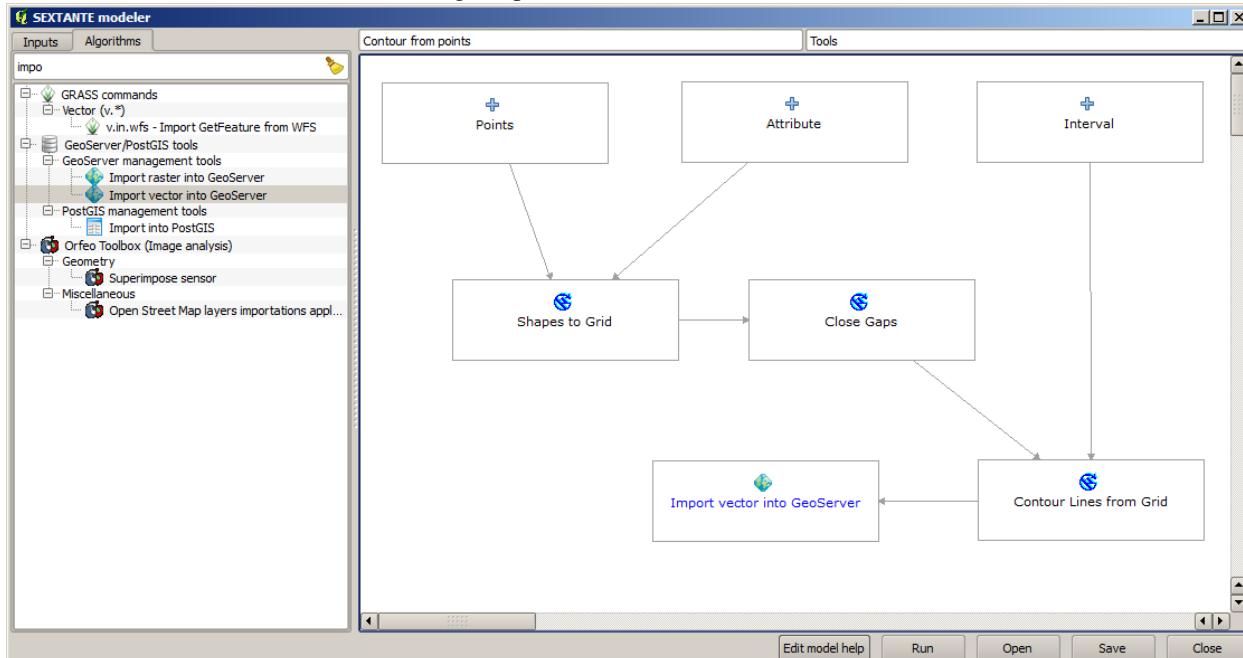
Calling algorithms from the toolbox is the most common way of processing data with SEXTANTE, but in some cases that might not be the best alternative, specially if we have a workflow that involves a large number of different processes. SEXTANTE includes a graphical modeler that allows to create complex workflows that can be later executed as a single process, thus simplifying the process.

The modeler interface is started from the SEXTANTE menu, using the “SEXTANTE modeler” menu.

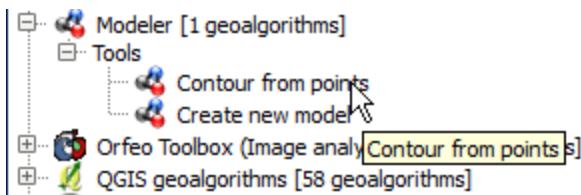


Creating a model involves adding a set of inputs and then the algorithms to use on them, defining the links between them.

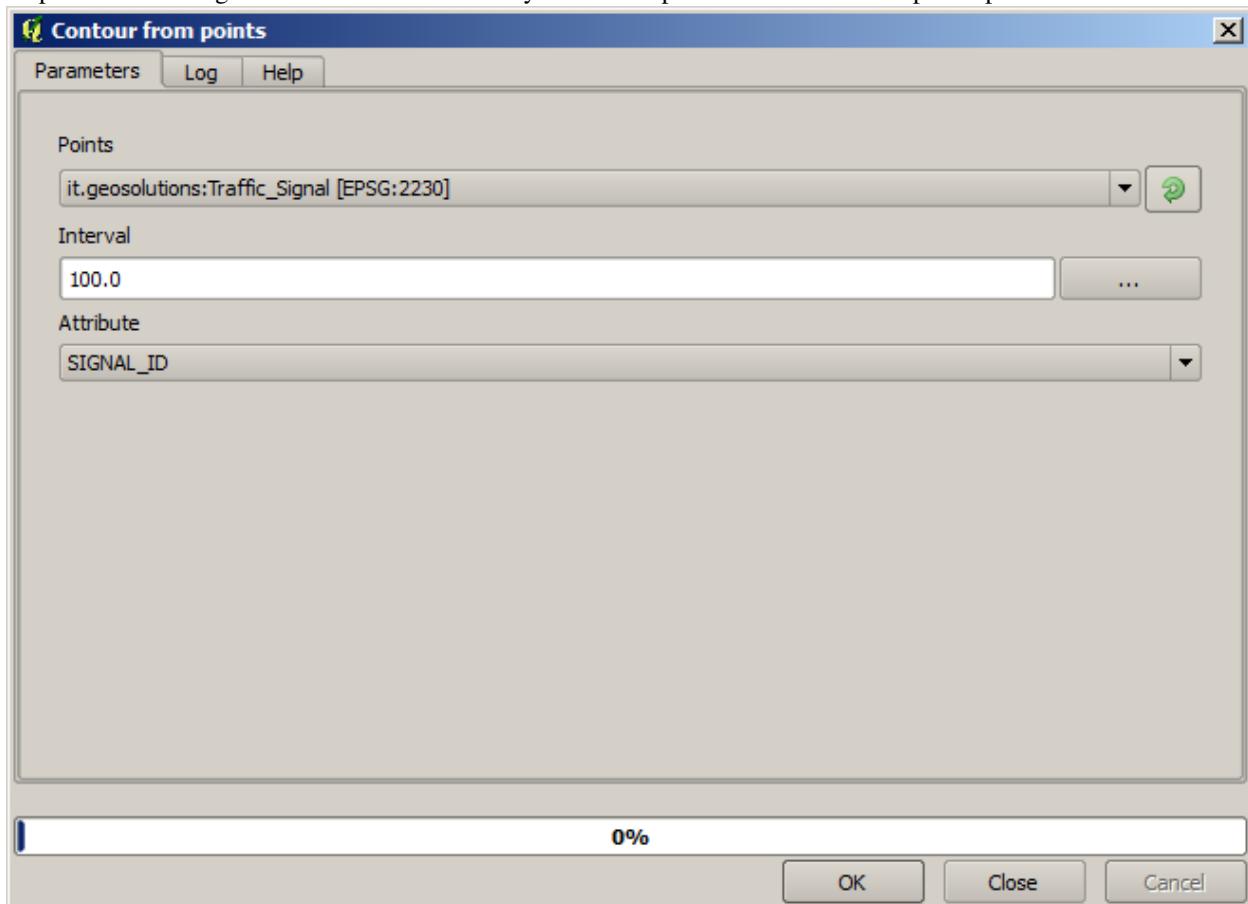
As an example, the model in the figure below takes a points layer, interpolates a raster layer from it and then extracts contour lines for that resulting raster layer, given an interval. The final layer is imported into a GeoServer instance. Used with a WFS service, this can be used to easily create an additional lines layer for a given points layer in a GeoServer instance, such as one containing temperature data for a set of sensors.



The model can be added to the toolbox and run as any of the built-in algorithms.



Its parameters dialog is also created automatically from the inputs it takes and the outputs it produces.



SEXTANTE exposes its API through the QGIS python console, including not just all its available algorithms, but also several tools for easy handling both vector and raster data and creating new geoalgorithms. Users familiar with python will be able to create much more complex models with ease, and to automate tasks that involve processing.

algorithms are executed ussing the `runalg` method, passing the name of the algorithm and the parameters it requires. Importing a layer into geoserver can be done from the QGIS console using code like the one shown below:

```
import sextante
filename = "/home/gisdata/example.shp"
sextante.runalg("gspg:importvectorintogeoserver", "http://localhost:8080/geoserver/rest", "admin", "geoserver")
```

Algorithms in the `gspg` namespace include utilities for interacting with both GeoServer and PostGIS.

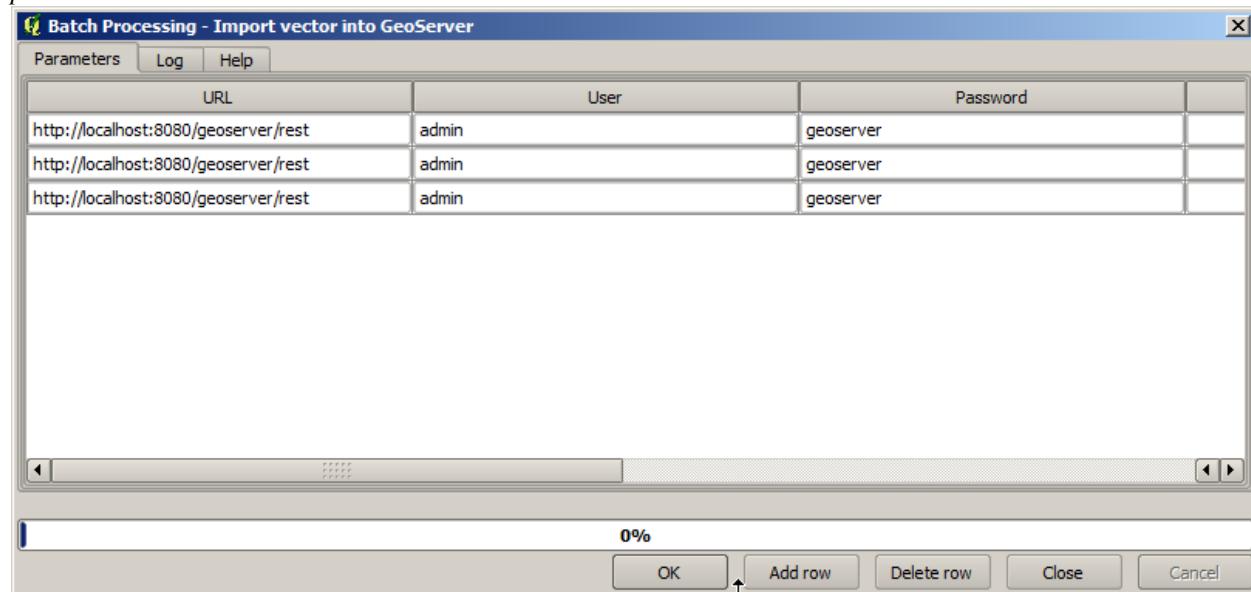
If the layer is loaded into QGIS, there is no need to enter the filename. The layer object can be obtained with the `getobject()` method and then passed to the algorithm call instead of the filename. For a layer named `mylayer`, that would be:

```
import sextante
layer = sextante.getobject("mylayer")
```

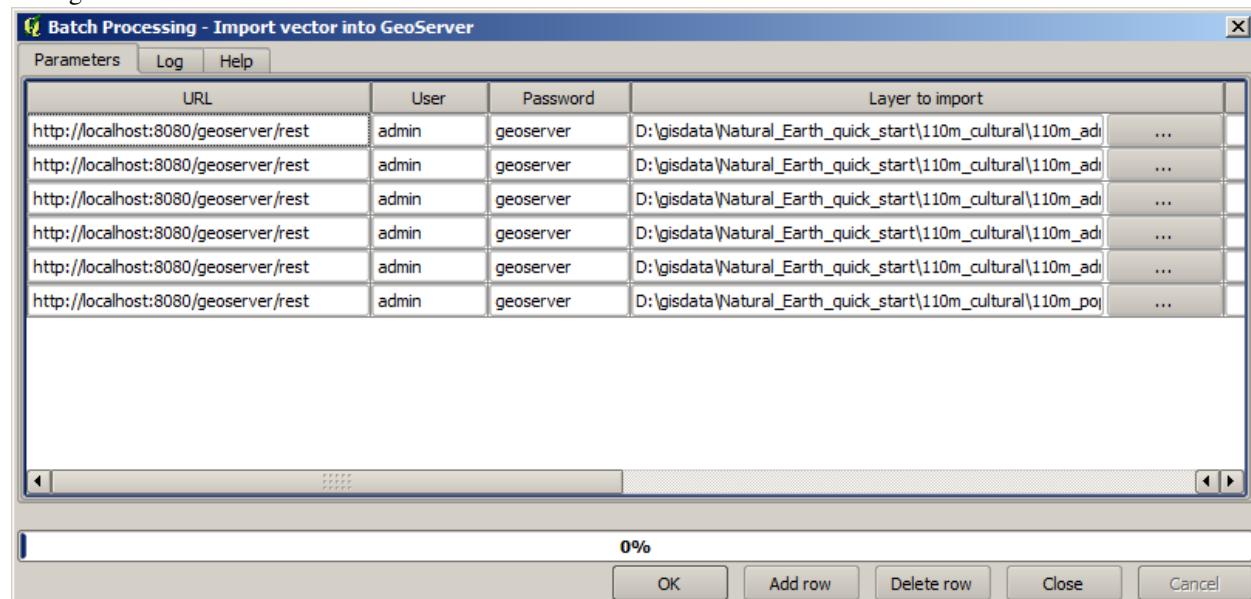
```
sextante.runalg("gspg:importvectorintogeoserver", "http://localhost:8080/geoserver/rest", "admin", "geo
```

Finally, a last productivity tool is available in SEXTANTE: the batch processing interface. Repeated calls to a single algorithm are simplified by using the batch processing interface. This can be used, for instance, to perform a bulk import of layers into GeoServer, by setting the batch processing interface to call the *Import into GeoServer* algorithm as many times as layers are to be imported.

To open the batch processing interface, right-click on the name of an algorithm in the toolbox and select *Run as batch process*.



Each row in the table (3 by default) represents a single execution, and more rows can be added manually, or will be automatically added when selecting a set of input layers, each of them to be used as input in a different execution of the algorithm.



Models can also be run as a batch process. The model defined above, which computed a set of contour lines from a points layer and imported the result into GeoServer, can be called repeatedly using the same input layer and different intervals, to get contour layers of different level of detail, suitable to be rendered at different scales.

More detailed documentation about SEXTANTE can be found at a dedicated chapter in the current QGIS manual, at [http://docs.qgis.org/html/en/docs/user\\_manual/sextante/index.html](http://docs.qgis.org/html/en/docs/user_manual/sextante/index.html). For the most up-to-date version, check the corresponding entry at the QGIS documentation github repository, at [https://github.com/qgis/QGIS-Documentation/tree/master/source/docs/user\\_manual/sextante](https://github.com/qgis/QGIS-Documentation/tree/master/source/docs/user_manual/sextante)



# GEONODE APIs

**7.1 OGC Services**

**7.2 GeoServer REST API**

**7.3 GeoServers Import and Print APIs**

**7.4 GeoNode's Ad-Hoc API**



# SETTING UP A GEONODE DEVELOPMENT ENVIRONMENT

This module will lead you through the steps necessary to install a GeoNode development environment.

## 8.1 GeoNode Development Tools

## 8.2 Git Repository Setup

## 8.3 Installing GeoNode's Python Package

## 8.4 Pavement.py and Paver

## 8.5 Manually Deploying your Development Environment



# GEONODE'S DEVELOPMENT PROCESS

## 9.1 GeoNode's Issue Tracking System

## 9.2 Testing in GeoNode

### 9.2.1 Unit Tests

### 9.2.2 Integration Tests

### 9.2.3 Javascript Tests

## 9.3 GeoNode's Patch Review Process

## 9.4 GeoNode Improvement Proposals

## 9.5 GeoNode's Roadmap Process

## 9.6 Development Resources