Geo Web applications: GeoDjango

Option GIS-Python

Jean-Paul Calbimonte

School of Management

Bachelor of Science HES-SO (BSc) in Business Information Technology

> GeoDjango

What is GeoDjango?

https://docs.djangoproject.com/en/3.0/ref/contrib/gis/

- Contrib module for Django
- Geographic Web framework for Django
- Simple as possible to create geographic Web applications
- Django model fields for OGC geometries and raster data.
- Extensions to Django’s ORM for querying and manipulating spatial data.
- Loosely-coupled, high-level Python interfaces for GIS geometry and raster operations
- Data manipulation in different formats.
- Editing geometry fields from the admin.

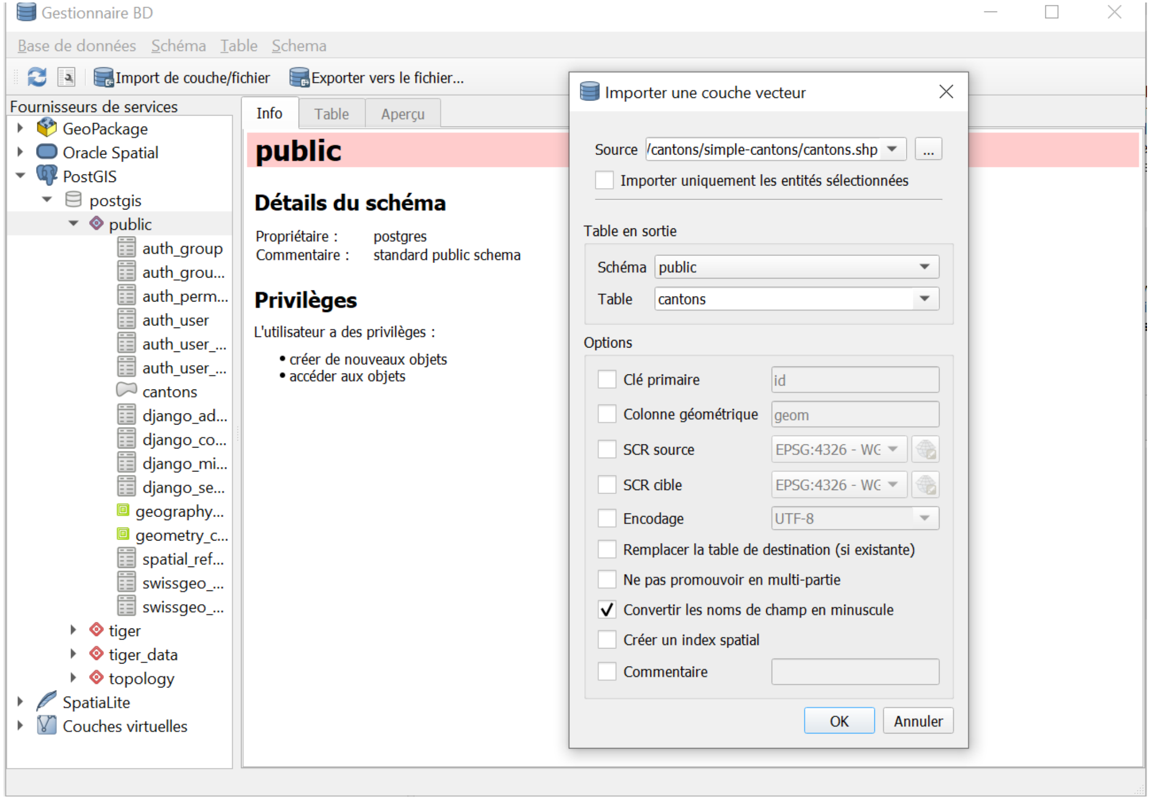
> settings.py

```
INSTALLED_APPS = [',
 'django.contrib.admin',
 'django.contrib.auth',
 'django.contrib.contenttypes',
 'django.contrib.sessions',
 'django.contrib.messages',
 'django.contrib.staticfiles',
 'django.contrib.gis',
]
```

```
DATABASES = {
 'default': {
   'ENGINE': 'django.contrib.gis.db.backends.postgis',
   'NAME': 'postgres',
      'USER': 'postgres',
      'PASSWORD': 'admin',
      'HOST': 'db',
      'PORT': '5432',   }
}
```

> Import cantons shapefile with QGIS

Get the file at: data/cantons/simple-cantons/cantons.shp
Go to QGIS>Base de données>Gestionnaire BD



public

Détails du schéma

Propriétaire : postgres
Commentaire : standard public schema

Privilèges

L'utilisateur a des privilèges :

- créer de nouveaux objets
- accéder aux objets

Importer une couche vecteur

Source /cantons/simple-cantons/cantons.shp ...

□ Importer uniquement les entités sélectionnées

Table en sortie

Schéma public
Table cantons

Options

□ Clé primaire id
□ Colonne géométrique geom
□ SCR source EPSG:4326 - WG
□ SCR cible EPSG:4326 - WG
□ Encodage UTF-8
□ Remplacer la table de destination (si existante)
□ Ne pas promouvoir en multi-partie
☑ Convertir les noms de champ en minuscule
□ Créer un index spatial
□ Commentaire

> models.py

```
from django.contrib.gis.db import models
```

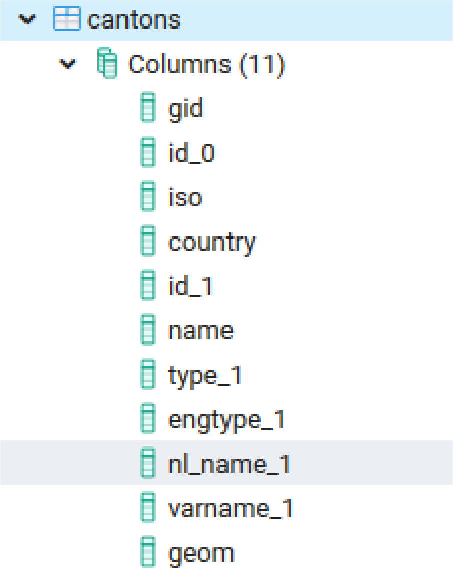
```
class Canton(models.Model):
     id=models.PositiveIntegerField(primary_key=True)
     name=models.CharField(max_length=200)
     geom=models.MultiPolygonField(srid=4326,null=True)

     class Meta:
        db_table = "cantons"

     def __str__(self):
        return self.name
```

```
> python manage.py makemigrations swissgeo
```

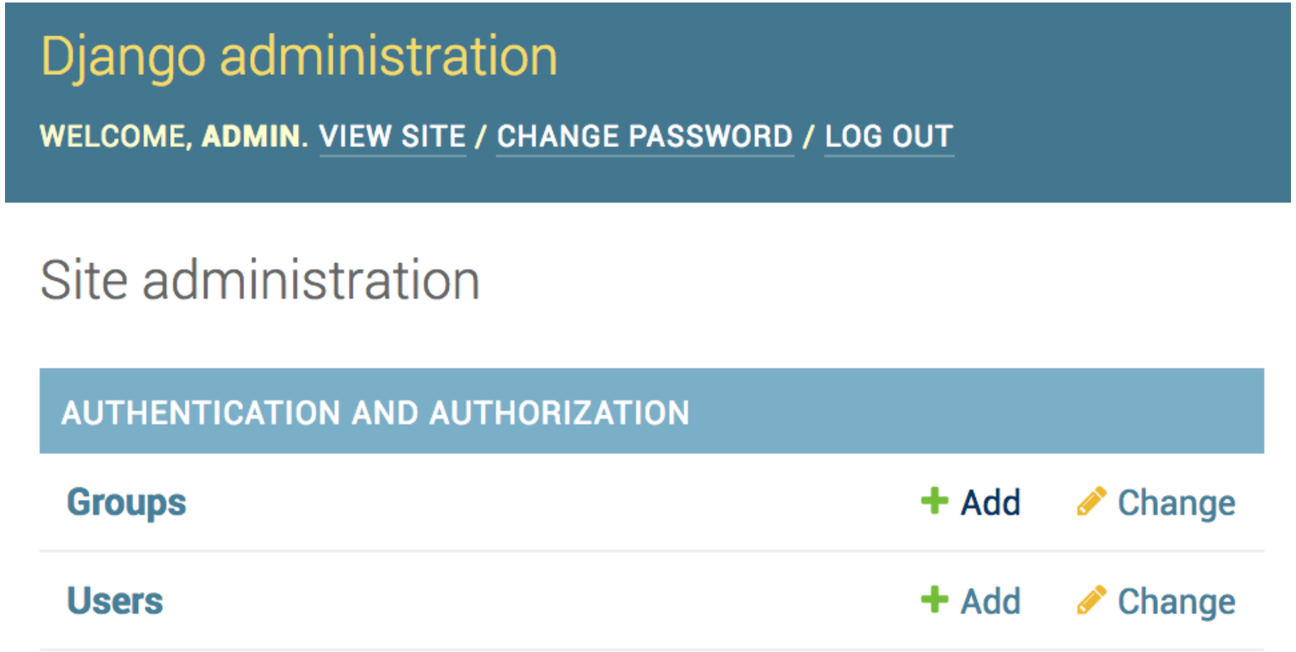
```
> python manage.py migrate  --fake
```



cantons
- Columns (11)
  - gid
  - id_0
  - iso
  - country
  - id_1
  - name
  - type_1
  - engtype_1
  - nl_name_1
  - varname_1
  - geom

> Django admin

http://127.0.0.1:8000/admin



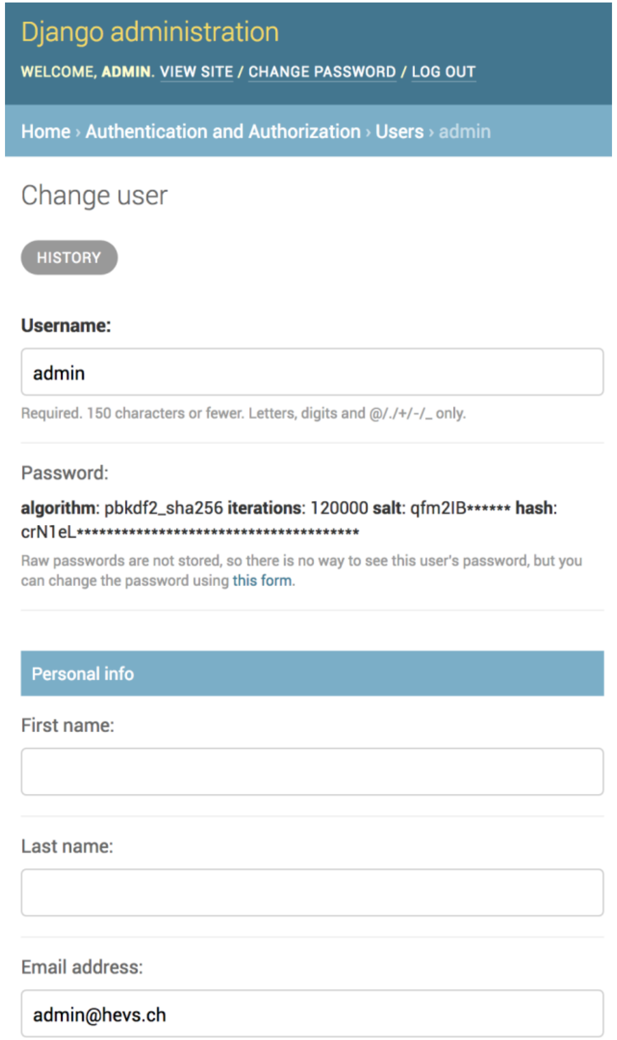
Django administration

WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT

Site administration

AUTHENTICATION AND AUTHORIZATION

Groups	+ Add	Change
Users	+ Add	Change



Django administration

WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT

Home › Authentication and Authorization › Users › admin

Change user

Username: admin

Required. 150 characters or fewer. Letters, digits and @/./+/-/_ only.

Password:

algorithm: pbkdf2_sha256 **iterations**: 120000 **salt**: qfm2IB****** **hash**: crN1eL*************************************

Raw passwords are not stored, so there is no way to see this user's password, but you can change the password using this form.

Personal info

First name:

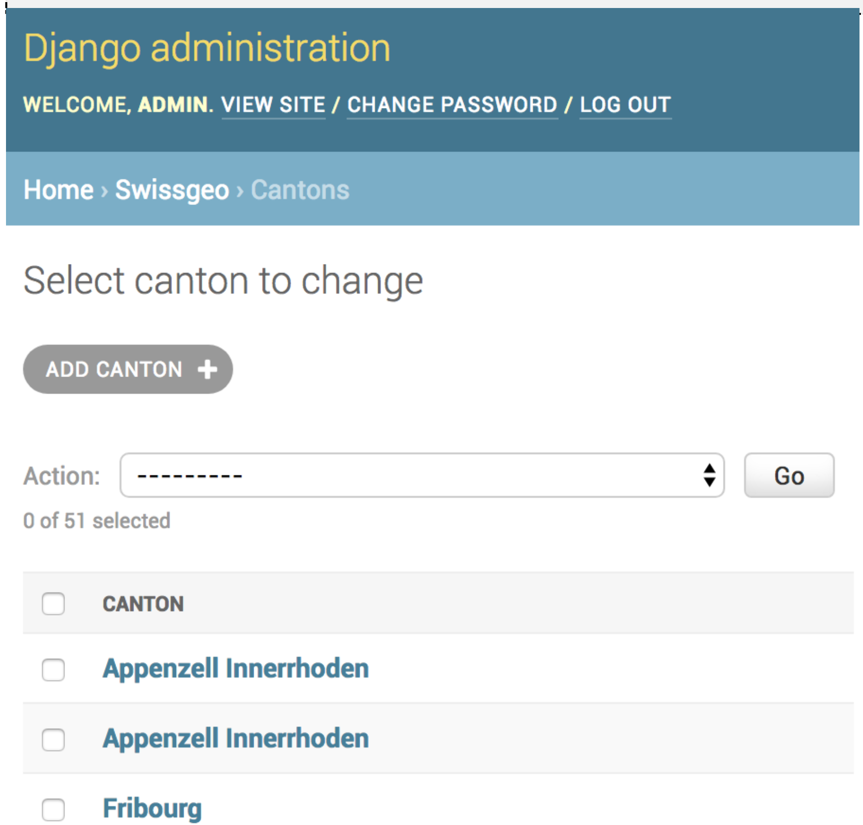
Last name:

Email address: admin@hevs.ch

> admin.py

```
from django.contrib.gis import admin

from .models import City, Hospital, Canton
admin.site.register(City)
admin.site.register(Hospital)
admin.site.register(Canton, admin.OSMGeoAdmin)
```



Django administration

WELCOME, **ADMIN**. VIEW SITE / CHANGE PASSWORD / LOG OUT

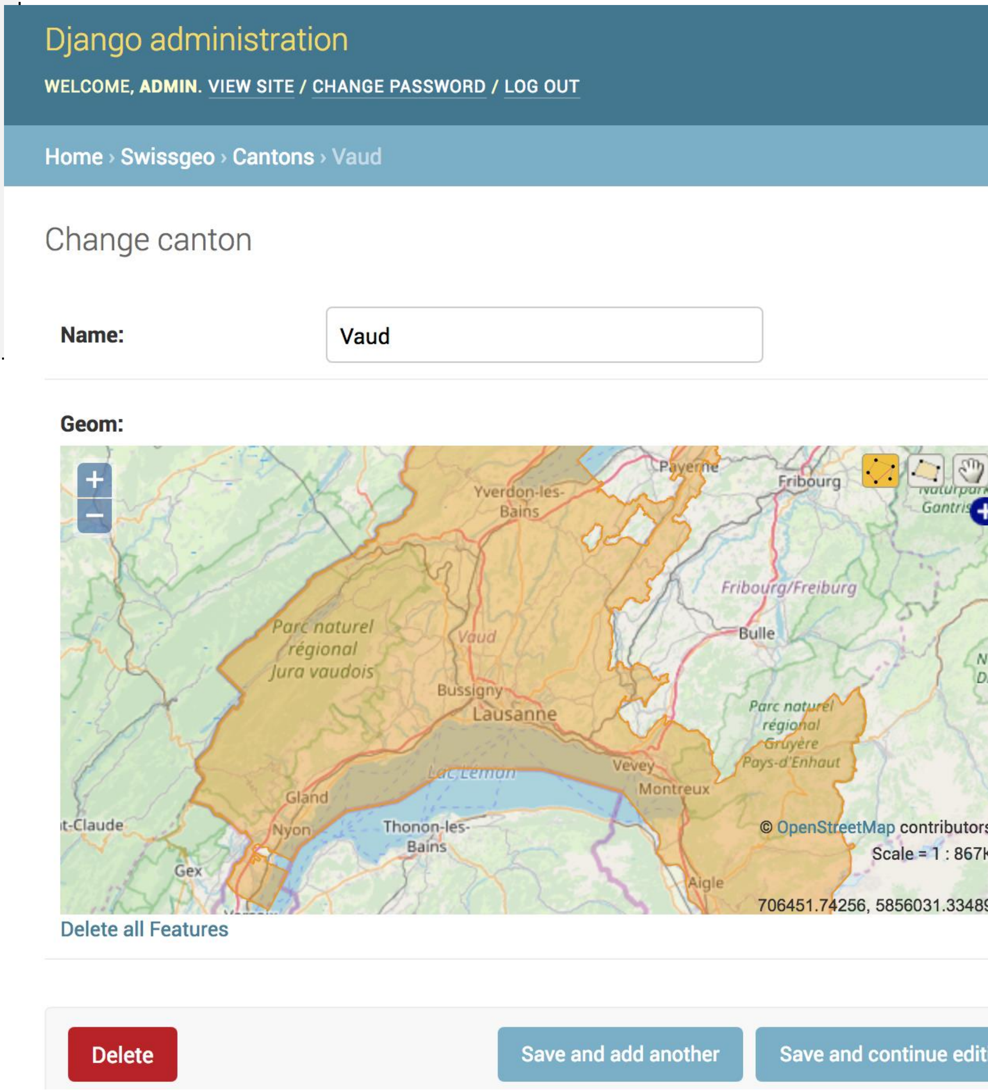
Home › Swissgeo › Cantons

Select canton to change

Action: --------- Go

0 of 51 selected

□	CANTON
□	Appenzell Innerrhoden
□	Appenzell Innerrhoden
□	Fribourg



Django administration

WELCOME, **ADMIN**. VIEW SITE / CHANGE PASSWORD / LOG OUT

Home › Swissgeo › Cantons › Vaud

Change canton

Name: Vaud

Geom:

Delete all Features

> Requests with Geo Models

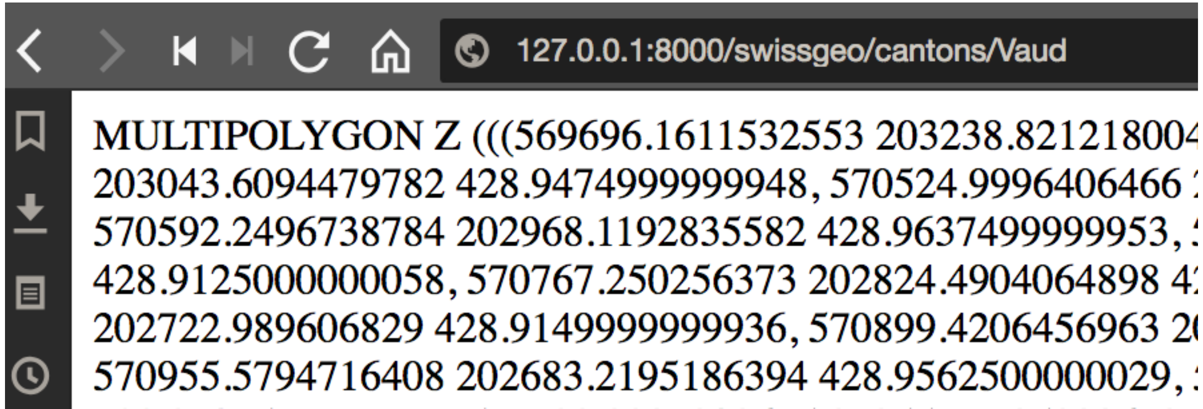
http://127.0.0.1:8000/swissgeo/cantons/Vaud

urls.py

```
urlpatterns = [
  path('city/', views.cities, name='cities'),
  path('city/<int:city_id>', views.city, name='city'),
  path('cantons/<str:canton_name>', views.canton, name='canton'),
```

views.py

```
def canton(request,canton_name):
    cantons=Canton.objects.filter(name=canton_name)
    return HttpResponse(cantons[0].geom.wkt)
```



127.0.0.1:8000/swissgeo/cantons/Vaud

```
MULTIPOLYGON Z (((569696.1611532553 203238.821218004
203043.6094479782 428.9474999999948, 570524.9996406466
570592.2496738784 202968.1192835582 428.9637499999953,
428.9125000000058, 570767.250256373 202824.4904064898 4
202722.989606829 428.9149999999936, 570899.4206456963 2
570955.5794716408 202683.2195186394 428.9562500000029,
```

> Templates with Geo Models

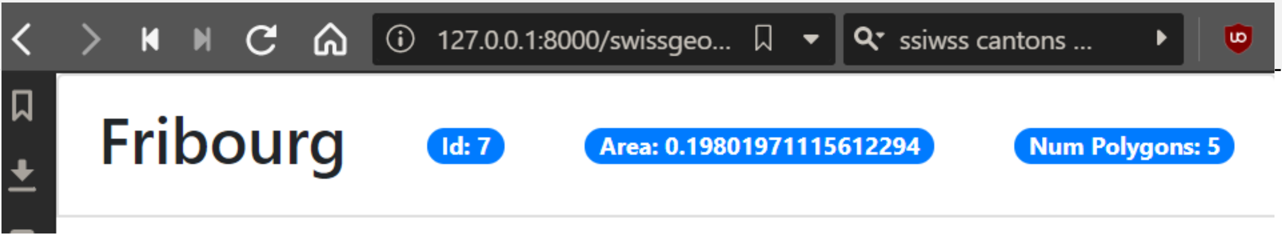
views.py

http://127.0.0.1:8000/swissgeo/cantons/Fribourg

```
def canton(request,canton_name):
  cantons=Canton.objects.filter(name=canton_name)
  return render(request,'swissgeo/canton.html',
                {'cantonobj':cantons[0]})
```

swissgeo/canton.html

```
<ul class="list-group">
  <li class="list-group-item d-flex justify-content-between align-items-center">
     <h2>{{cantonobj.name}}</h2>
     <span class="badge badge-primary badge-pill">Id:{{cantonobj.id}}</span>
     <span class="badge badge-primary badge-pill">Area: {{cantonobj.geom.area }}</span>
     <span class="badge badge-primary badge-pill"># Polygons: {{cantonobj.geom.num_geom}}</sp
  </li>
</ul>
```



Fribourg Id: 7 Area: 0.19801971115612294 Num Polygons: 5

> Returning GeoJSON

http://127.0.0.1:8000/swissgeo/cantons.json

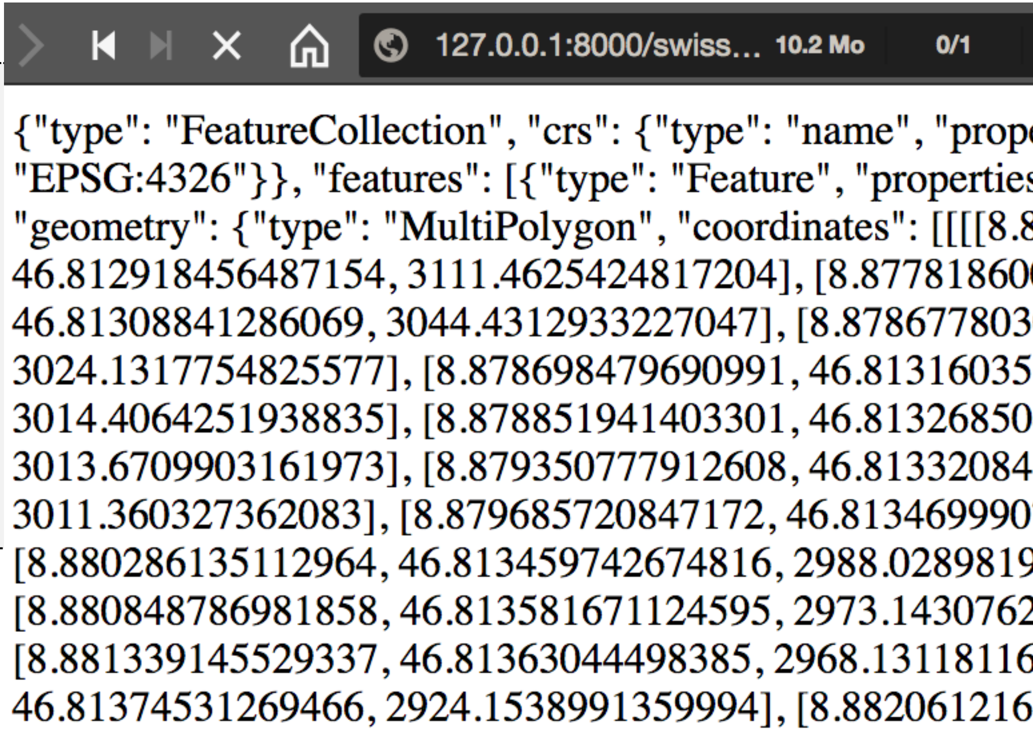
urls.py

```
urlpatterns = [
  path('cantons/<str:canton_name>', views.canton, name='canton'),
  path('cantons.json', views.cantonsjson, name='cantonsjson'),
```

views.py

```
from django.core.serializers import serialize

def cantonsjson(request):
    cantons=Canton.objects.all()
    ser=serialize('geojson',cantons,
                  geometry_field='geom',
                  fields=('name',))
    return HttpResponse(ser)
```



{"type": "FeatureCollection", "crs": {"type": "name", "prope
"EPSG:4326"}}, "features": [{"type": "Feature", "properties
"geometry": {"type": "MultiPolygon", "coordinates": [[[[8.8
46.812918456487154, 3111.4625424817204], [8.87781860
46.81308841286069, 3044.4312933227047], [8.878677803
3024.1317754825577], [8.878698479690991, 46.81316035
3014.4064251938835], [8.878851941403301, 46.81326850
3013.6709903161973], [8.879350777912608, 46.81332084
3011.360327362083], [8.879685720847172, 46.813469990
[8.880286135112964, 46.813459742674816, 2988.0289819
[8.880848786981858, 46.813581671124595, 2973.1430762
[8.881339145529337, 46.81363044498385, 2968.13118116
46.81374531269466, 2924.1538991359994], [8.882061216

> Leaflet in GeoDjango

https://django-leaflet.readthedocs.io

settings.py

```
INSTALLED_APPS = [
   'swissgeo.apps.SwissgeoConfig',
   'django.contrib.admin',
   'django.contrib.auth',
   'django.contrib.contenttypes',
   'django.contrib.sessions',
   'django.contrib.messages',
   'django.contrib.staticfiles',
   'django.contrib.gis',
   'leaflet',
]
```

```
LEAFLET_CONFIG ={
    'MIN_ZOOM':3,
    'MAX_ZOOM':15,
    'DEFAULT_ZOOM':7,
    'DEFAULT_CENTER': (46.7,8),
}
```

> Leaflet in django templates

urls.py

```
urlpatterns = [
    path('cantons', views.cantons, name='cantons'),
```

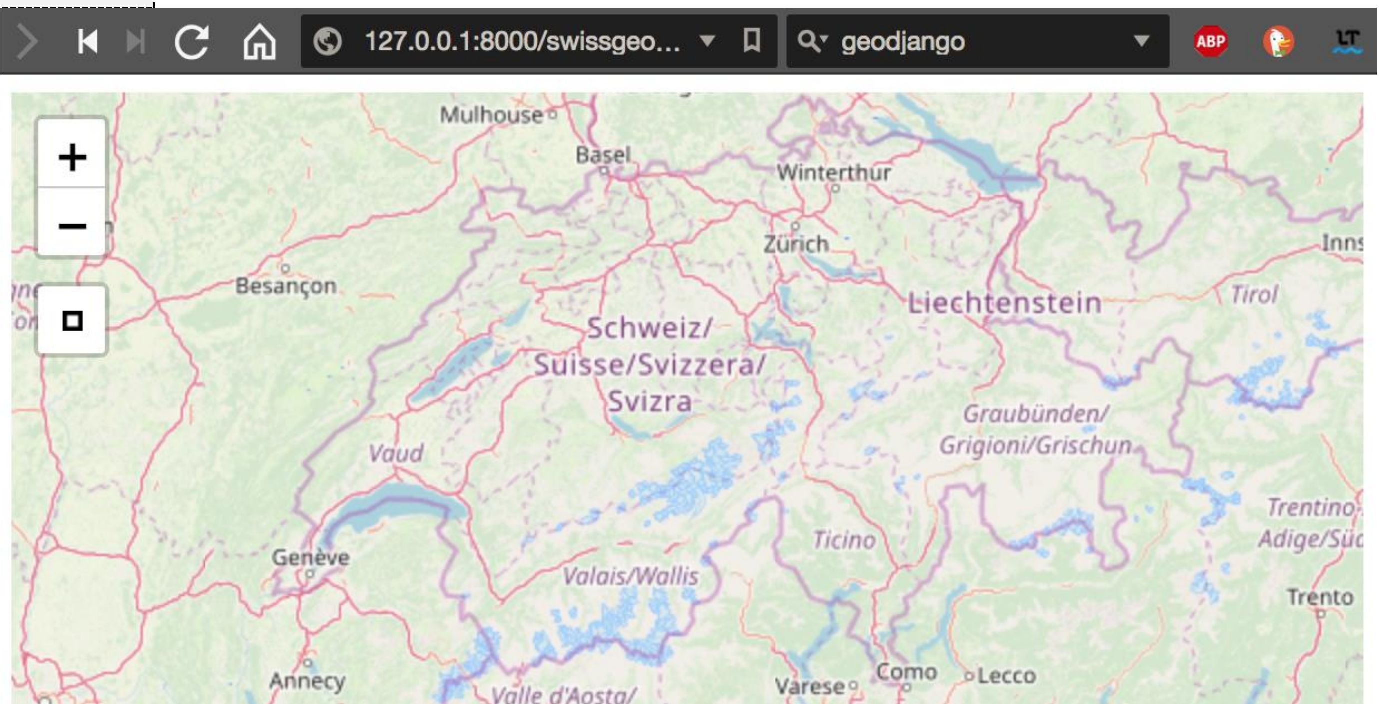
views.py

```
def cantons(request):
    context ={     }
    return render(request,
      'swissgeo/cantons.html',context)
```

cantons.html

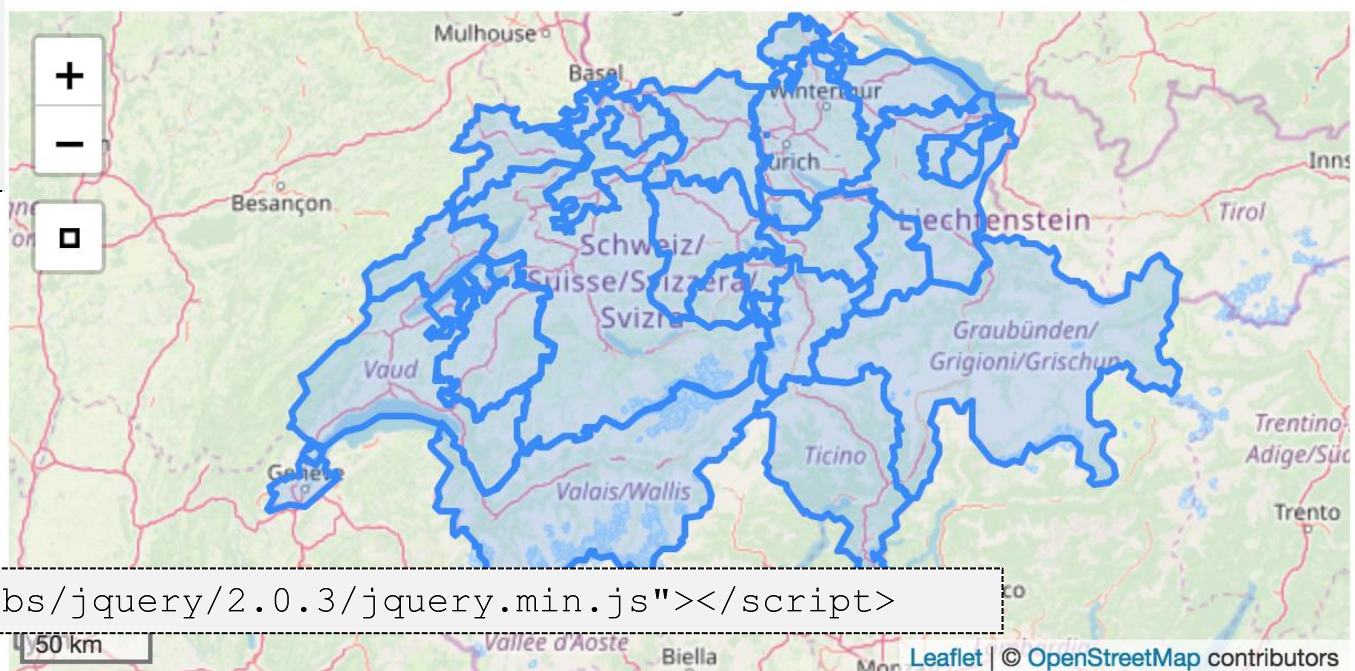
```
{% load leaflet_tags %}
<head>
{% leaflet_js %}
{% leaflet_css %}
</head>

<body>
{% leaflet_map "cantons" %}
</body>
```



> Leaflet in django templates

```
<body>
   {% leaflet_map "cantons" callback="main_map_init" %}
   <script type="text/javascript">
     function main_map_init (map, options) {
       var dataurl = '{% url "cantonsjson" %}'
       $.getJSON(dataurl, function (data){
          L.geoJson(data).addTo(map); });
       }
</script>
</body>
```

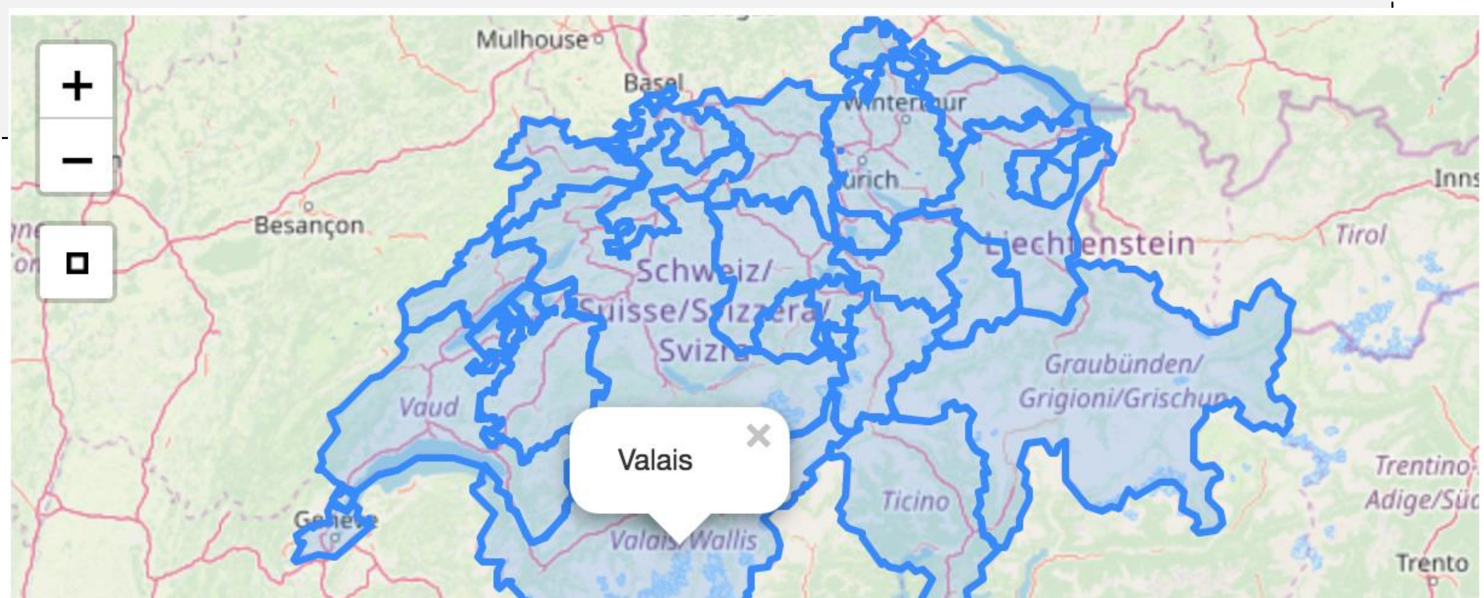


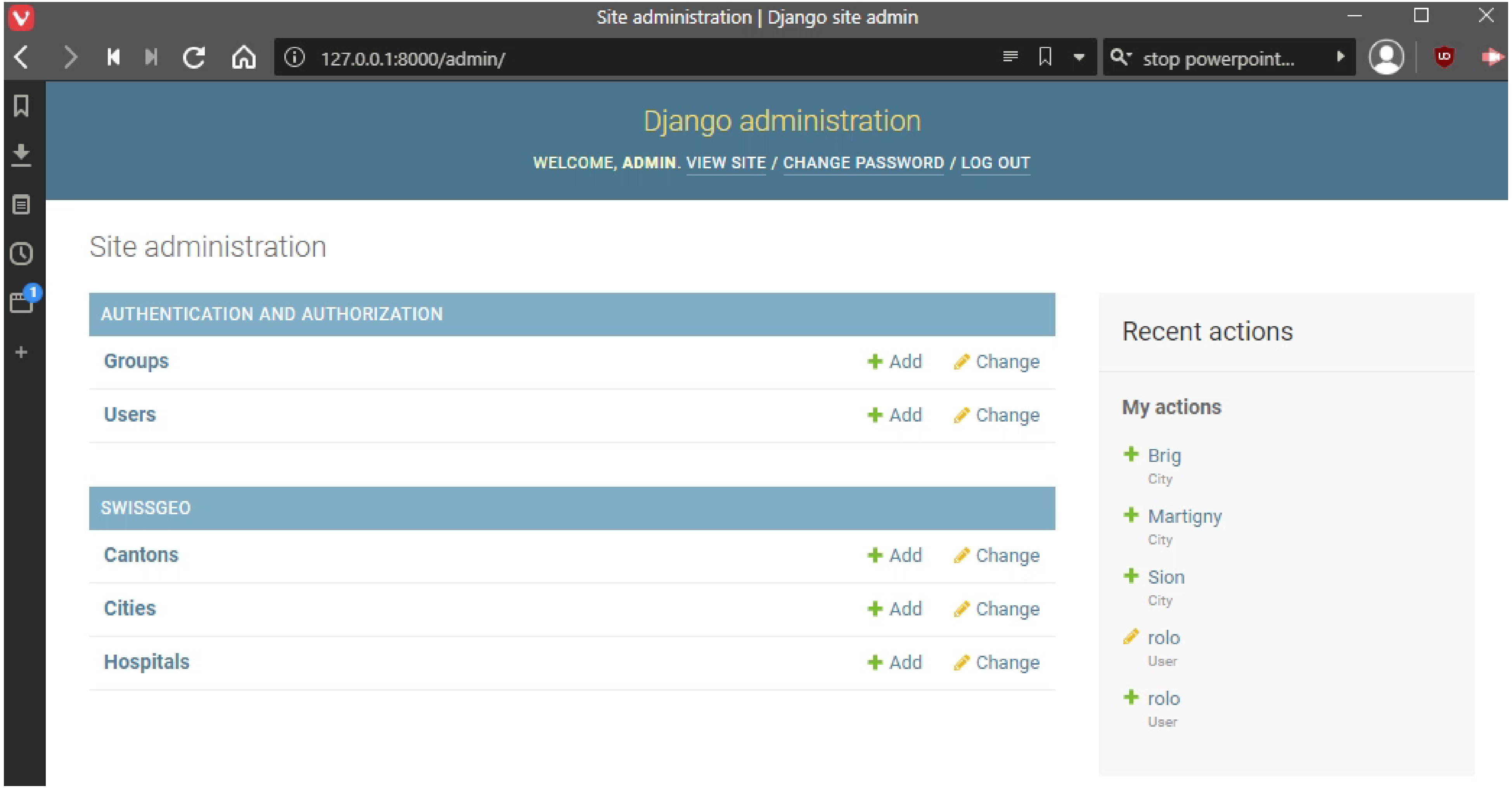
```
<script src="//cdnjs.cloudflare.com/ajax/libs/jquery/2.0.3/jquery.min.js"></script>
```

> Leaflet in django templates

```
function main_map_init (map, options) {
     var dataurl = '{% url "cantonsjson" %}'
     $.getJSON(dataurl, function (data){
          L.geoJson(data,{onEachFeature: onEachFeature}).addTo(map); });
}

function onEachFeature(feature, layer) {
    if (feature.properties &&
          feature.properties.name) {
       layer.bindPopup(feature.properties.name);
    }
}
```





Django administration

WELCOME, ADMIN. VIEW SITE / CHANGE PASSWORD / LOG OUT

Site administration

AUTHENTICATION AND AUTHORIZATION		
Groups	✚ Add	✎ Change
Users	✚ Add	✎ Change

SWISSGEO		
Cantons	✚ Add	✎ Change
Cities	✚ Add	✎ Change
Hospitals	✚ Add	✎ Change

Recent actions

My actions

- ✚ Brig
  City
- ✚ Martigny
  City
- ✚ Sion
  City
- ✎ rolo
  User
- ✚ rolo
  User

Thanks!

Questions?