Relationships between cephalopod’s abundance and environmental parameters in the SW Atlantic
Study Area

- AREA 1: High seas of the SW Atlantic beyond Argentinean EEZ and north of the Falkland Islands Conservation Zones (FICZ-FOCZ)

- AREA 2: Falkland Islands Conservation Zones (FICZ-FOCZ)
Cephalopod species

- Argentine shortfin squid (*Illex argentinus*)

- Patagonian squid (*Doryteuthis gahi*, formerly *Loligo gahi*)
Data

Fishery Data (2010-2013):
- Log books (CPUE) filled in by captains of Spanish trawlers and provided by the Spanish General Secretariat for Fisheries (SGP)

Environmental Data:
- Bathymetry (GEBCO)
  - Slope
  - Aspect
  - BPI
- Geographical data (latitude, longitude)
- Oceanography data (SST, Chlorophyll, etc)
Bathymetry

Area 1: High Resolution Bathymetry

Total Area: Lower Resolution Bathymetry
Bathymetry: Derived Datasets

No significant slope in the fisheries areas

No significant faces orientation in the areas

SAME ANALYSIS WITH THE HR BATHYMETRY
Sea Surface Temperature 2013

Winter

Spring

Summer

Autumn

Image provided by Physical Sciences Division, Earth System Research Laboratory, NOAA, Boulder, Colorado, from their Web site at http://www.esrl.noaa.gov/psd/.

Maybe different Season Months Selection???
Chlorophyll Distribution

Time Series netCDF dataset by NOAA (To include)
### Analysis 2013 Logbooks

The dimension of the table is 4630 files by 11 columns.

<table>
<thead>
<tr>
<th></th>
<th>lat</th>
<th>lon</th>
<th>depth</th>
<th>op_num</th>
<th>fish_time</th>
<th>catch_kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>53.10</td>
<td>63.48</td>
<td>-1441.0</td>
<td>0.000</td>
<td>0.0</td>
<td>0</td>
</tr>
<tr>
<td>1st Quantile</td>
<td>-50.17</td>
<td>-60.87</td>
<td>-208.0</td>
<td>2.000</td>
<td>13.0</td>
<td>168</td>
</tr>
<tr>
<td>Median</td>
<td>-46.95</td>
<td>-60.68</td>
<td>-157.0</td>
<td>3.000</td>
<td>20.0</td>
<td>936</td>
</tr>
<tr>
<td>Mean</td>
<td>-48.14</td>
<td>-60.77</td>
<td>-187.4</td>
<td>2.709</td>
<td>351.6</td>
<td>5459</td>
</tr>
<tr>
<td>3rd Quantile</td>
<td>-46.25</td>
<td>-60.43</td>
<td>-135.0</td>
<td>3.000</td>
<td>700.0</td>
<td>5839</td>
</tr>
<tr>
<td>Maximum</td>
<td>-41.85</td>
<td>-56.83</td>
<td>-58.0</td>
<td>6.000</td>
<td>1535.0</td>
<td>83722</td>
</tr>
</tbody>
</table>

- Argentine shortfin squid
- Patagonian squid
Data Exploration

Ilex Argentinus by Season and environmental parameters
Data Exploration

*Doryteuthis gahi* by Season and environmental parameters
Ilex Argentinus correlation between environmental parameters
Data Exploration

*Doryteuthis gahi* correlation between environmental parameters
Methodology

- Geographic Information Systems (GIS)

- Data Exploration:
  - Cluster Analysis: (Supervised and not supervised methods). Hierarchical Models, K-means, SOM (Self Organized Maps)

- Prediction tools:
  - Neural networks (NN): Feedback algorithm
  - Decision Trees: CART
Expected results from this study:

- Distribution of cephalopods in relation to depth, latitude, longitude, SST and chlorophyll concentrations

Future work:

- We shall intend to widening the historical data series (probably from 2000 onwards)

- To analyze the influence of el Niño in the distribution of both species

- Add new data: SSS???, Bottom Temperature, Sediment Data??, Benthic Position Index Data.