




Capacity Building Activities at CRECTEALC

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Professor and Developer.



Centro Regional de Enseñanza de Ciencia y Tecnología del Espacio para América Latina y el Caribe (CRECTEALC)

CRECTEALC CAMPUS MEXICO

CRECTEALC (Regional Centre for Space Science and Technology Education for Latin America and the Caribbean) results from an international initiative led by UN-OOSA

Institutional setting

- Established by the governments of Brazil and Mexico (1997)
- Has a Governing Board, a General Secretariat, Campuses in Brazil and Mexico;
- Mexico Campus was established in 2002, hosted by the National Institute for Astrophysics, Optics and Electronics (INAOE) in Tonantzintla, Puebla
- Was affiliated to the United Nations (2003)



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Education areas:

- **Remote Sensing & Geographical Information Systems**
- **Satellite Communications**

Types of capacity-building activities:


- Long-term (9-month) courses
- Workshops, Courses, Meetings of Experts
- Support Master's degree in Space Science and Technology (awarded by INAOE)

GNSS-related capacity building

CRECTEALC is a member of Working Group C of the ICG and collaborates with its Chair, UN-OOSA, to implement capacity building and dissemination activities approved by the ICG.

Teaching staff:

- From CRECTEALC/INAOE & invited professors



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Profile of Participants:

- Most of them apply from countries in Latin America and the Caribbean;
- Have a university degree in Geography, Engineering, Physics, Computer Science, Urban Planning, Agriculture, Geospatial Sciences and other application fields.
- Some have work experience at their institutions, others are recent university graduates
- All receive accommodation at shared bungalows during education/training period

Desired outcome:

- Participants use knowledge acquired in work programs at institutions in their home countries.

Capacity Building

- * We are devoted to develop capabilities in our students to apply the in-depth knowledge acquired in geographic information systems, remote sensing, satellite image processing and GNSS positioning technology to, among others:
 - Decision- making in national development programs,
 - Study and plan the development of human activities for environment conservation,
 - Urban planning,
 - Agriculture, and particularly
 - Disaster risk reduction and emergency response.

Example of a Workshop Series Organized by CRECTEALC



- Workshop on the Use of Space Science and Technology for the Prevention of and Response to Disasters in Mesoamerica

Date and place: 19th – 22th November 2013, Tuxtla Gutiérrez, México

- Workshop on the use of Open Source Software and Satellite Data in the Prevention of, and Response to, Disasters in Mesoamerica

Date and place: 19th – 23th May 2014, Tonantzintla, Puebla, México

- Workshop on Higher Resolution SRTM Data & Flood Modelling

Date and place: May 25th – 29th 2015, Tonantzintla and Puebla, México

Participants had hands-on training on 2 flood models, several image analysis tools and took home an SRTM-30m DEM for all of Latin America and Caribbean (provided by USGS-NASA)

Use of Earth Observation (EO) Tools and Data

We teach the use of tools such as ERDAS, ILWIS, ArcGIS, QGIS and GRASS



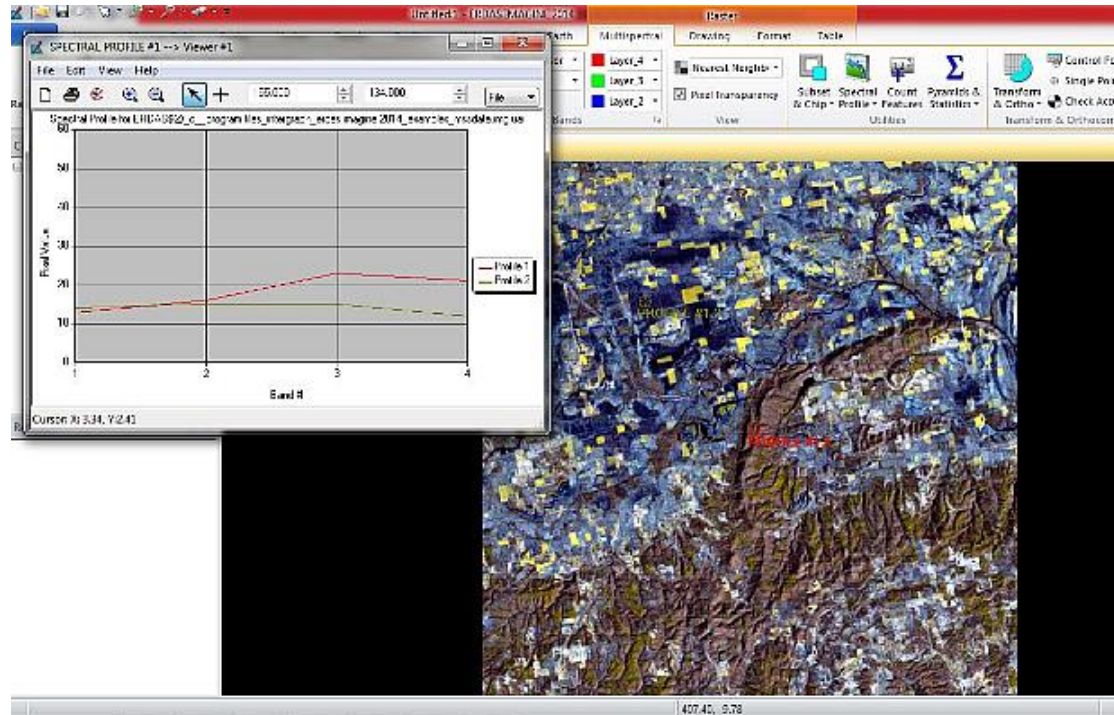
GRASS GIS

Bringing advanced geospatial technologies to the world

We use satellite and drone multi-spectral images, DEMs (SRTM-30m, others), thematic cartography, geo-referenced aerial images and field data

Erdas, Ilwis and Matlab are used to process images that can be exported and imported to and from QGIS and ArcGIS.

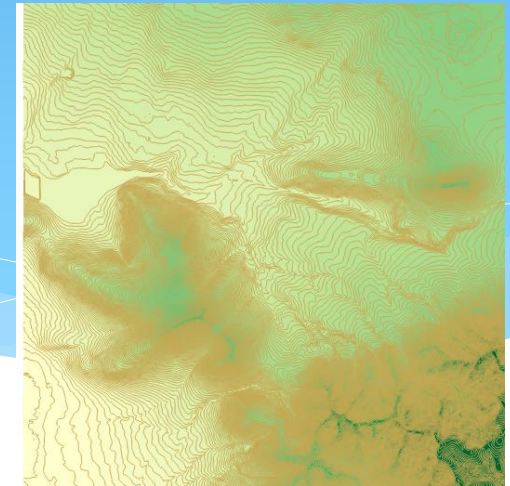
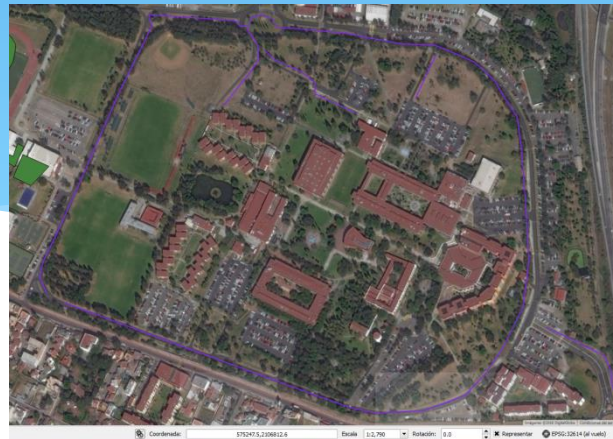
ERDAS
IMAGINE®



Vectorial Layers

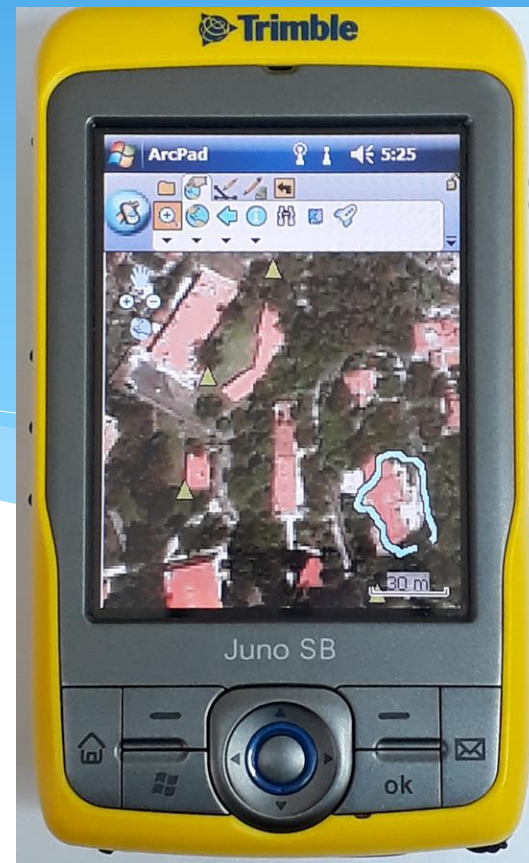
Vector layers contain points, lines or polygons which represent geographical features on EO (Earth Observation) images and base maps displayed on a computer screen.

Sources of vector layers: results of other people's work, or we can build them by drawing over maps or images, or from field data positioning using GNSS devices.



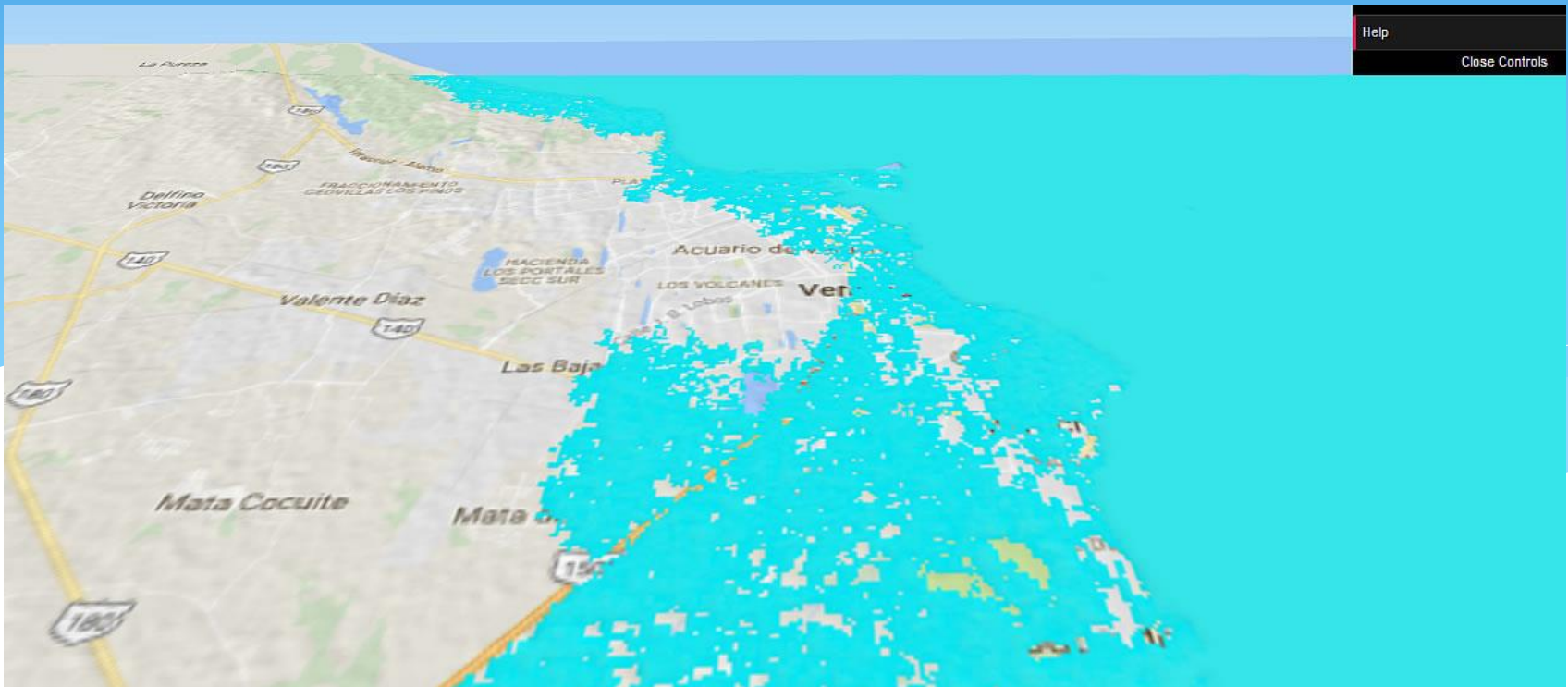
GPS devices used to build vector layers.

We use two types of devices for building layers: Garmin GPS and Trimble Juno with Windows mobile and ArcPad software installed.



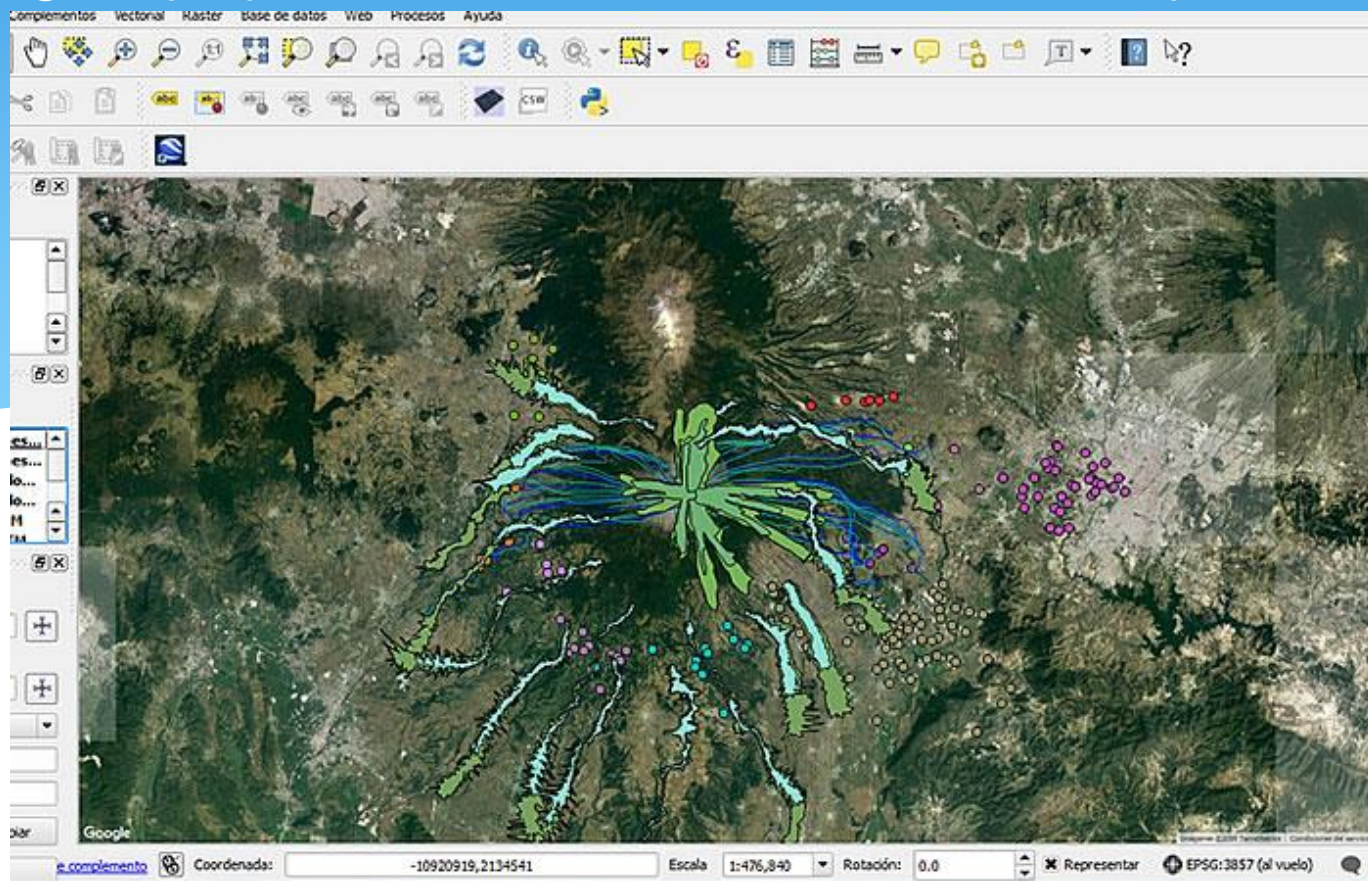
Combined base maps and other layers are used to represent conditions of the study area, from the health conditions of plant cover to areas in danger in case of a disaster.

By displaying this area in 3D, we assist people who are not experts in geographic or computer systems but are directly affected, to be aware of dangers or to make wiser decisions.

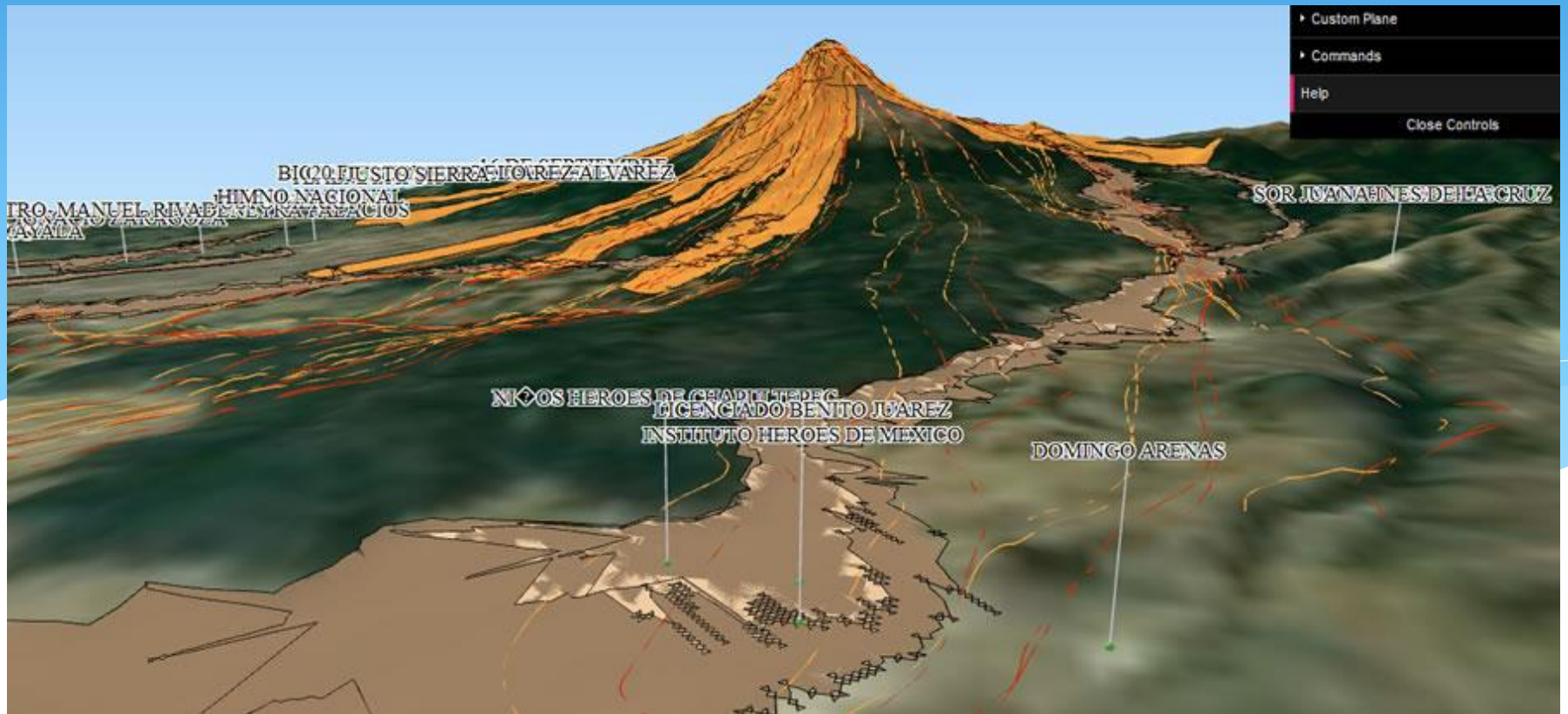




In this example, the dots represent schools around the Popocatepetl volcano are combined with layers provided by CENAPRED, Mexico's agency for disaster prevention, that represent various eruption events that could occur (lava flows, ash emissions, pyroclastic flows and lahars) in order to identify the areas, and particularly the schools, that could be affected. This QGIS flat-view display is useful enough for people who live in these areas to be aware of the possible damages.

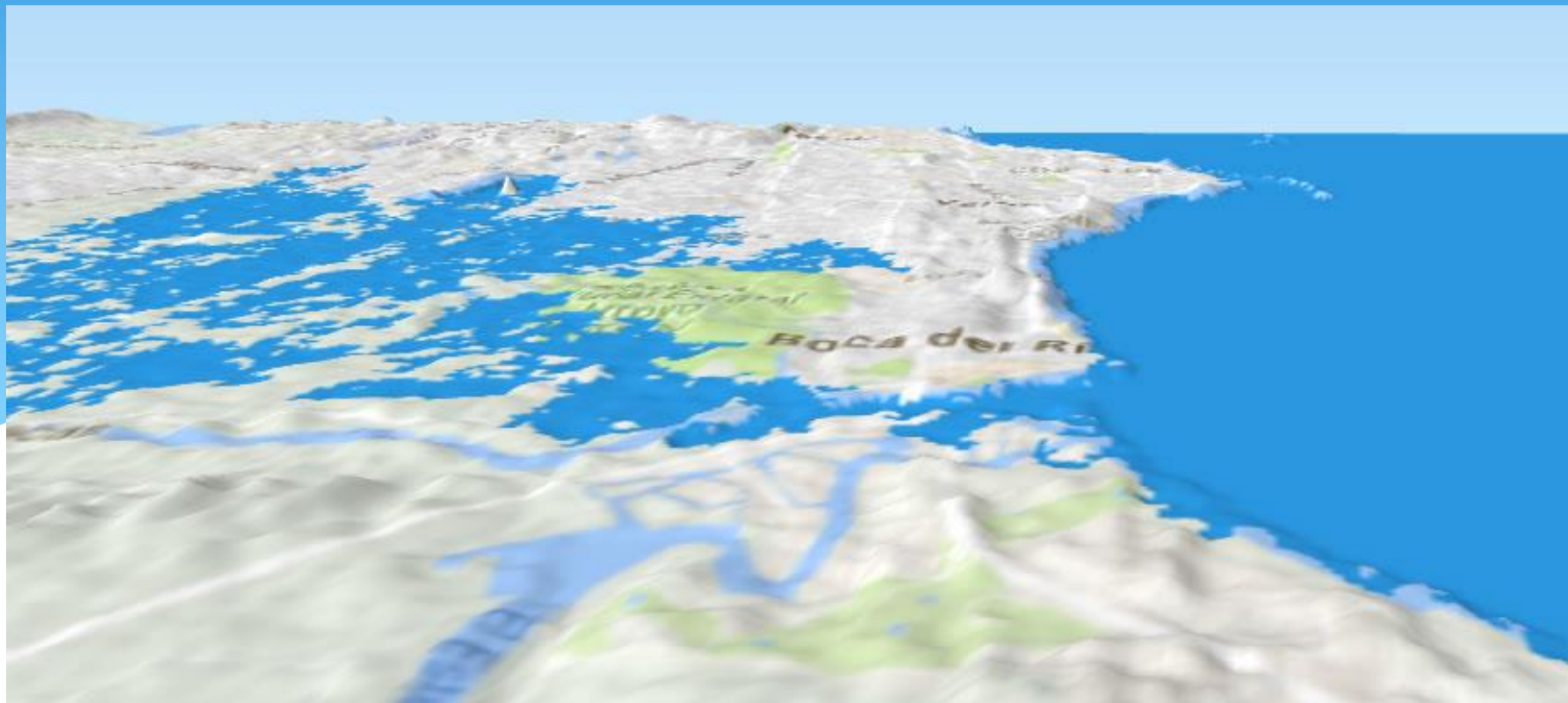


Now, displaying the same area in 3D, the zone becomes easier to understand and to explore for the user to know which areas are in danger:





Using QGIS, Grass, and a DEM we can simulate a flood over an area of interest to represent water surging until it reaches a given height, modeling where water will reach according to differences in terrain altitude. We can now display the area in a 3D view.



We can overlay the model image on a satellital image to make easier way to identify parts of the terrain, especially inhabited areas, that are in risk of flooding. This is very useful information to plan prevention activities to reduce risk and to respond to possible emergencies. In this case it is areas in risk due to sea-level rise.



Thank you.



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To apply for the courses, visit:

<http://crectalc.org>

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