Latin American Regional Workshop on Adaptation

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Vulnerability and Adaptation in Cuba

The Drought Case

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Presentation Outline

- Institutional arrangements;
- Brief history on climate change in Cuba;
- Some findings and results;
- Recent work and activities.

Institutional arrangements

Climate Change National Team

Cuba Government

Host Ministry

Science, Technology and Environment Coordination

Institute of Meteorology

Sectors

- **Energy, mine and chemistry industry**
- **Land Use**
- **Agriculture, forestry and sugar industry**
- **Foreign affairs**
- **Transport**
- **Fishing**
- **Construction**
- **Water resources**
- **Academic and research institutions**
- **Environmental NGOs**

Technical Teams

- **GHG Inventory**
- **Mitigation**
- **Vulnerability and Adaptation**

A Brief History

1991: **First scientific assessment of potential climate change impacts in Cuba (experts opinion);**

1995: **National Research Program on Global Changes was started;**

1997: **A scientific assessment on variations and changes in climate of Cuba was made;**

1999: **An assessment of impacts and adaptation to climate change was finished;**

2000: Cuba finish its First National Communication to UNFCCC.

More recent: CIDA-CCCF, CIDA-UNDP & GEF-UNDP

Main Research Focus

- Understand current climate variability is very important for adaptation process;
- Incorporate uncertainty instead of avoid it;
- Water resources, agriculture and human systems have been the main areas;
- Assimilation and implementation of climate and biophysical models;
- Integrated assessment approach and modeling

Some Findings and Results

Come from

- The scientific assessment on variations and changes in the climate of Cuba;
- The assessment on climate change impacts and adaptation in Cuba;
- Projects of National Research Program “Global Changes and environment evolution in Cuba”;
- GEF, CIDA and UNDP Projects.

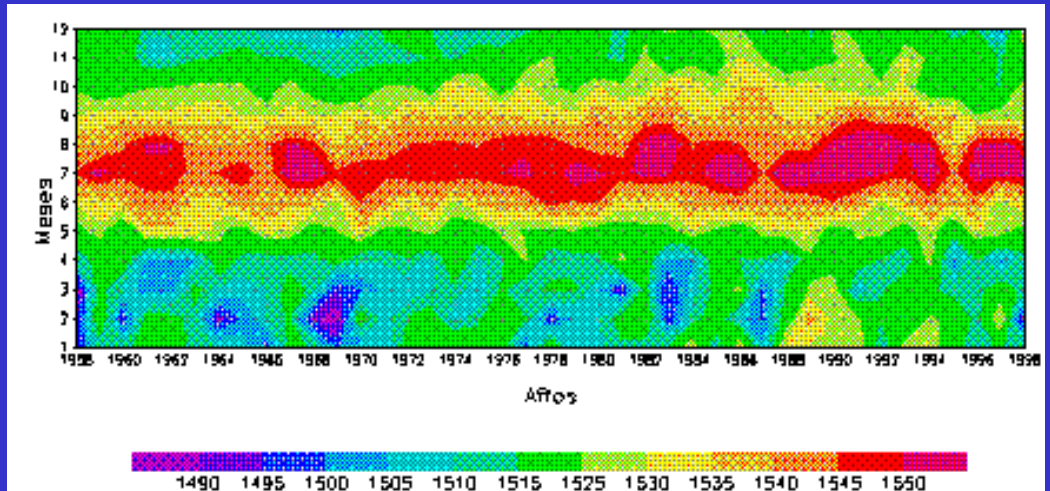
Variations and Changes in the climate of Cuba

An increase of annual mean temperature (0.5 °C) and minimum temperature (1.5 °C), with a significant reduction in diurnal temperature range;

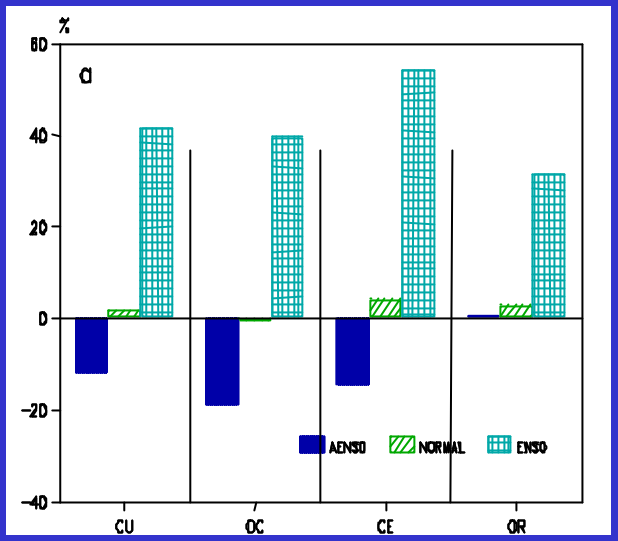
Increase in the influence of El Niño event;

Increase of extreme events frequency including droughts;

All the signals were consistent and more evident since the middle of 70s, according with the observed variations in atmospheric circulation over the Caribbean.



Understanding the influence of ENSO

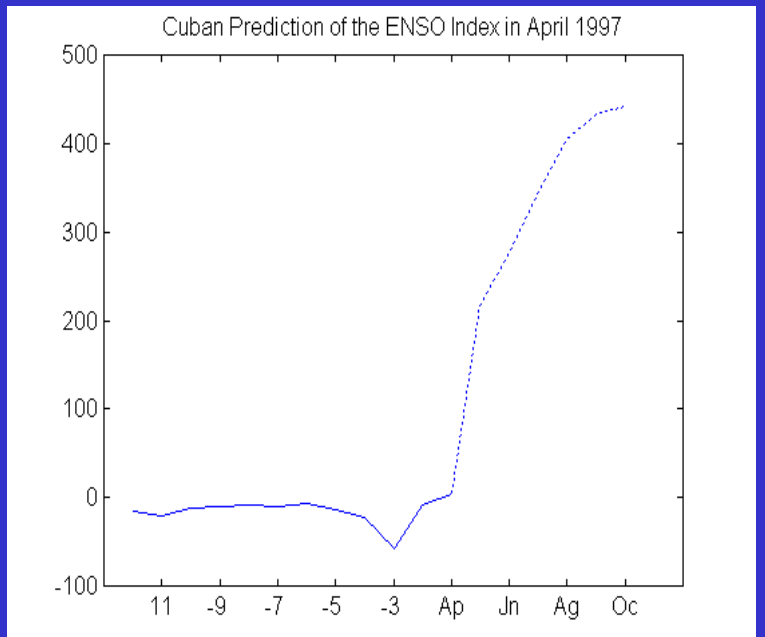


Main impacts

El Niño impact in Cuba is fundamentally determined by an increase in the winter rains and more frequent severe weather events like tornadoes, hail etc.

Response

- Increase the level of scientific development reached by Cuba, allowed efficient monitoring and assessments.
- Develop a Cuban prediction of El Niño.



Impacts and adaptation to climate change country study

Assessed Sectors

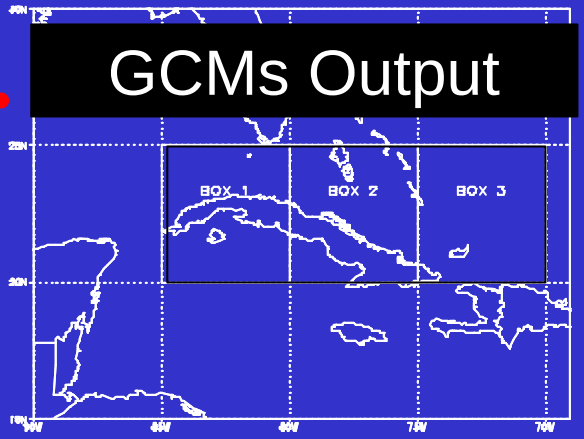
- **Freshwater resources**
- **Coastal Zones and Marine Resources**
- **Agriculture and Forests**
- **Human Health**
- **Human Settlements and Land Use Changes**
- **Wildlife and Biodiversity**

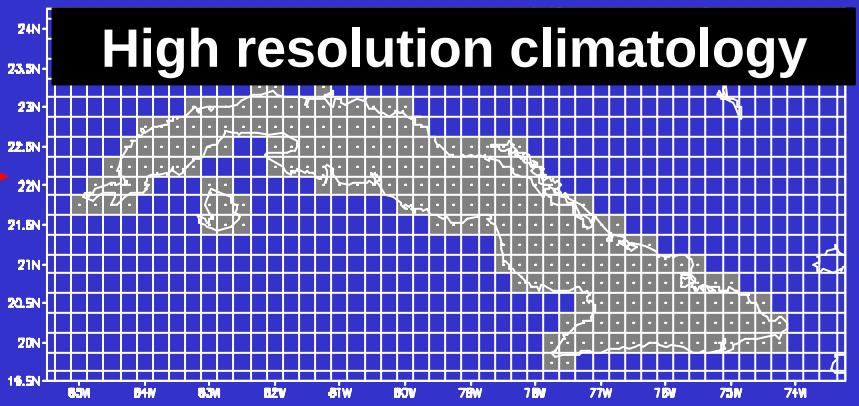
Time Frame

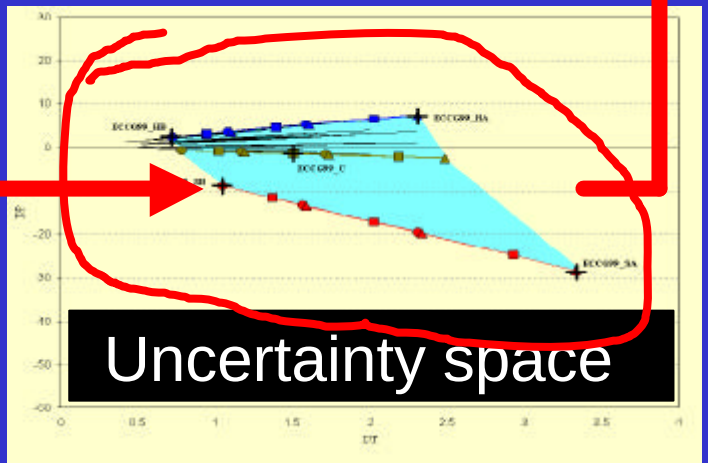
30 year-periods centered on 2020, 2030, 2050 and 2100

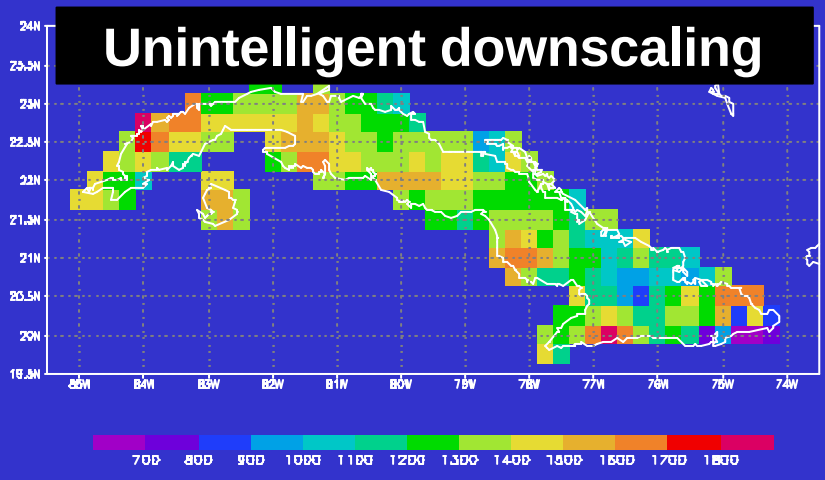
Climate change projections

<u>Scenarios</u>. Using a simple climate model MAGICC and the scenario generator SCENGEN to explore uncertainties









Assessing the Main Impacts

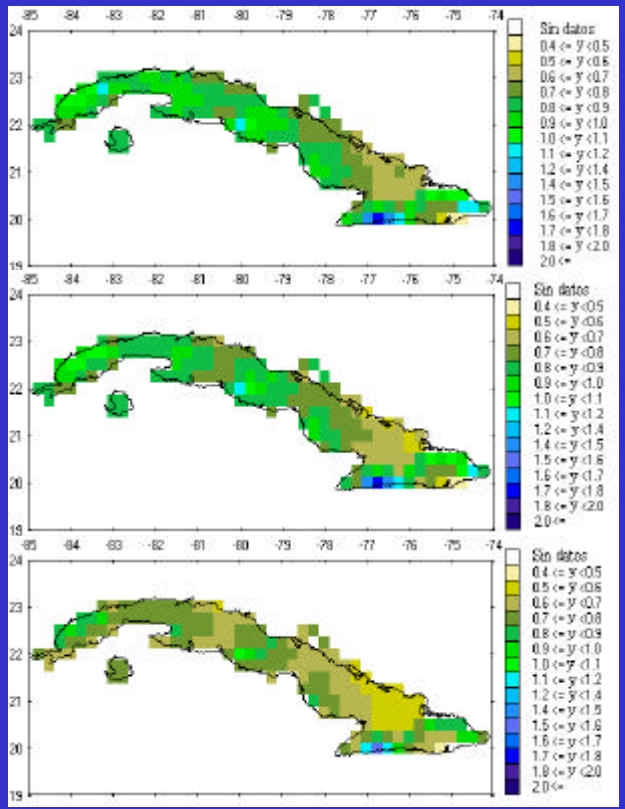
Sea level rise could produce the main impacts on Cuba. It could:

- **Reduce the availability and quality of freshwater**
- **Affect mangrove and coastal ecosystems**
- **Increase the vulnerability of coastal human settlements**

Assessing the Main Impacts

Even if rainfall increases, warming could favors the evaporation and a more or less enhancement of aridity process. The main associated impacts could be:

Reduction of forestry areas.
Loss of biodiversity.
More frequent and intensive drought process.
Crops yields decrease.
Reduction of the area for agricultural activities.



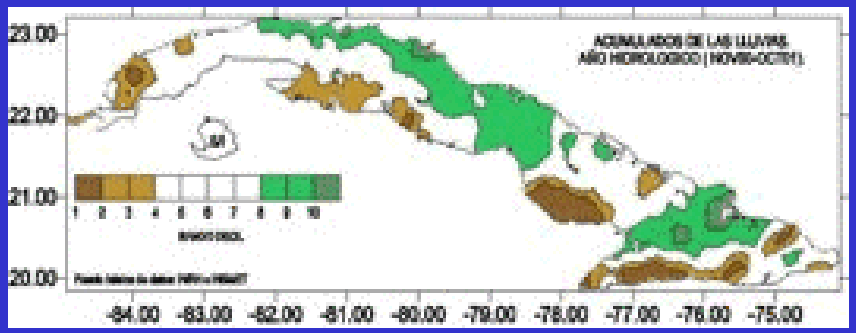
1961-1990

2010

2100

Recent work and activities

ssessing the meteorological rought



vertical velocity influence on drought intensification

200 hPa -12 km

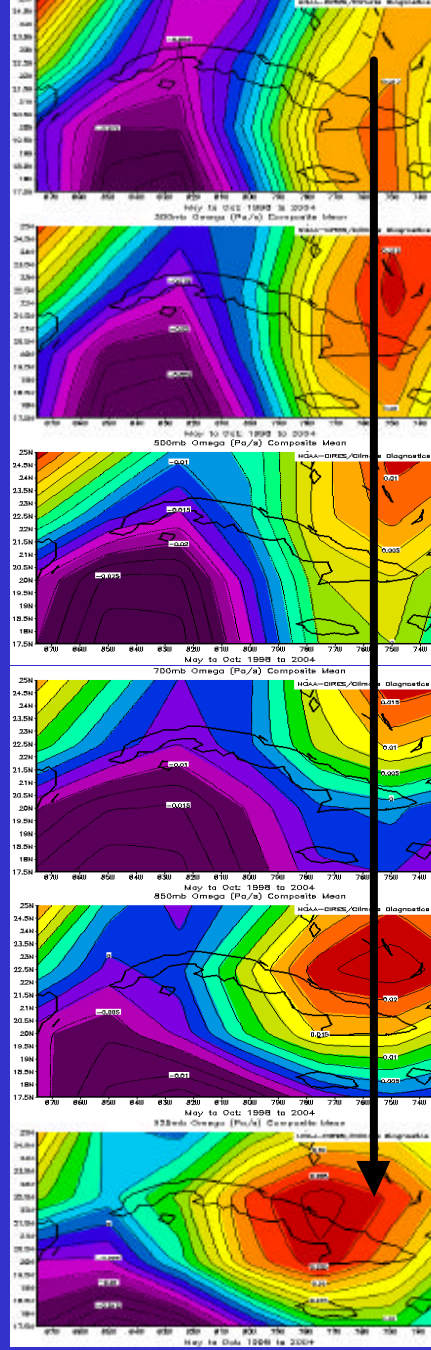
300 hPa - 9 km

500 hPa - 5 km

700 hPa - 3 km

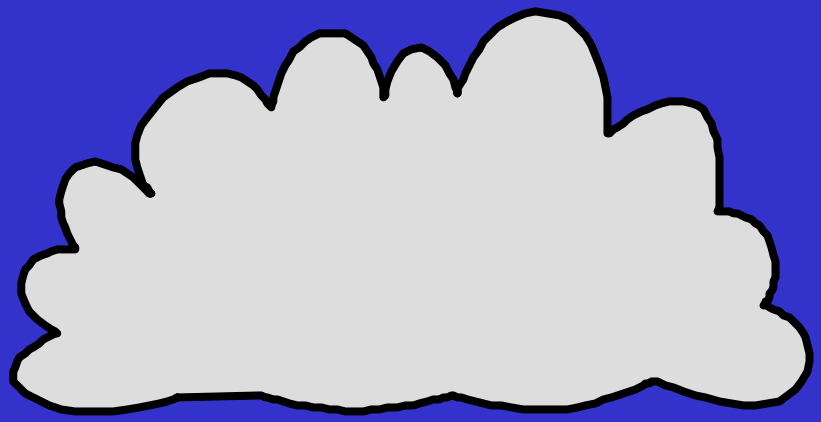
850 hPa - 1.5 km

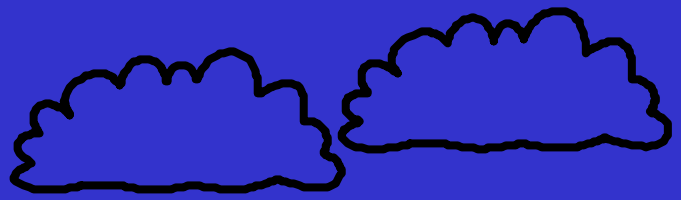
925 hPa - 800 m

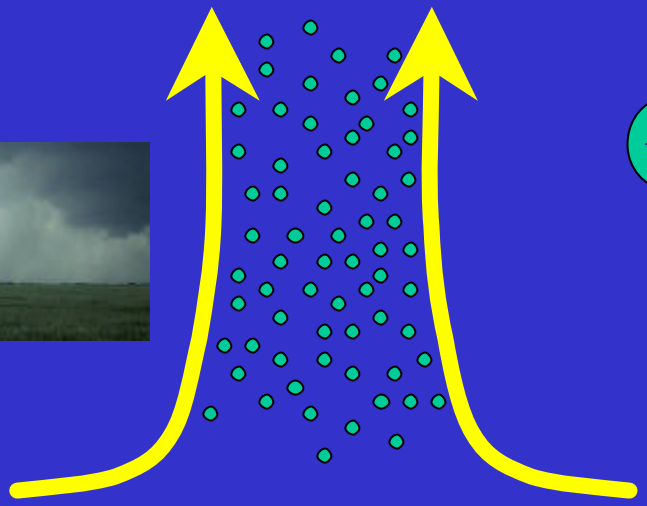


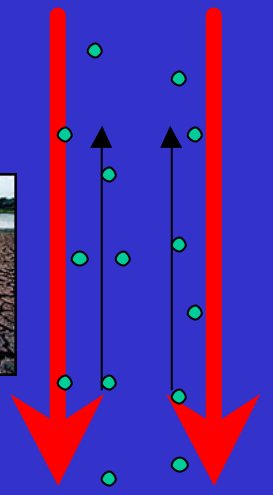
ASCENDENTE

DESCENDENTE



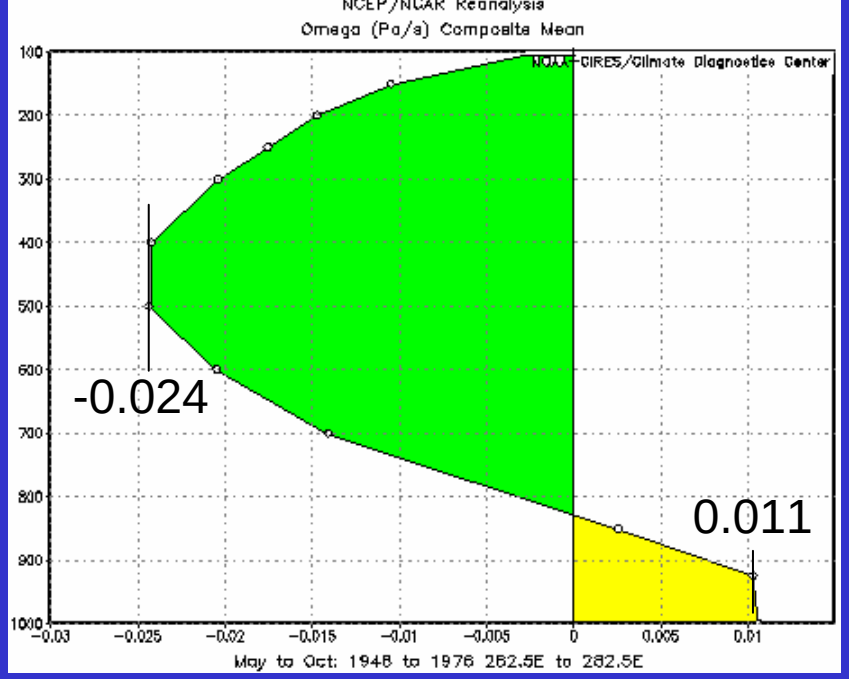


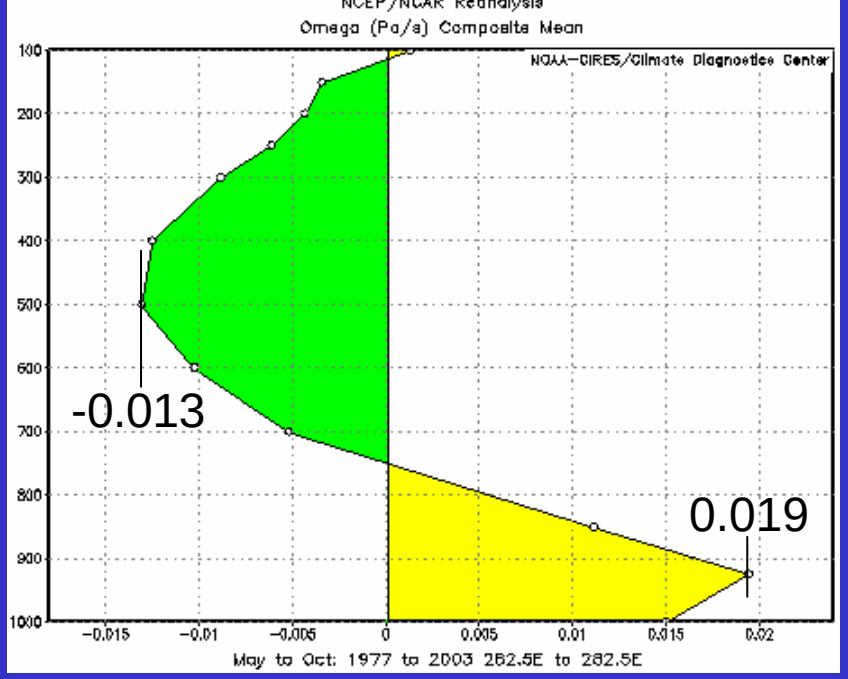


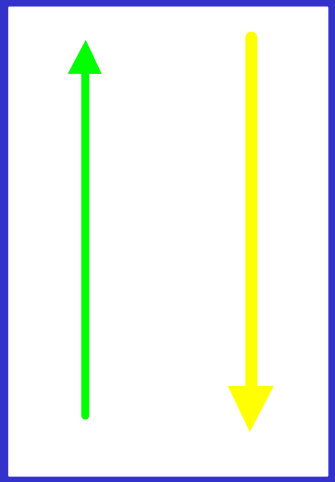


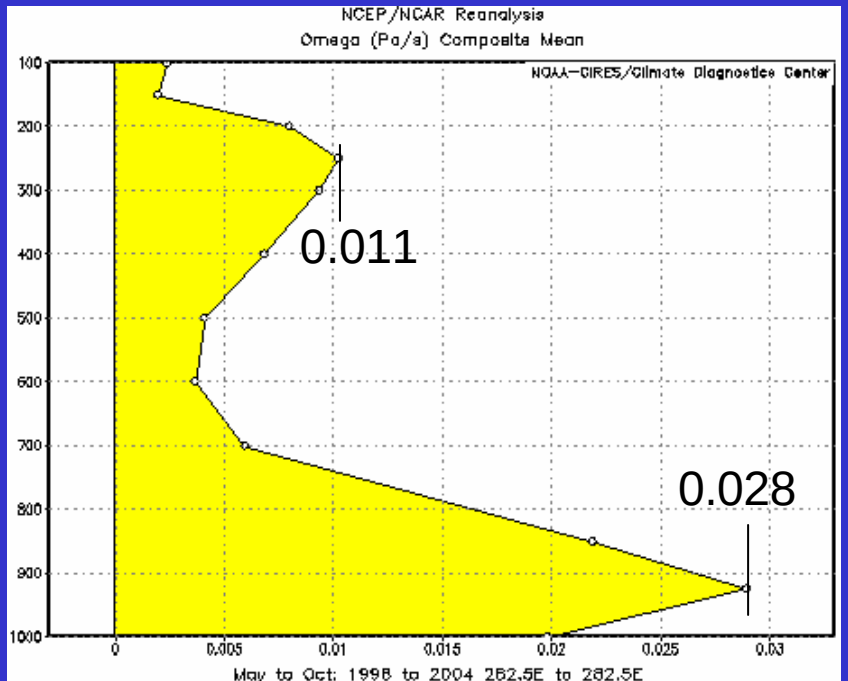
FAVORABLE

DESFAVORABLE

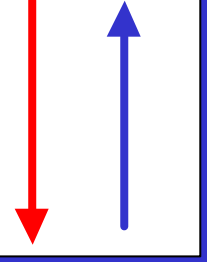

NCEP/NCAR Reanalysis
Omega (Pa/s) Composite Mean
NOAA–CIRES/Climate Diagnostics Center
-0.024
0.011
May to Oct: 1948 to 1976 262.5E to 282.5E


NCEP/NCAR Reanalysis
Omega (Pa/s) Composite Mean
NOAA–CIRES/Climate Diagnostics Center
-0.013
0.019
May to Oct: 1977 to 2003 262.5E to 282.5E




NCEP/NCAR Reanalysis
Omega (Pa/s) Composite Mean
NOAA–CIRES/Climate Diagnostics Center
0.011
0.028
May to Oct: 1998 to 2004 262.5E to 282.5E

Vertical velocity in 20-25 º N & 75-80 º W.
Period: 1948-2004 (May-October)



0 hPa -12 km

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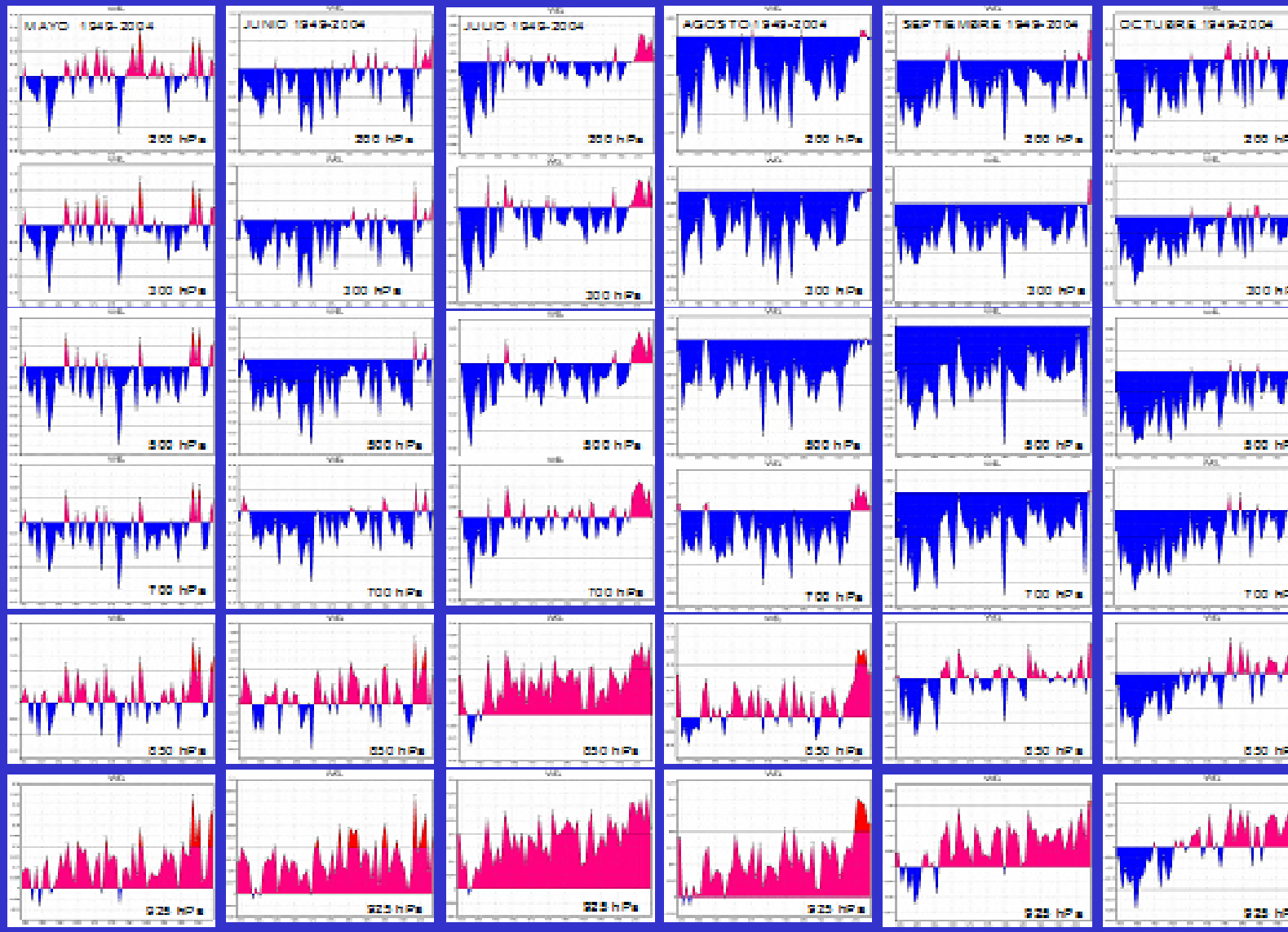
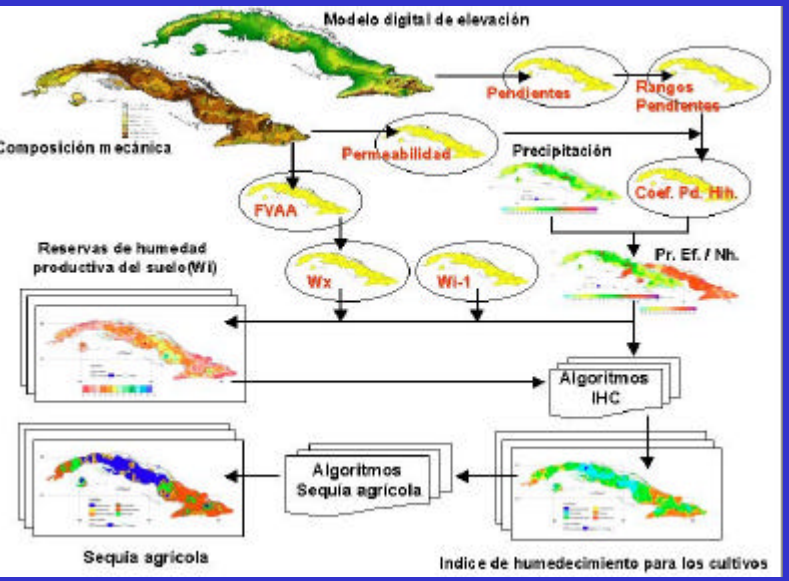
5 hPa - 800 m

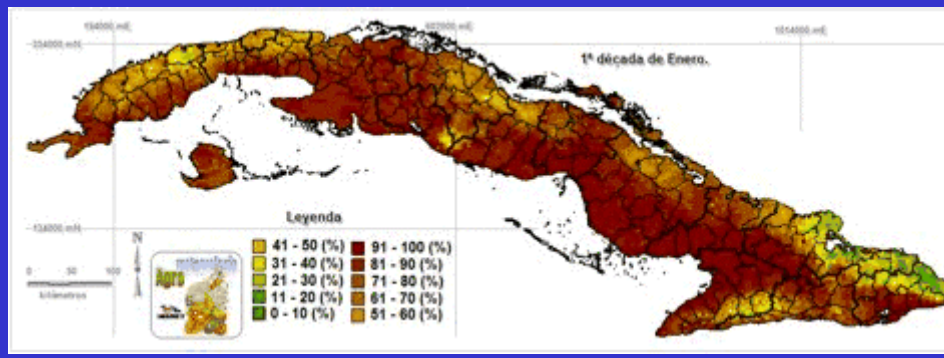


Recent work and activities

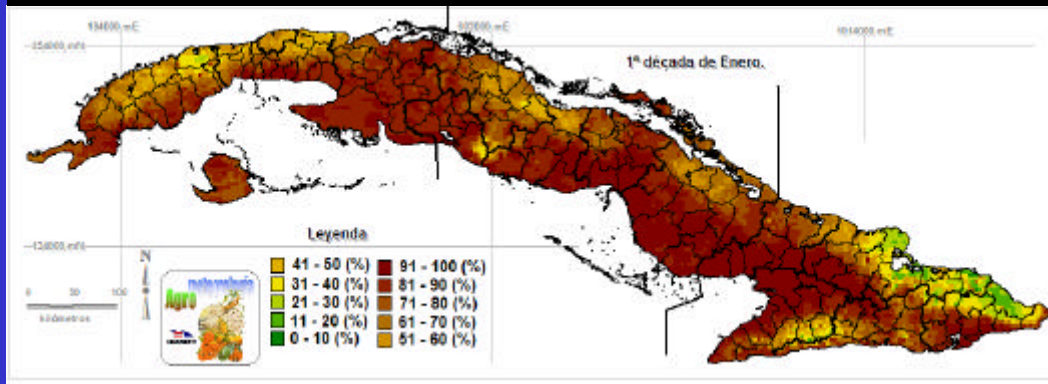


Flux diagram for the assessment

Assessing the agro meteorological drought



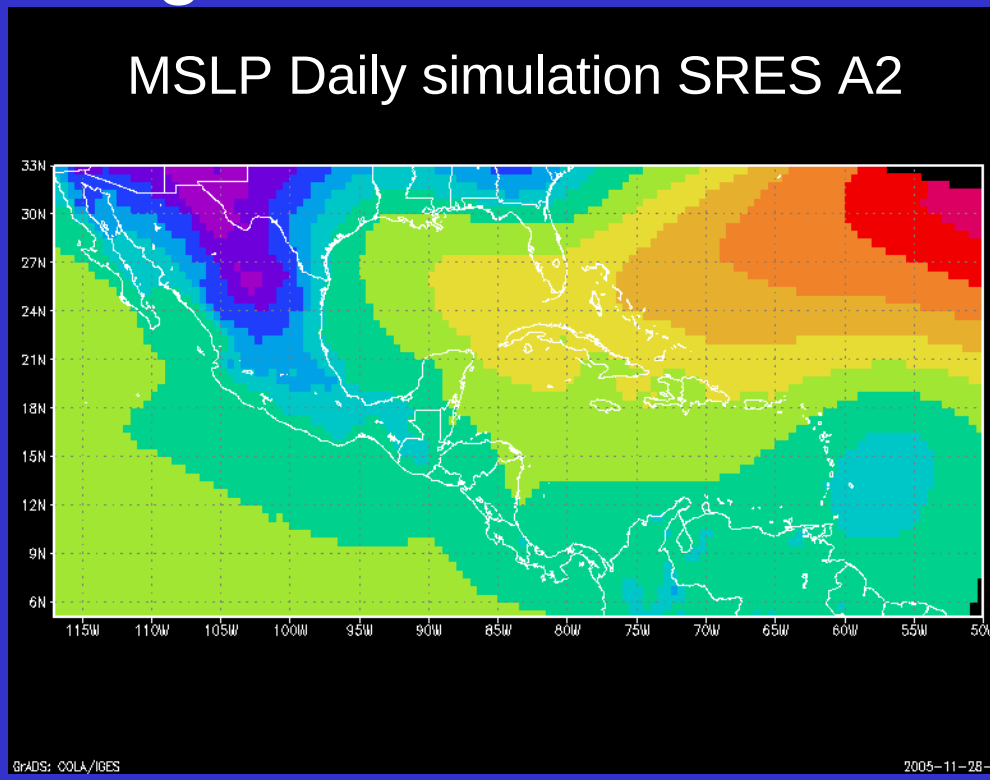
Agro meteorological drought probability for the first 10 days period of January



Recent work and activities

Regional Climate Modeling

PRECIS Training course supported by UNDP project

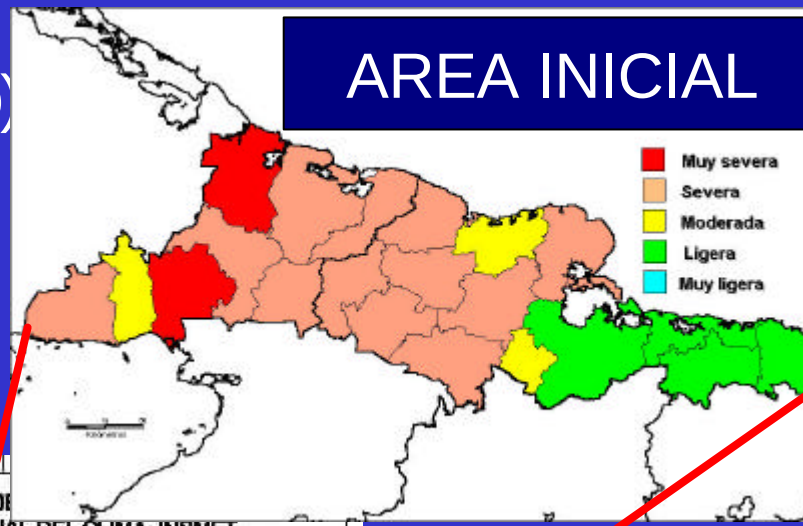


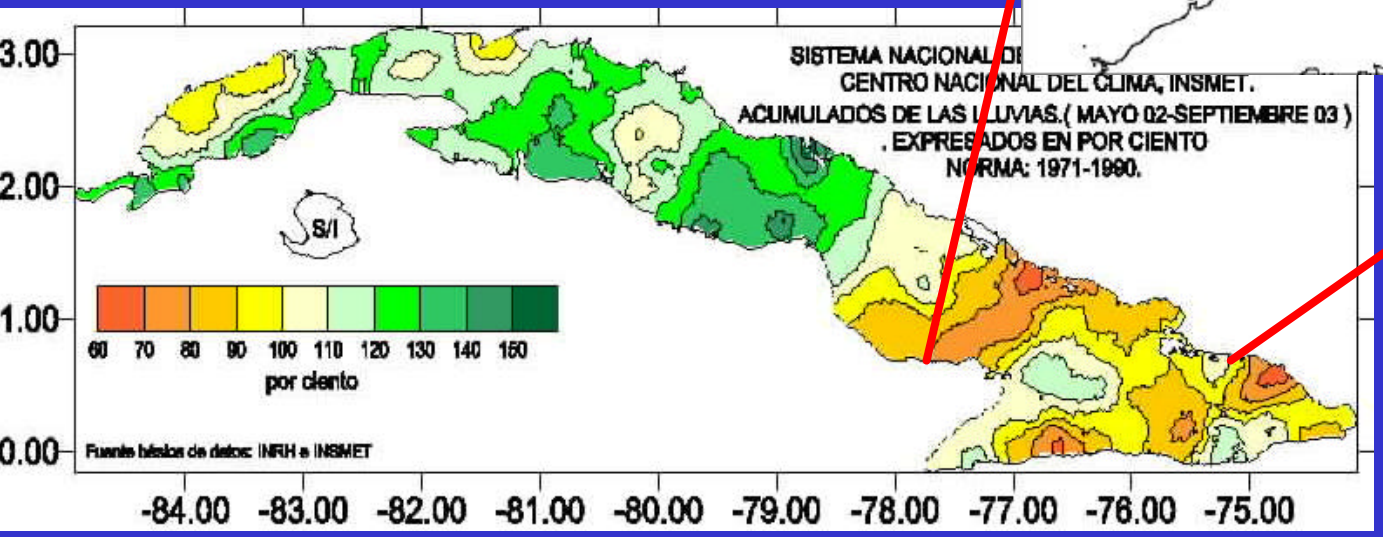
PRECIS was running for Control Simulation and SRES A2 scenario. Now we are running SRES B2 scenario. All for HADCM3 GCM

We are also assimilated and use RegCM and MM5 Regional Models to make climate simulations

REGION DE ESTUDIO EN CUBA

- Persistencia del fenómeno de la Sequía (elemento científico)
- Vulnerabilidad Alimentaria y Desarrollo Local (socio económico)
- Prioridad del Estado Cubano (estratégico)
- Viabilidad/racionalidad (práctico)





General Characteristics of the Study Region

Proy. Regional	Provincia Las Tunas	Municipios seleccionados (Manatí, Puerto Padre, J. Menéndez)
Superficie (km^2)	6 578, 6	2 771,0
Población (hab)	533 623	180 000
Asentamientos urbanos rurales	508 18 490	276 9 267

Municipios 8 27 Consejos Populares

Actions for coordination, Capacity Building and Awareness

Octubre, 2003: Primeros encuentros con las autoridades de la Provincia

Febrero, 2004: Taller capacitación y Desarrollo de la Primera encuesta.

Talleres de Capacitación. Marzo y Junio del 2004

Talleres de presentación y validación. Mayo del 2005.

CAPACITY BUILDING WORKSHOPS

- Project presentation
- The science of Climate Change
- Drought: Concepts and definitions
- Risk and opportunities assessment (Working Groups)
- Preliminary results from survey

DIAGNÓSTICO

Condiciones naturales, Medio Ambiente, Clima, Población

Infraestructuras — Vial, ferroviaria, hidráulica, comunicaciones, eléctrica

Economía — Agricultura, forestal, pecuaria, industrial, turismo

Sistema de asentamientos

Servicios

LEVANTAMIENTO ENCUESTAL

. Población

. Campesinos

. Informantes clave

ENTREVISTAS ABIERTAS

ENTREVISTAS GRUPALES

PROSPECTIVA

ESCENARIOS

MEDIDAS, ESTRATEGIAS Y POLÍTICAS DE ADAPTACIÓN

Priorities for Cuba

- Improve the capacity to produce better climate change scenarios;
- Enhance the climate change research community;
- Strengthening the research cooperation with the Caribbean Community Climate Change;
- Spread the incorporation of the human dimension in the assessments
- Increase the capacity for Integrated Assessment approach and modeling

En el camino de la adaptacion

- Directiva 1 del Consejo de Defensa Nacional
- Importante obra hidráulica (Obra del Siglo) para enfrentar la sequía.
- Fortalecimiento del sistema meteorologico nacional