Capacity Building in Earth Observations for Agriculture

Jurandir Zullo Junior, Hilton Silveira Pinto - Eduardo Delgado Assad

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006
Current Situation of Brazilian Agribusiness

Agribusiness and Brazilian Economy

GDP = US$ 500 bi (30% of GDP = US$ 165 bi in 2003)
40% of Exports = US$ 30 bi
30% of Jobs

World’s Larger Exporter of Sugar, Alcohol, Orange Juice, Coffee, Soybean, Chicken and Beef

Evolução da Safra de Grãos

Produção Brasileira de Carnes

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Current Situation of Brazilian Agribusiness

Causes:
1) Natural Resources: Climate, Soil and Water
2) Human Resources
3) Technology

Climate
Advantages of Climate Conditions
- Great variations around the country - Large number of different crops;
- Low occurrence of phenomena as tornadoes, snow and hurricanes;

Constraints
- The main crops are rainfed (grow during the rainy season);
- 90% of all agricultural losses in the beginning of 90's were caused
  - by dry spells during the rainy season, specially during the reproductive phase (flowering and grain-filling) - 60%
  - by rainfall excess during harvest - 30%
Probability of 10-days dry spells in the State of Bahia

January

- < 25%
- 25% - 50%
- 50% - 75%
- 75% - 100%

February

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006
Program of Climate Risk Reduction

Political Coordination: Ministry of Agriculture

Beginning: 1995

Technical Coordination: EMBRAPA (Brazilian Agricultural Research Corporation)

Participants: Research Institutes and Universities

Objective: Decrease the Climate Risks for less than 20%
  - Dry spells during the reproductive phase
  - Rainfall excess during the harvest period

Methodology: Simulation of Cumulative Water Balances for Different Soil Types, Planting Dates, Cycle Lengths, Surface Stations

Workshop on Capacity Building - GEO | S.J. Campos, May 29th-31st, 2006
Program of Climate Risk Reduction - Team

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006
Soybean
Early Cultivar
Clay Soil
Period: Oct 1st–10th
Goiás (341,000 km²)
Soybean Early Cultivar Clay Soil Period: Nov 1st–10th
Goiás (341,000km²)

Program of Climate Risk Reduction - Output

ZONEAMENTO AGROCLIMÁTICO DA CULTURA DA SOJA NO ESTADO DE GOIÁS
CICLO: PRECOCE SOLO: TIPO 3 SEMEADURA: 01/11 a 10/11

FAVORÁVEL

INTERMEDIÁRIA

DESFAVORÁVEL

S.J.Campos, May 29th-31st, 2006
Soybean
Early Cultivar
Clay Soil
Period: Dec 1st-10th
Goiás (341,000km²)

Program of Climate Risk Reduction - Output

ZONEAMENTO AGROCLIMÁTICO DA CULTURA DA SOJA NO ESTADO DE GOIÁS
CICLO: PRECOCE  SOLO: TIPO 3  SEMEADURA: 01/12 a 10/12

FAVORÁVEL
INTERMEDIÁRIA
DESFAVORÁVEL

S.J.Campos, May 29th-31st, 2006
## Program of Climate Risk Reduction - Output

### Agritempo

**Sistema de Monitoramento Agrometeorológico**

<table>
<thead>
<tr>
<th>Cultura</th>
<th>Cíclo</th>
<th>Solo</th>
<th>Periodos Favoráveis (Verde) e Desfavoráveis (Vermelho) de Plantio por Decênio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AGO</td>
</tr>
<tr>
<td><strong>ARROZ IRRIGADO</strong></td>
<td>MEDIO</td>
<td>ARENOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARGILOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEXTURA MEDIA</td>
<td>1</td>
</tr>
<tr>
<td><strong>ARROZ SEQUEIRO</strong></td>
<td>MEDIO</td>
<td>ARGILOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEXTURA MEDIA</td>
<td>1</td>
</tr>
<tr>
<td><strong>FEIJAO DE SEQUEIRO SAFRA DE VERAO</strong></td>
<td>INTERMEDIARIO</td>
<td>ARENOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARGILOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEXTURA MEDIA</td>
<td>1</td>
</tr>
<tr>
<td><strong>MEDIO</strong></td>
<td></td>
<td>ARENOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ARGILOSO</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TEXTURA MEDIA</td>
<td>1</td>
</tr>
</tbody>
</table>

**Use:** as Federal Farm Credit Policy (US$ 14 billion)

**Workshop on Capacity Building - GEO**

*S.J.Campos, May 29th-31st, 2006*
Program of Climate Risk Reduction - Output

Climate Zoning - Coffee (Coffea arabica)

Total Area: 249,000 km²

Suitable
Suitable - Thermal Excess
Suitable - Irrigation Needed
Suitable - Frost Risk
Unsuitable

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Espacialização dos Riscos Climáticos para Cultura: SOJA
Temperatura Normal

Nov 1st a 10th

3419071.85 km²
1111233.55 km²
2106526.59 km²

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Climate Change - Soybean - Brazil

Espacialização dos Riscos Climáticos para Cultura: SOJA
Temperatura Aumento 1 Grau

Nov 1\textsuperscript{st} a 10\textsuperscript{th}

Workshop on Capacity Building - GEO

S.J.Campos, May 29\textsuperscript{th}-31\textsuperscript{st}, 2006
Input Data

Evapotranspiration

Rainfall

Vegetative

Reproductive

Maturity

Kc

Soil Water Holding Capacity

Initial

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006
Results

✓ Organization of National Farm Credit Policy and Insurance

✓ Decrease of agricultural losses due to climate events

✓ Even self-financed farmers use the results (planting calendars)

✓ Increase of Yield, Production and Use of Technology

✓ Decrease and Inhibition of Frauds

✓ Availability of Data for Agricultural Planning

✓ Demand for New Crops, Regions and Periods
Information System for Monitoring Weather and Climate

Workshop on Capacity Building - GEO
S.J. Campos, May 29th-31st, 2006

http://www.agritempo.gov.br
Output: Maps, Bulletins, Graphs and Tables with Meteorological and Climate Data and Information Applied to Agriculture
Agritempo System - Output

Mapas Agroclimatológicos - MG

Workshop on Capacity Building - GEO

S.J. Campos, May 29th - 31st, 2006
Agritempo System - Output

Água Disponível no Solo

MG Mapa 3 de 12

Mapa de disponibilidade de água no solo para o período de 22/05/2006 a 26/05/2006.

Botões de navegação para visualizar outros mapas.

VOLTAR

Município: Itembaçu
Latitude: 18.0254
Longitude: 41.6943

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006
Agritempo System - Output

Temperatura Média

MG Mapa 8 de 12

VOLTAR

Municipio: Saimas
Latitude: 16°16'00"
Longitude: 42°20'75"
Agritempo System - Output

Mapas de Previsão - MG

Temperature Mínima para 12 horas
Temperature Mínima para 24 horas
Temperature Mínima para 48 horas

Temperature Mínima para 72 horas
Temperature Mínima para 96 horas
Temperature Mínima para 120 horas

Temperature Máxima para 12 horas
Temperature Máxima para 24 horas
Temperature Máxima para 48 horas

Temperature Máxima para 72 horas
Temperature Máxima para 96 horas
Temperature Máxima para 120 horas

Previsão da chuva para 12 horas
Previsão da chuva para 24 horas
Previsão da chuva para 48 horas

Previsão da chuva para 72 horas
Previsão da chuva para 96 horas
Previsão da chuva para 120 horas

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Agritempo System - Output

Temperature Minimum 72 hours

Temperature Minimum: Projection for 30/05/2006

Municipality: Río Pardo da Minas
Latitude: 15.6659
Longitude: 42.5372

Workshop on Capacity Building - GEO
S.J.Campos, May 29th-31st, 2006
Workshop on Capacity Building - GEO

Agritempo System - Output

Precipitação 48 horas

Precipitação: Previsão para 29/05/2006
Crop Yield Forecasting - Agrometeorological Method - Coffee - 2001 - State of São Paulo
Agritempo System - Partners

Input: Daily Data of Temperature (Minimum and Maximum) and Rainfall from more than 1,000 Ground Stations by Phone, Fax, Email and FTP

Data: More than 40 million records and historical data from 4,000 ground stations
Application: Estimation of Surface Temperature in Operational Warning Systems
Application: Forecast of Planted Area, Yield and Production
Remote Sensing Data - NDVI - Minas Gerais

Project: Improvement of the National System of Crop Yield Forecasting
Coordination: Ministry of Agriculture (since 2004)

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Problem: Insufficient Number of Surface Stations in Some Regions

Agritempo System - Limits

Workshop on Capacity Building - GEO

S.J.Campos, May 29th-31st, 2006
Conclusions

✓ Important Projects (Climate Risk Reduction, Weather and Climate Monitoring, Climate Change) based on “simple” and organized data

✓ Multi-disciplinary and Multi-institutional Activities

✓ More historical data for the Project of Climate Risk Reduction

✓ More surface data for monitoring - Remote Sensing

✓ Importance of Climate and Weather Forecast
Capacity Building in Earth Observations for Agriculture

Jurandir Zullo Junior, Hilton Silveira Pinto - Eduardo Delgado Assad

Workshop on Capacity Building - GEO

S.J. Campos, May 29th-31st, 2006