

Strategic Plan for
Agricultural Meteorology
in the Caribbean
2007-2012

Agrometeorology is concerned with the interaction between meteorological and hydrological factors on one hand and agriculture in the widest sense including, including horticulture, animal husbandry and forestry on the other hand...

Guide for training Agrometeorology Personnel, WMO 134, 1981

Traditional Agrometeorology Priorities in the Caribbean

- Colonial farmers widely collected rainfall, as from early it was recognised that rainfall was the most limiting and variable factor in the region's agriculture-particularly times of extremes
- Tropical cyclones results in losses of crop, livestock and farm infrastructure
- Low temperature at altitude and in Belize (passage of cold fronts)

Success stories of Agrometeorology Globally

- FARMWEATHER (Australia) resulted in economic benefits from the four main export crops (wheat, cotton, barley, sorghum) of six times the cost of the service
- Experiment conducted on cowpea in the Sahel. Farmers separated their plots in two. On one subplot they followed normal agricultural practices. On the other plot followed the advice of extension officers of the Rural Development Service and an Agrometeorological Monitoring Team. The control plots yielded lower yields than the one for which advice was given.
- The US Drought Monitor developed as an experiment in 1999 and developed into an operational product just months afterwards due to severe and widespread droughts across the US
- The Weekly Weather and Crop bulletin product of the Joint Agricultural Weather Facility and the National Agricultural Statistics Service.

**Some existing Regional and Global initiatives
with links to Agrometeorology**

**Mainstreaming Adaptation to Climate
Change**

www.caribbeanclimate.bz/page.php?12

GECAFS www.gecafs.org

**CDERA Comprehensive Disaster
Management www.cdera.org**

Potential consequences of Climate Change of interest to agriculture

- Shifts and changes in start, end and length of growing season
- More frequent droughts and longer dry spells
- Days with greater rainfall intensity, duration and amounts (flooding, erosion)
- Days with temperatures above critical thresholds.
- Shifts in crop zones
- Yield changes (losses or opportunities)
- Markets (losses or opportunities)

Global Environmental Change and Food Systems GECAFS

- ...an “international, interdisciplinary research project focussed on understanding the links between food security and global environmental change”
- Its goal is to develop adaptation strategies to cope with the impacts of environmental change on the food system and to assess the environmental and socio-economic feedback of such adaptation strategies
- Environmental changes include changes in climate, quality and quantity of water, nitrogen cycling, atmospheric composition, sea level and conditions, land cover and soils and biodiversity.

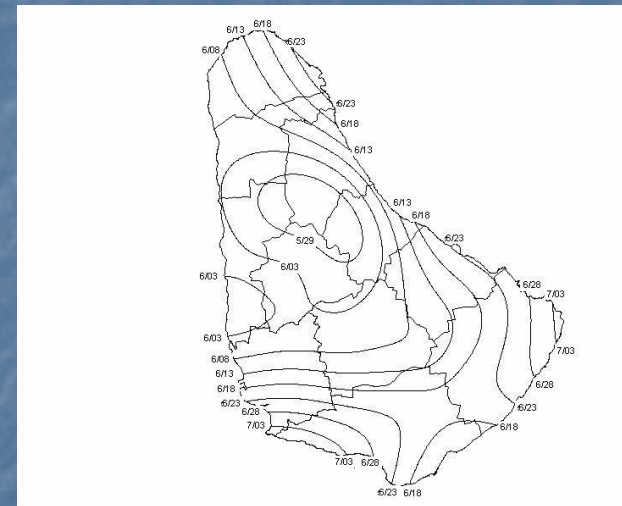
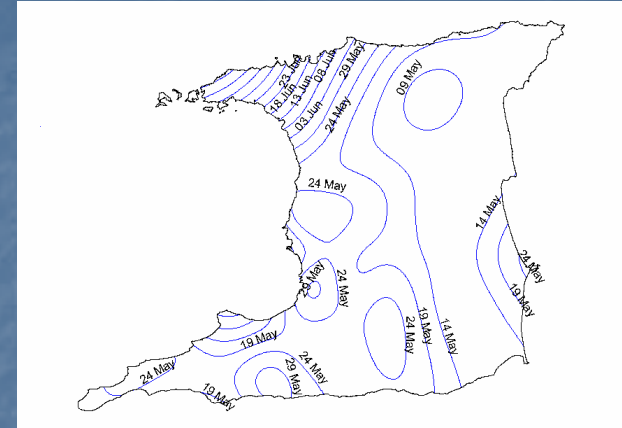
...GECAFS

- GEC ----- Food ----- Policy
- GECAFS Caribbean
- A set of prototype Caribbean Scenarios for research on Global Environmental Change and Regional Food Systems
- GECAF Caribbean Science Plan and Implementation Strategy

Caribbean Agrometeorology Network

CarAgMet

- This activity began in September 2005 with three participating countries Trinidad, Grenada, St. Lucia.
- A network of meteorologists and agriculturists coming into together to increase awareness of the application of agrometeorology, develop agromegeorological products, increase dialogue between the two sciences provide educational and informative related articles.
- Initial problem with network members being able to dedicate themselves as much as required to the cause – CIMH has dedicated a significant proportion of the time of two of its staff members to assist in this programme
- Some products and articles received from these countries and can be viewed at <http://63.175.159.26/~monthly/CarAgMet2/products.htm>
- Since the initial membership, Guyana has come on board
- Looking forward to increased membership from member countries



Start of the growing season in
Trinidad and Barbados

Farmers in the Caribbean are aware of the importance and impact of weather and climate

Results of Survey of agricultural scientists and farmers in the English-speaking Caribbean

- Survey developed during international workshop on Improving Agrometeorological Bulletins
- 75 interviews were returned
- Countries participating – Antigua Barbuda, Belize, St Vincent and the Grenadines, Trinidad and Tobago, Jamaica, St. Kitts
- Only two said they did not use or have use for meteorological data
- Belize is the only CARICOM country with a structured agromet service with a trained member of staff (Trinidad and Tobago and Jamaica have a climatology departments)

Results of Survey of agricultural scientists and farmers in the English-speaking Caribbean

Other comments

- the meteorological information should be presented in a way that is tailored for agriculture
- some weather related information would serve best if it was more crop specific and this would add even more value to the information
- forms of dissemination of information were not necessarily adequate
- two farmers mentioned they were quite satisfied with the information they receive - Belize

Number of those interviewed that use meteorological information and the parameters they use. Numbers in brackets represent a parameter that was not provided as a choice

| Parameter | No. of interviewees |
|-----------------------|---------------------|
| Rainfall | 69 |
| Air temperature | 27 |
| Soil temperature | 14 |
| Humidity | 29 |
| Wind | 31 |
| Sunshine | 37 |
| Radiation | 7 |
| Soil moisture | 26 |
| Weather (forecast) | 34 |
| Evapotranspiration | (1) |
| Irrigation | (1) |
| Sea conditions | (1) |
| Hurricane information | (9) |

Means by which meteorological information is acquired to aid in management decisions

| Method of information | No. of interviewees |
|------------------------------|---------------------|
| Weather forecast | 68 |
| Satellite | 9 |
| Weather advisories | 43 |
| Seasonal rainfall outlook | 49 |
| Agrometeorological bulletins | 6 |
| Farmers Almanac (McDonald's) | (1) |

The area in which an agrometeorological service can aid agricultural activities

| Activity | No. of interviewees |
|--|---------------------|
| Research | 1 |
| Planting decision | 31 |
| Crops types to sow | 15 |
| Land/soil preparation | 4 |
| Dam development | 1 |
| General farming and planning decisions | 20 |
| Fertiliser application | 4 |
| Herbicide application | 2 |
| Pest and disease management | 11 |
| Water storage or irrigation | 15 |
| Reduce production costs | 3 |
| Increasing yield | 6 |
| Harvesting | 12 |
| Mechanisation | 1 |
| Finance planning and loan disbursement | 2 |
| Crop protection (temp, wind) | 3 |
| Choice of sun or mechanical drying | 1 |
| Crop zoning | 1 |
| Disaster preparedness | 2 |
| Prevent poultry/stock loss (flooding) | 3 |

Plan of Action

Satisfy Data Needs

- Meteorological data – This includes virtually the entire suite of meteorological parameters. Data can be from conventional or automatic weather stations and remote sensing techniques such as radar and satellite.
- Soil data –available water capacity, readily available water. These parameters are linked with the soil depth for roots. Soils maps are assets to any work in agroclimatlogy.
- Agronomic data – of particular interest include phenological, yield and field management data. Socio-economic data – this would be useful when conducting cost benefit analyses and on damage assessments after extreme events.
- Geographic Information Systems (GIS) allows for the interrelating (merging, selecting) of different categories of geo-referenced information.

Data needs

- Data rescue and digitising
- Set up of stations in areas seen as good for pilots that are not covered in the network
- Agronomic, pedological, meteorological, socio-economic, GIS
- Lots of information in the grey literature or not published at all

Recommended Activity

- [irrigation estimates](#) through water balance calculation
- information on weather related natural disasters, particularly [floods](#), excessive temperature, strong winds. Such information through advisories will be issued in language/format that agriculturists can understand
- timing of farming activity (e.g. [sowing](#))
- the development of [drought](#) indices and drought risk assessment parameters
- implications of regular [3 to 5 day forecasts](#) to agriculture
- more relevant [seasonal rainfall outlook](#) for agriculture.
- indication of [when certain thresholds are met](#) e.g. crop temperature threshold, wind speed thresholds for spraying, temperature threshold for heat stress in animals.
- Weekly/dekadal [weather bulletin](#) and summaries catering to agriculture.
- [Climatological trends](#) – traditional farmer knowledge would not work in a changed environment

Extreme Events Increased Frequency?

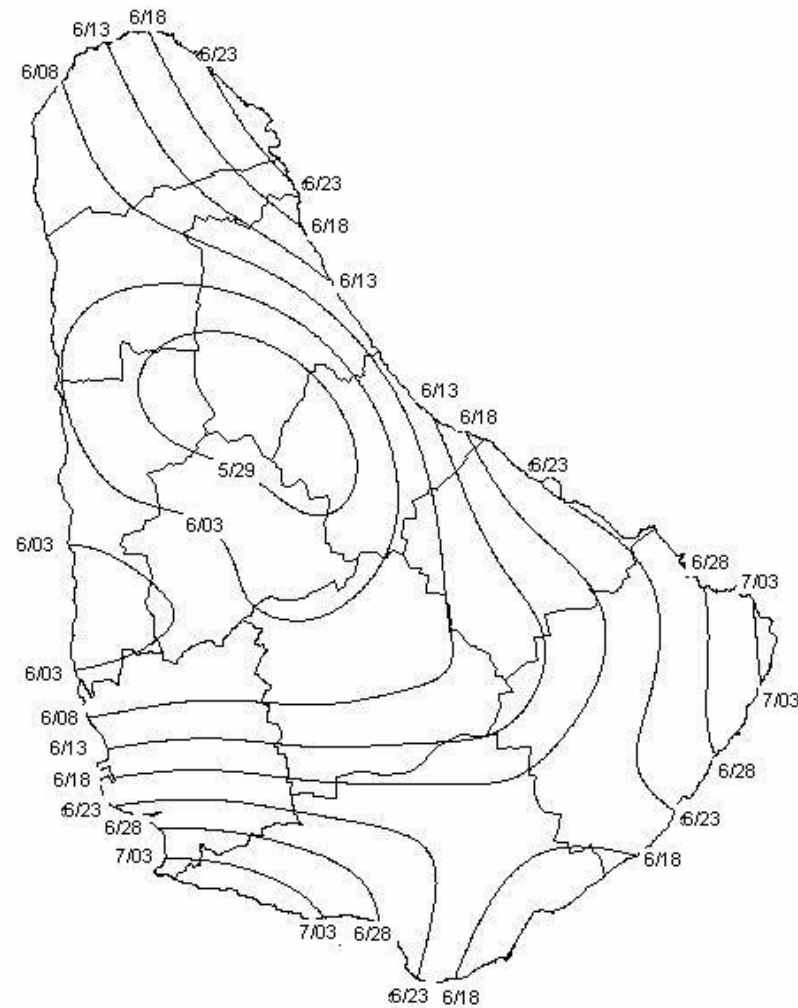
Flooding in Guyana January 2005



Images from www.djmggy.com

Examples of Products

Start of growing season

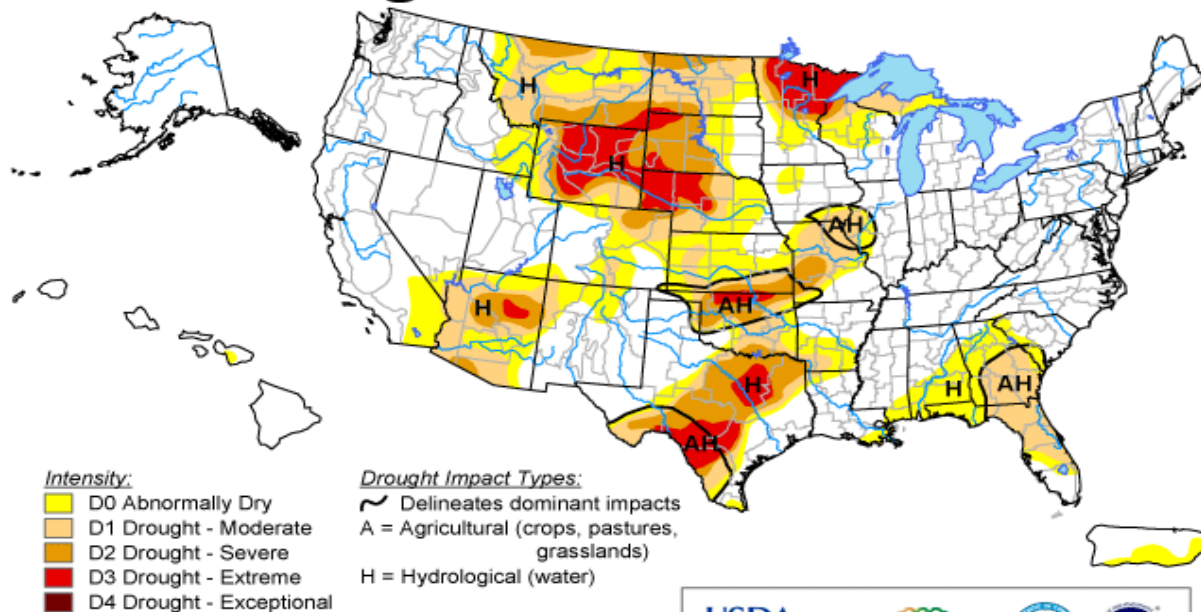


Examples of Products United States Drought Monitor

U.S. Drought Monitor

November 7, 2006

Valid 7 a.m. EST



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>

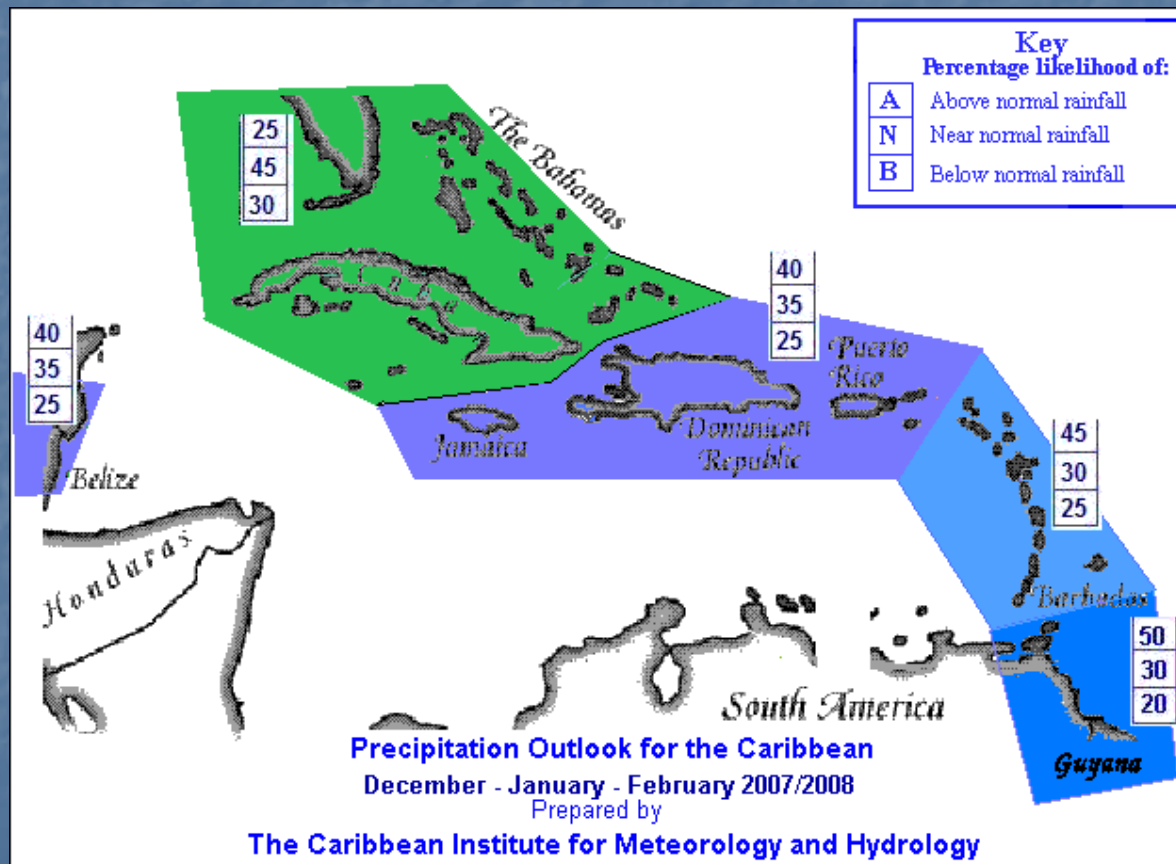


Released Thursday, November 9, 2006

Author: Douglas Le Comte, CPC/NOAA

Examples of Products

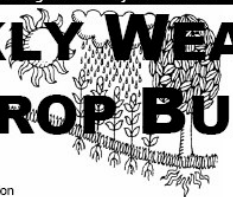
Seasonal Precipitation Outlook



Examples of Products Weekly or dekadal weather bulletin and summaries

Volume 93, No. 45
<http://www.usda.gov/occe/weob/jawf/wwcb.html>
November 7, 2006

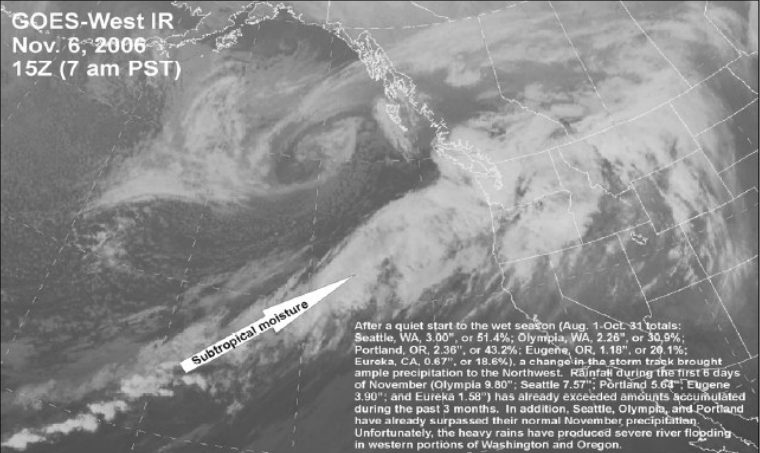
WEEKLY WEATHER AND CROP BULLETIN



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service

U.S. DEPARTMENT OF AGRICULTURE
National Agricultural Statistics Service
and World Agricultural Outlook Board

GOES-West IR
Nov. 6, 2006
15Z (7 am PST)



After a quiet start to the wet season (Aug. 1-Oct. 31 totals: Seattle, WA, 3.00", or 51.4%; Olympia, WA, 2.26", or 30.5%; Portland, OR, 2.36", or 43.2%; Eugene, OR, 1.18", or 20.1%; Eureka, CA, 0.87", or 18.6%), a change in the storm track brought ample precipitation to the Northwest. Rainfall during the first 6 days of November (Olympia 9.80"; Seattle 7.57"; Portland 5.63"; Eugene 3.90"; and Eureka 1.58") has already exceeded amounts accumulated during the past 3 months. In addition, Seattle, Olympia, and Portland have already surpassed their normal November precipitation. Unfortunately, the heavy rains have produced severe river flooding in western portions of Washington and Oregon.

HIGHLIGHTS

October 29-November 4, 2006

Highlights provided by USDA/WAOB

In the Pacific Northwest, an onslaught of storminess washed away a slow start to the 2006-07 wet season but caused flooding along rivers draining westward from the Cascades. Farther inland, Northwestern winter wheat areas received generally light but beneficial showers. Elsewhere west of the Rockies, mild, dry weather favored autumn fieldwork in central and southern California and the Southwest. Meanwhile on the Plains, very chilly conditions persisted through November 2, followed by a warming trend. In fact, cooler-than-normal weather prevailed nearly nationwide for the fourth consecutive week, with temperatures averaging at least 5 to 10°F below

(Continued on page 7)

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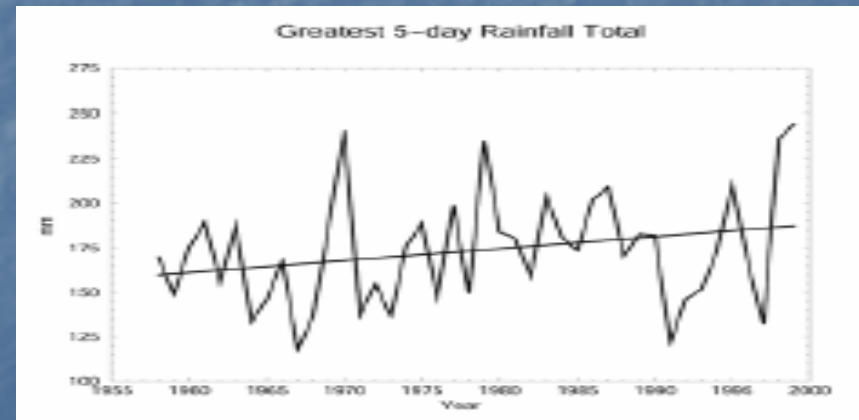
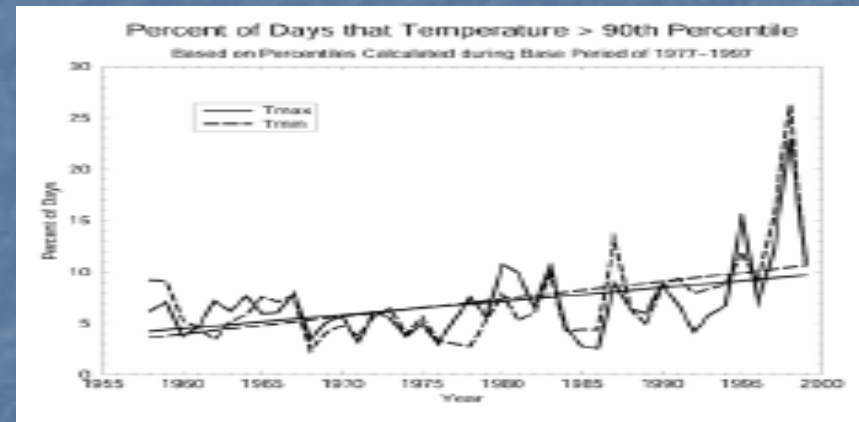
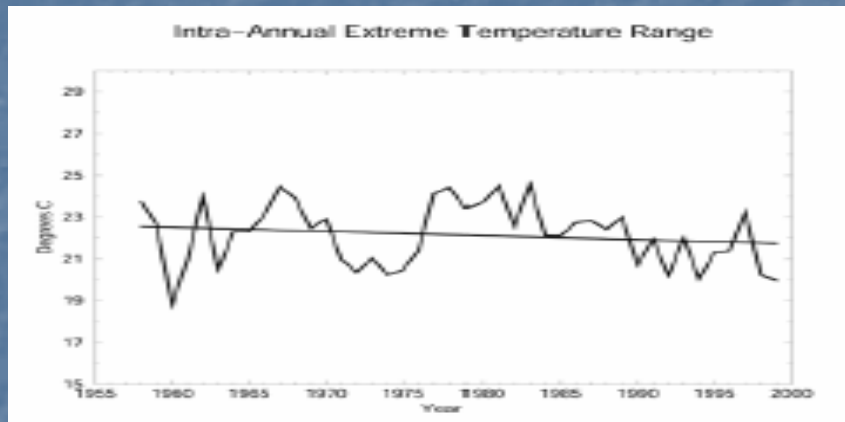
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Temperature and Rainfall Trends since 1950

Petersen et. al 2001



Approach

Toward Satisfying the Goals of the Strategic Plan

- Agriculturally important areas will be selected in some countries
- Interviews/consultations and discussions with key farmers, agricultural ministries, agricultural research and development agencies (e.g CARDI, UWI Faculty of Agriculture) and societies will be held to determine the key agrometeorology information needs
- Procure the relevant data for the development of the product or service. Needs access to the relevant databases or the development of such data bases in appropriate formats. Resources must be made available for the personnel and computer hardware and software to be made available
- Determine who the particular user(s) of the information will be

Approach

- determined methods of dissemination have to be resolved according to the capacities of the user
- implications/application for agriculture should be attached to the forecast (further MACC dialogue with IRI)

Training courses for those key people (identified) involved

- special short courses of two or three days duration for half a day each (for farmers)
- agricultural planning, research and development institutions, agricultural extension services would need courses specially catering to them – 3 to 4 weeks
- meteorologists and hydrologists at the level of the Senior Level Technician or Class 1. Staff members to carry out function related to agrometeorology within the service
- Some of these would be involved in CarAgMet which will have a chat forum added to its function

Achievements after five years (2012)

- Trained personnel in met services and some agro institutions
- Developed dialogue and collaborative links between institutions
- Develop links with national/regional projects with agrometeorological implications
- Network of persons within the collaborative/dialogue forum...
- ...Development of CarAgMet
- Improved data bases and data collection
- Pilot farms/cooperatives/research sites for use of agro information...
- ...Proof of concept which includes...
- Cost benefit (and social implications)