GEOSS Symposium on Integrated Observation for Sustainable Development in the Asia-Pacific Region

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Climate Change and Its Potential Impacts in the Philippines

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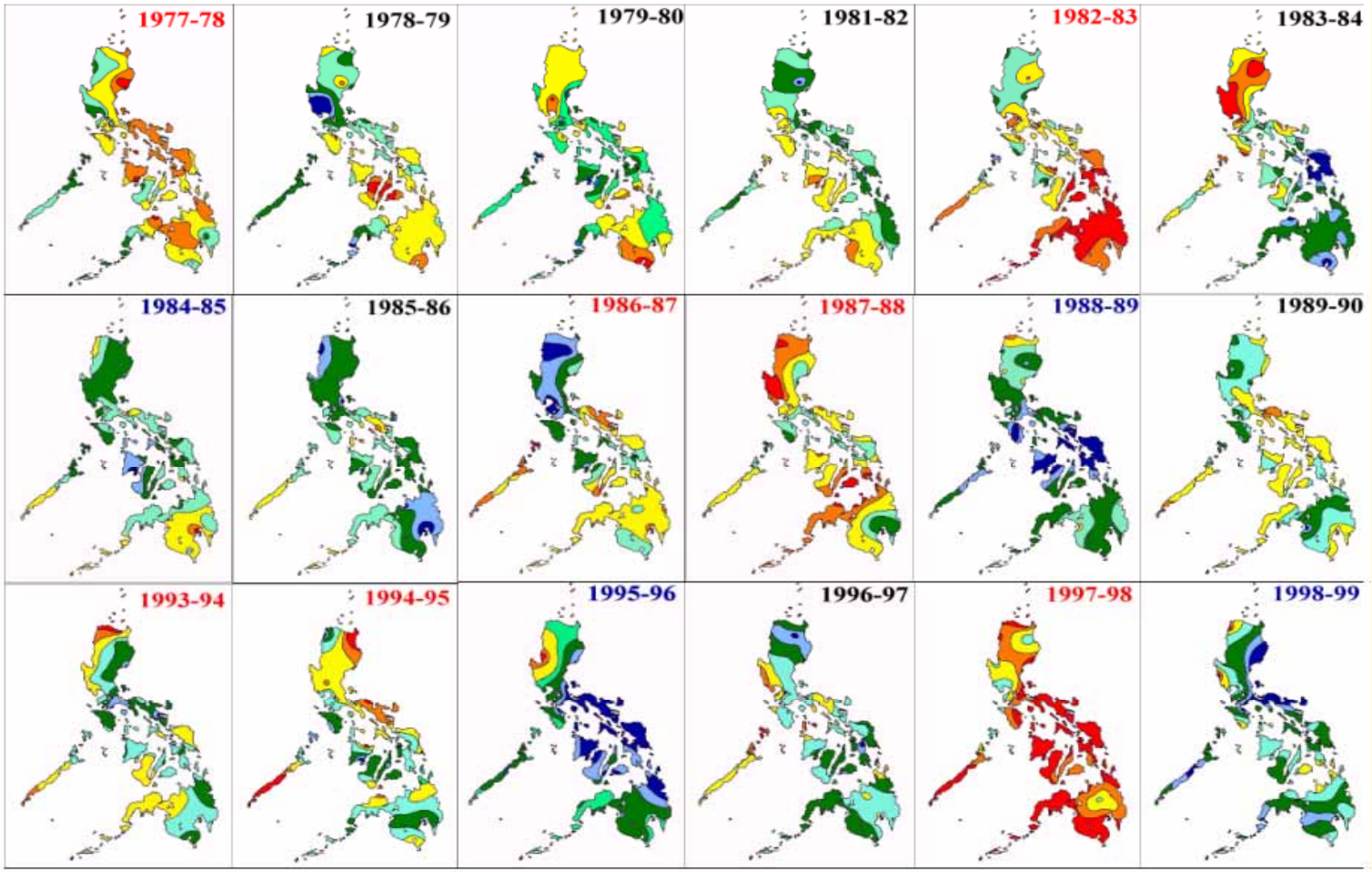
PAGASA / DOST

PAGASA/DOST

IMPACTS OF ENSO ON PHILIPPINE ANNUAL RAINFALL



Legend:

- Severe drought impacts
- Drought impacts with major losses
- Moderate drought impacts
- Near normal to above normal condition
- Way above normal condition
- Potential for flood damage
- Severe flood damage

Source:PAGASA

RED colored years are **EL NINO** years, **BLUE** colored years are **LA NINA** years and **BLACK** colored years are **NON_ENSO** years

- Seasonal rainfall in the Philippines is modulated by ENSO
- ENSO warm events (El Nino) cause drought in many areas
- ENSO cold events (La Nina) cause excessive rainfall

AGRICULTURAL IMPACTS

- Soil Moisture Availability
- Planting Dates (Crop Calendar)
- Crop Condition / Potential Crop Yield
- Production Shortfalls
- Pest and Diseases

HYDROLOGIC IMPACTS

- Streamflows
- Dam Operations / Water Allocation
  - Domestic Water Supply
  - Irrigation
  - Hydro Power Generation
  - Tourism
- Depth of Aquifer
- Water Quality
- Forest Resource / Watershed Management

MARINE BIOLOGICAL IMPACTS

- Fish Migration
- Fish Production
- Red Tide, Fish Kills
- Other Impacts on Marine Life

HUMAN HEALTH IMPACTS

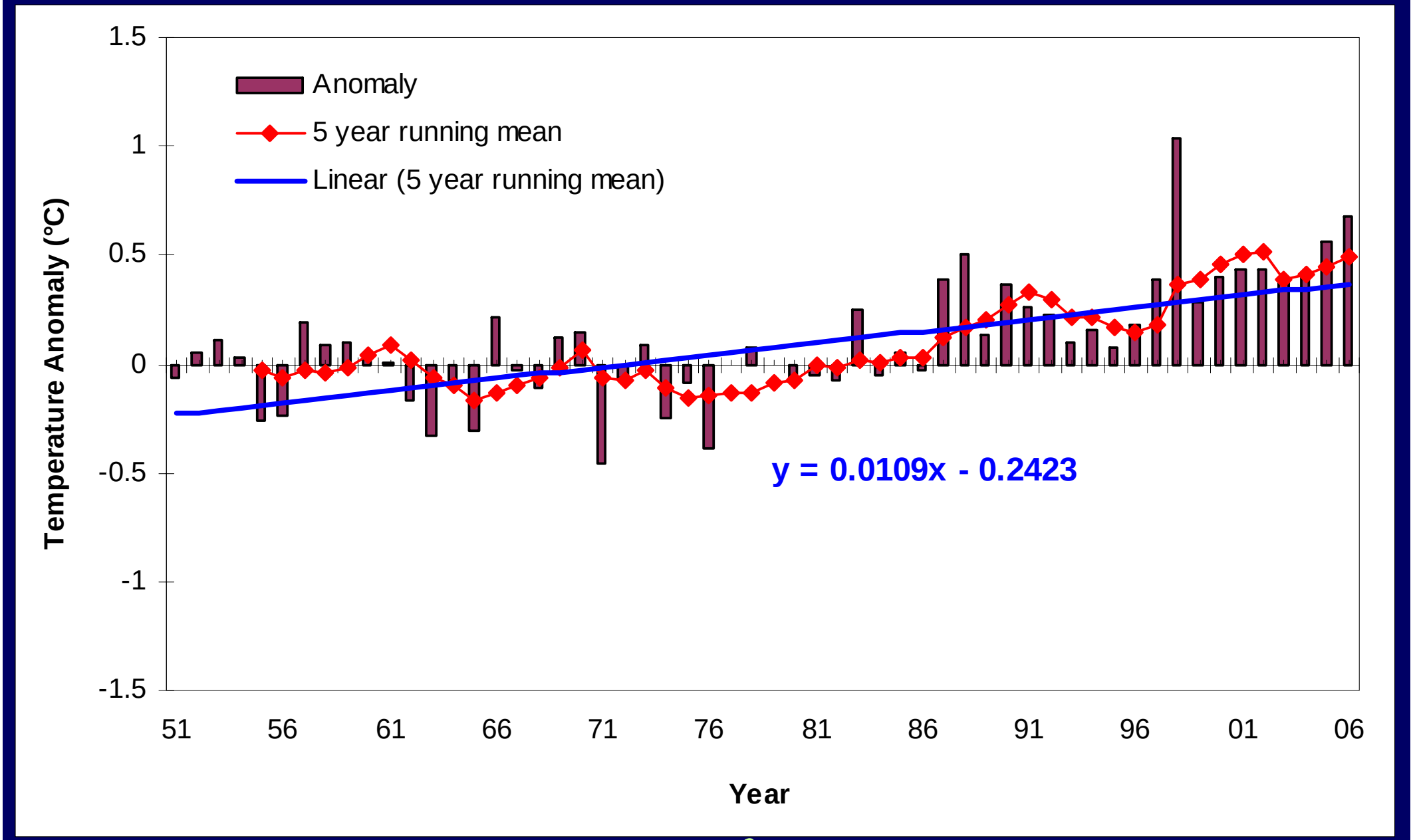
- Malnutrition
- Hygiene and Sanitation
- Drinking Water Quality
- Outbreak of Diseases
- Excessive Heat
- Poor Air Quality

Strategies to Mitigate Impacts of El Niño

- Water conservation
- Judicious allocation of available water supply (multi-purpose dams
- Use of drought resistant crops less water requirement/early maturing varieties
- Modified cropping calendar
- Water impounding projects/shallow tube wells
- Public awareness and understanding of the nature of droughts and impacts
- Crop Insurance

How have global warming been manifested in the Philippines?

Observed Mean Annual Mean Temperature Anomalies in the Philippines
Period: 1951-2006 (departures from the 1961-1990 normal values)



An increase of ***0.6104 °C*** from 1951-2006

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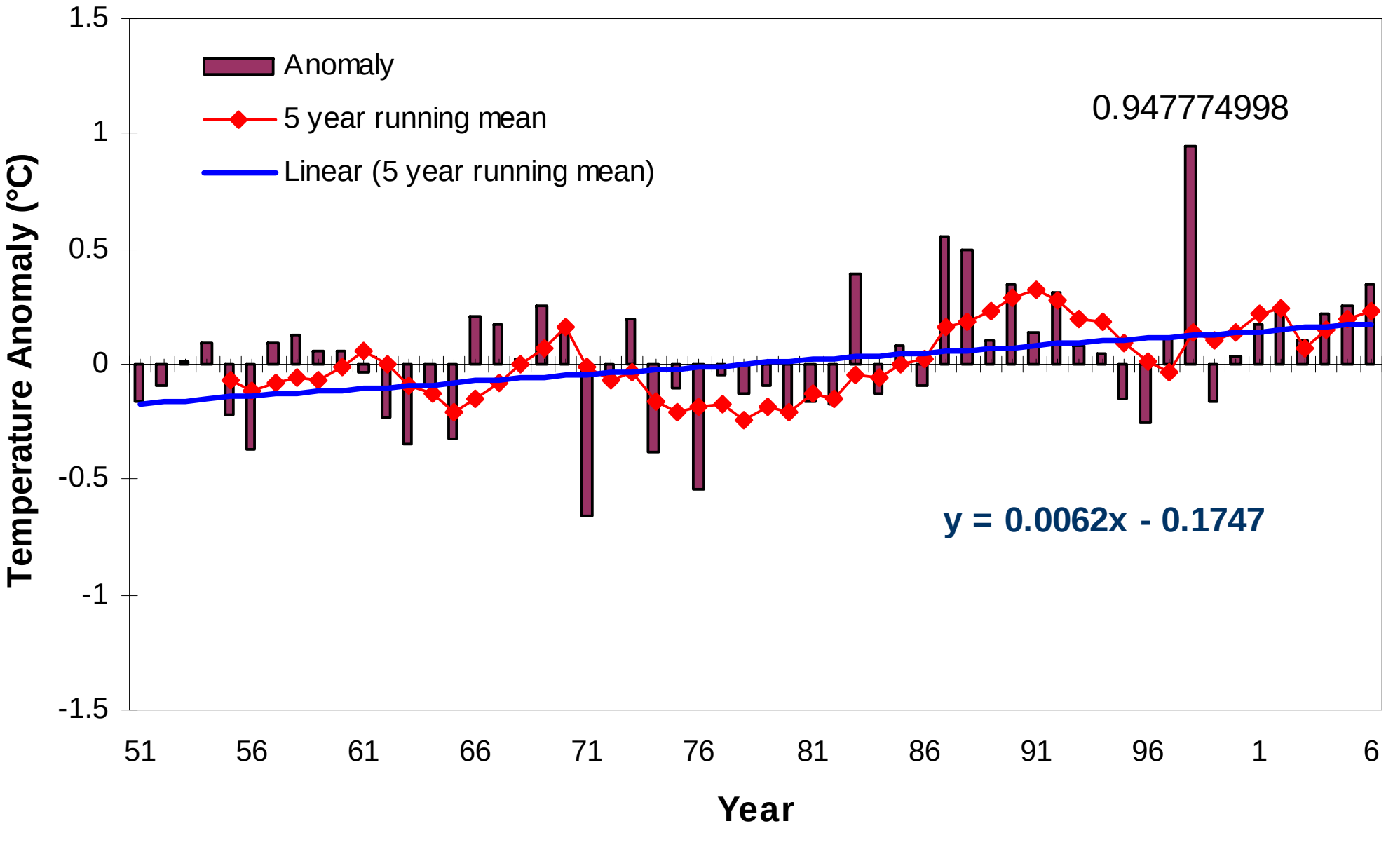
Observed Mean Annual Maximum Temperature Anomalies in the Philippines
Period: 1951-2006 (departures from the 1961-1990 normal values)



An increase of ***0.3472 °C*** from 1951-2006

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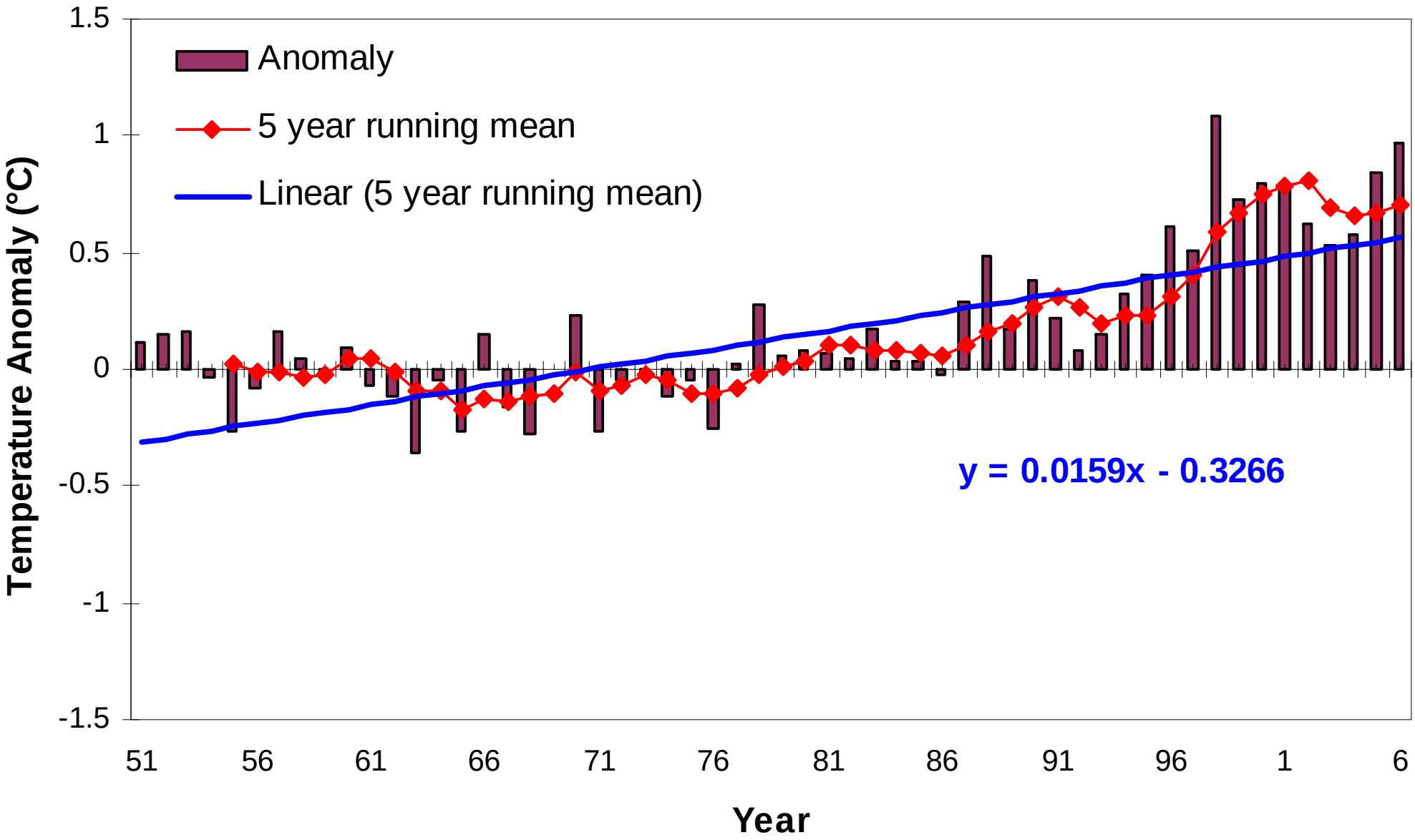
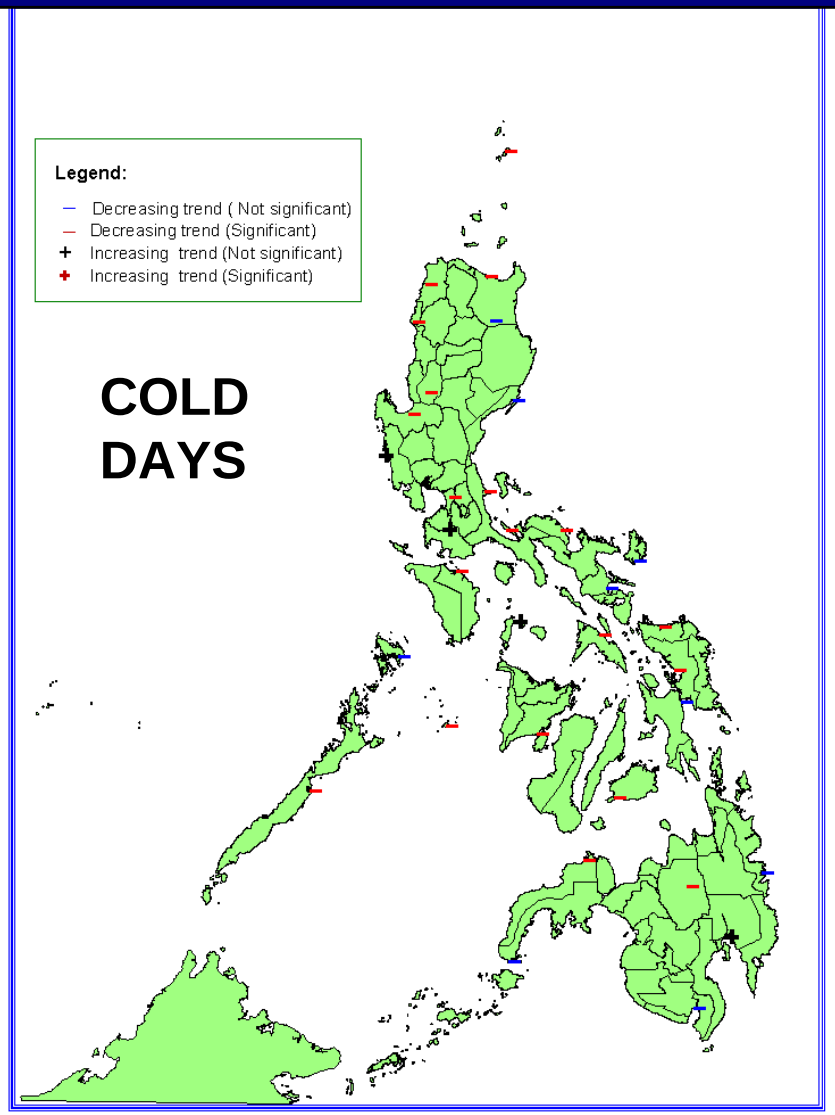
Observed Mean Annual Minimum Temperature Anomalies in the Philippines
Period: 1951-2006 (departures from the 1961-1990 normal values)

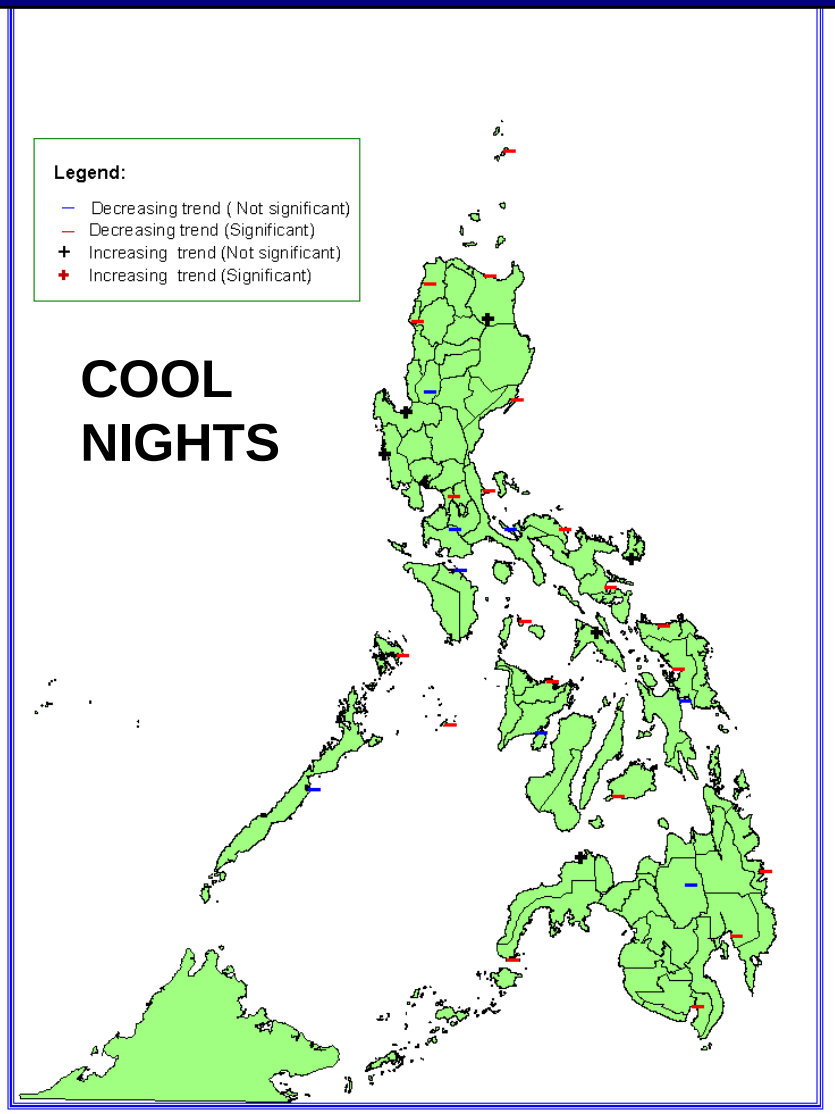


An increase of *0.8904 °C* from 1951-2006, increase in minimum temperatures almost 3 times increase in maximum temperatures

PAGASA/DOST

Trends in Extreme Daily Temperatures in the Philippines* (1961 – 2003)

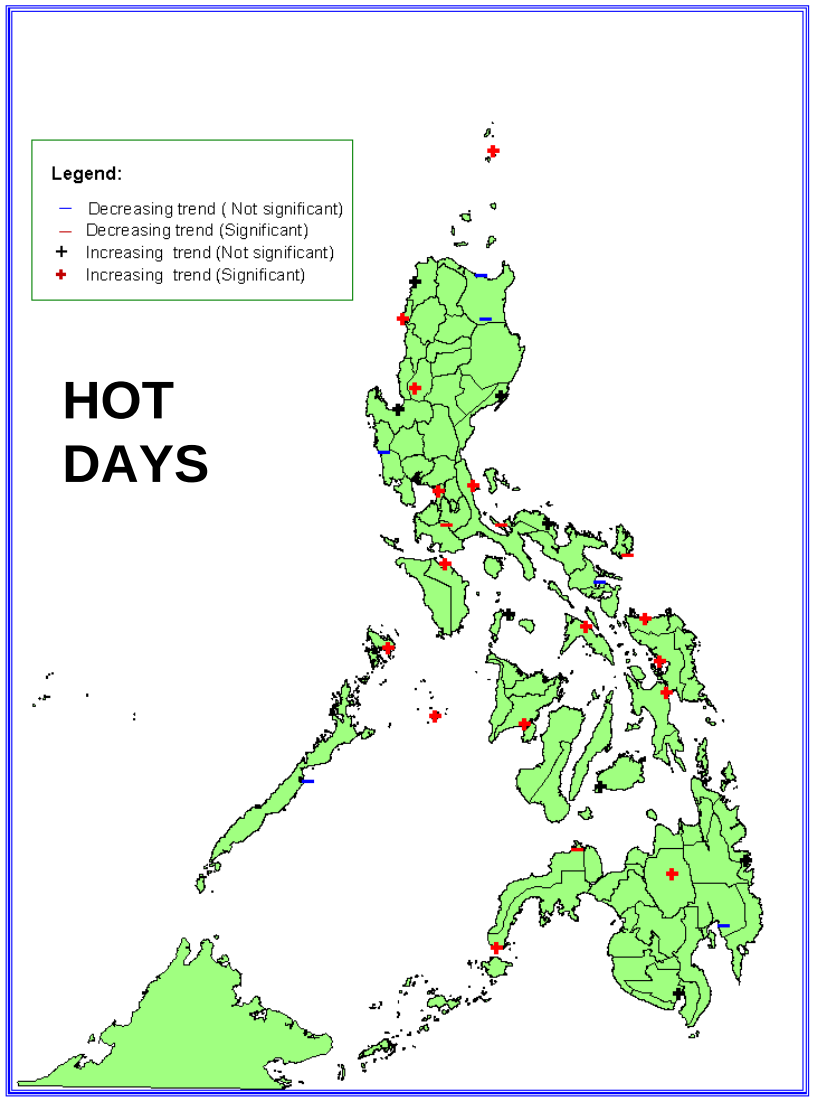


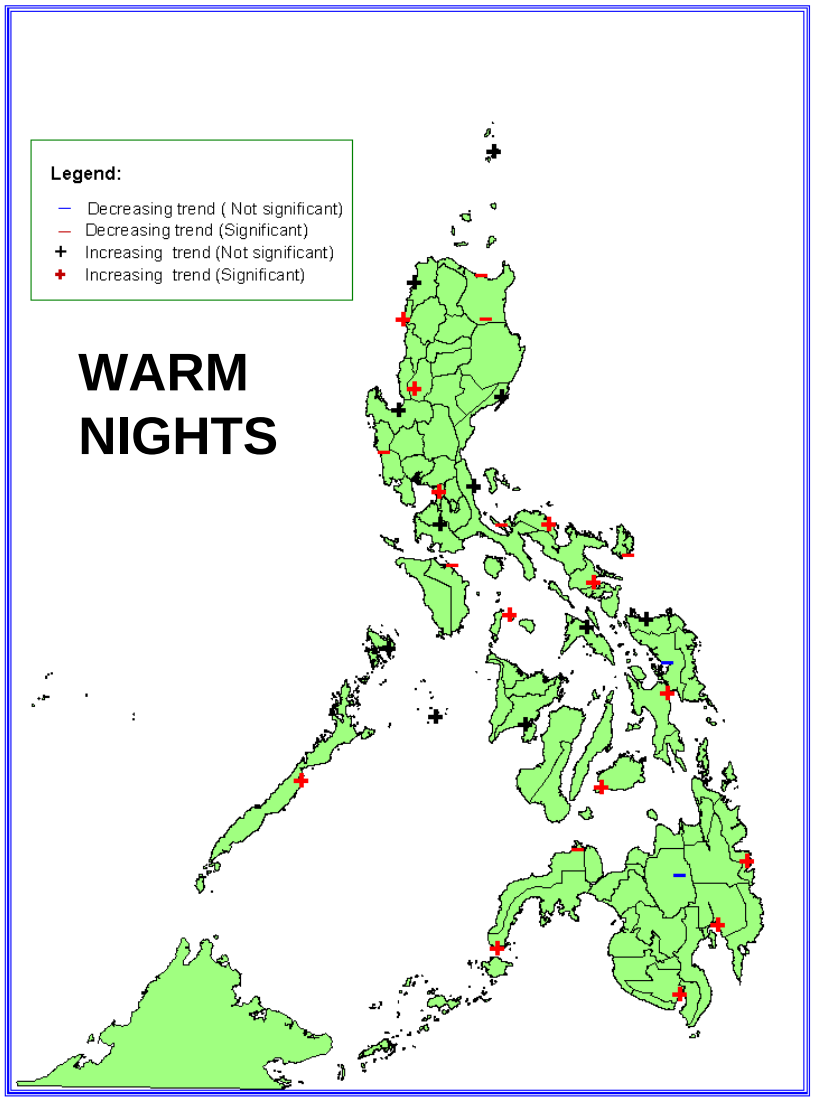


- **Significant decrease in the number of cold days and cool nights.**

Tibig, LV,et al (2004)Trends in extreme daily temperatures and 24-hr rainfall in the Phil. CAB Technical Report, PAG...

Trends in Extreme Daily Temperatures in the Philippines* (1961 – 2003)

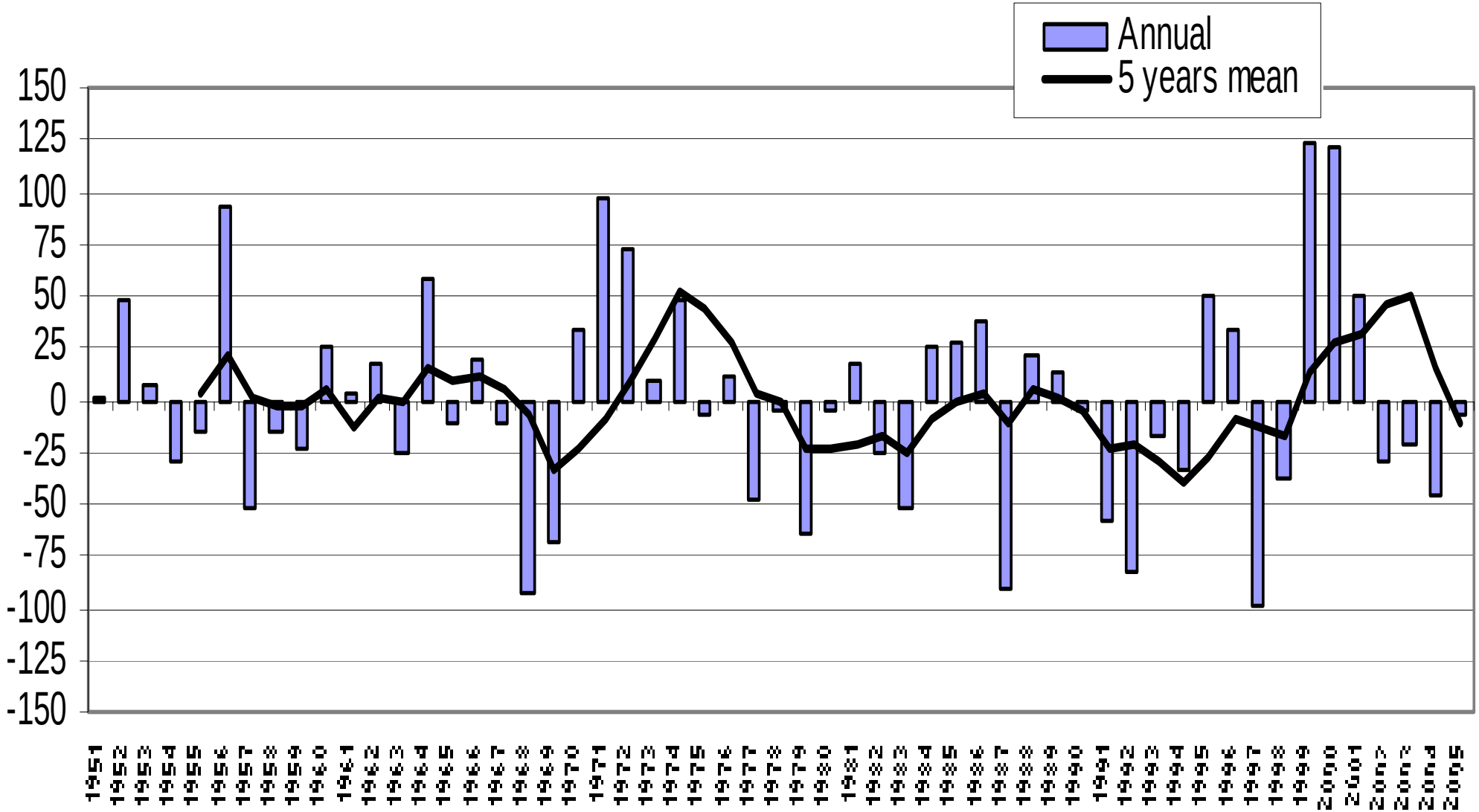




❖ **Significant increase in the frequency of hot days and warm nights.**

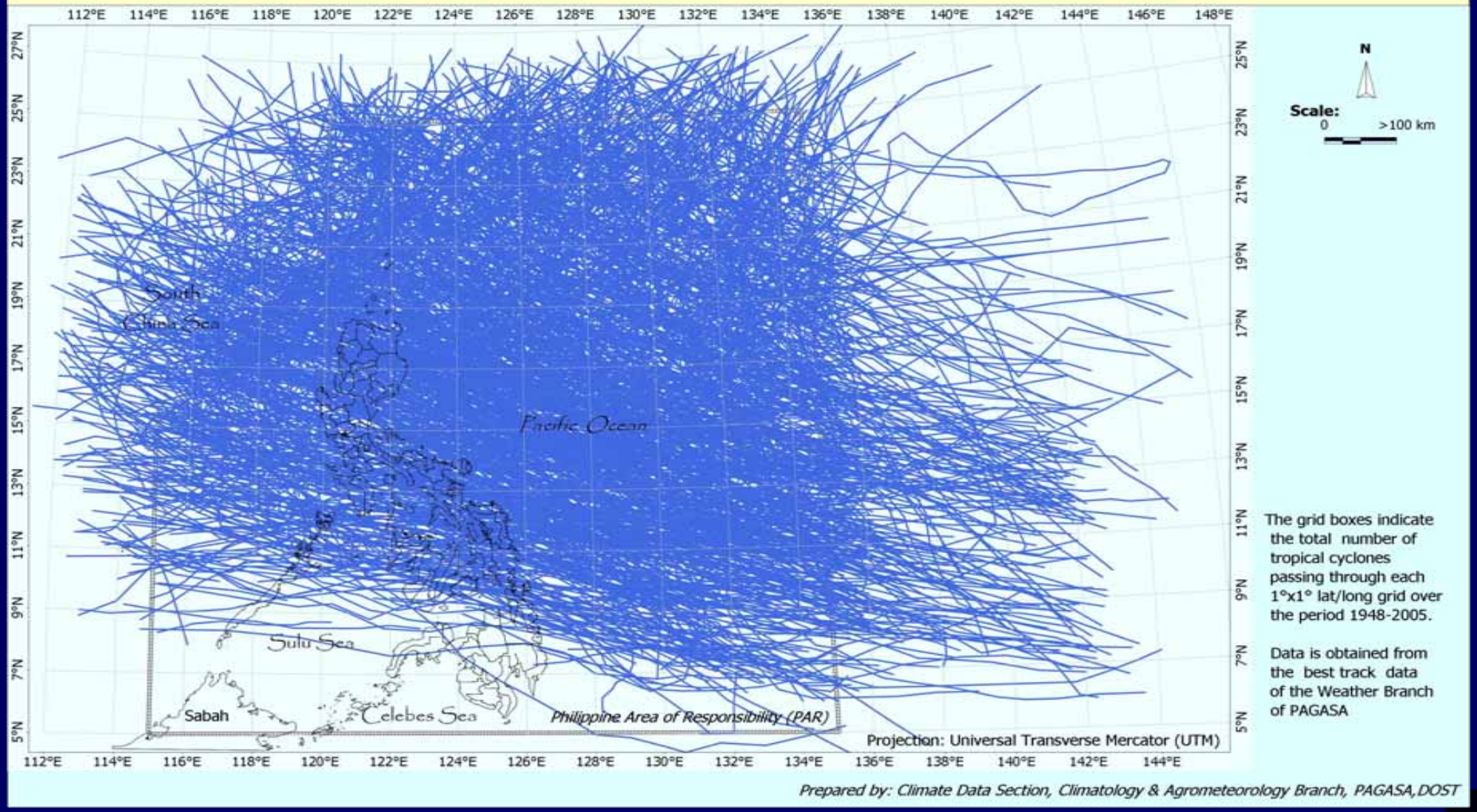
*Tibig, LV,et al (2004)Trends in extreme daily temperatures and 24-hr rainfall in the Phil. CAB Technical Report PAGASA

Anomaly of Annual Philippine Rainfall With Normal Base Period 1961- 1990



Data used

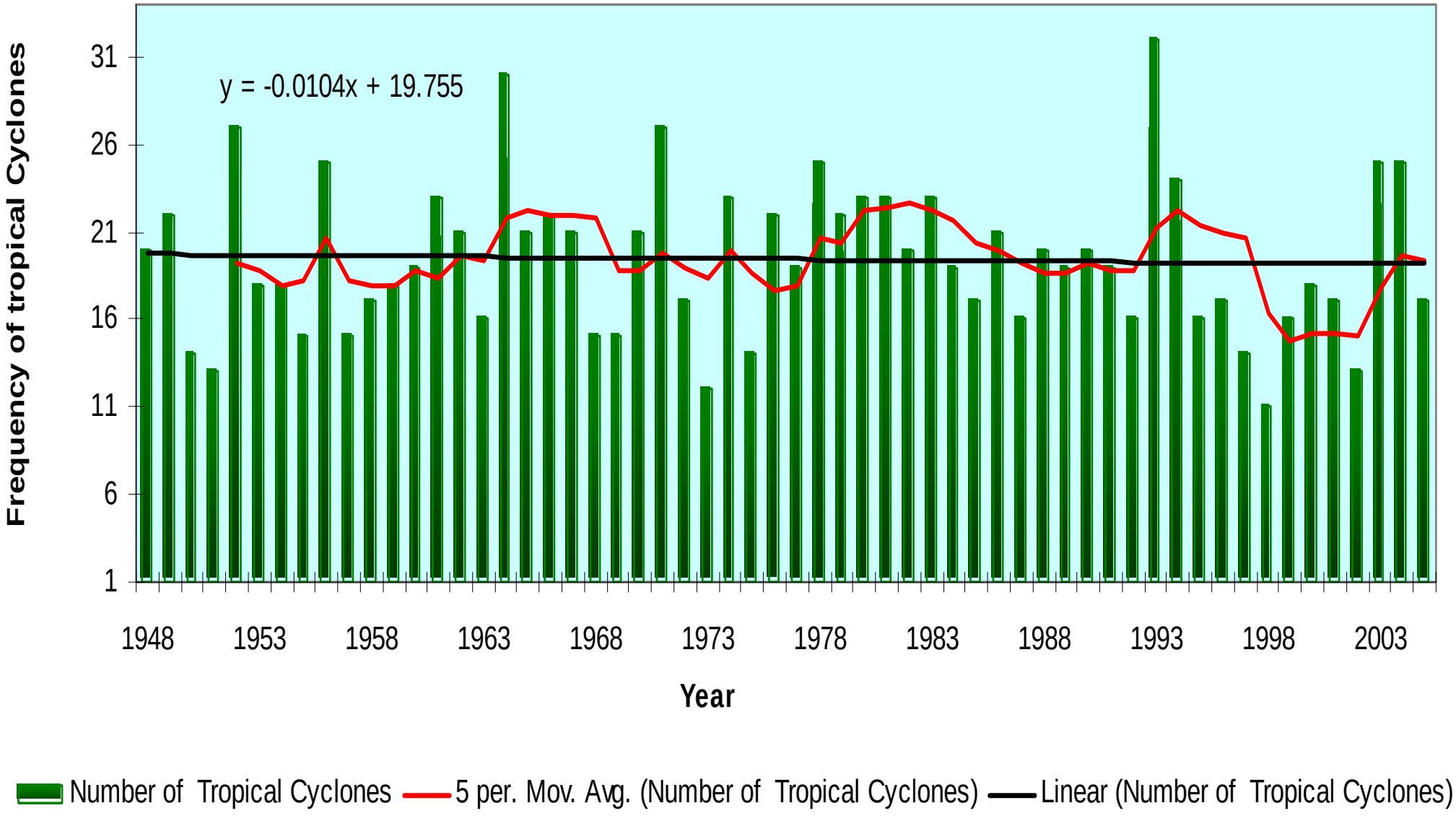
Actual tropical cyclone tracks for the period 1948-2005



Prepared by: Climate Data Section, Climatology & Agrometeorology Branch, PAGASA,DOST

Tracks of tropical cyclones that entered the PAR during the period 1948-2005 1128 tropical cyclones

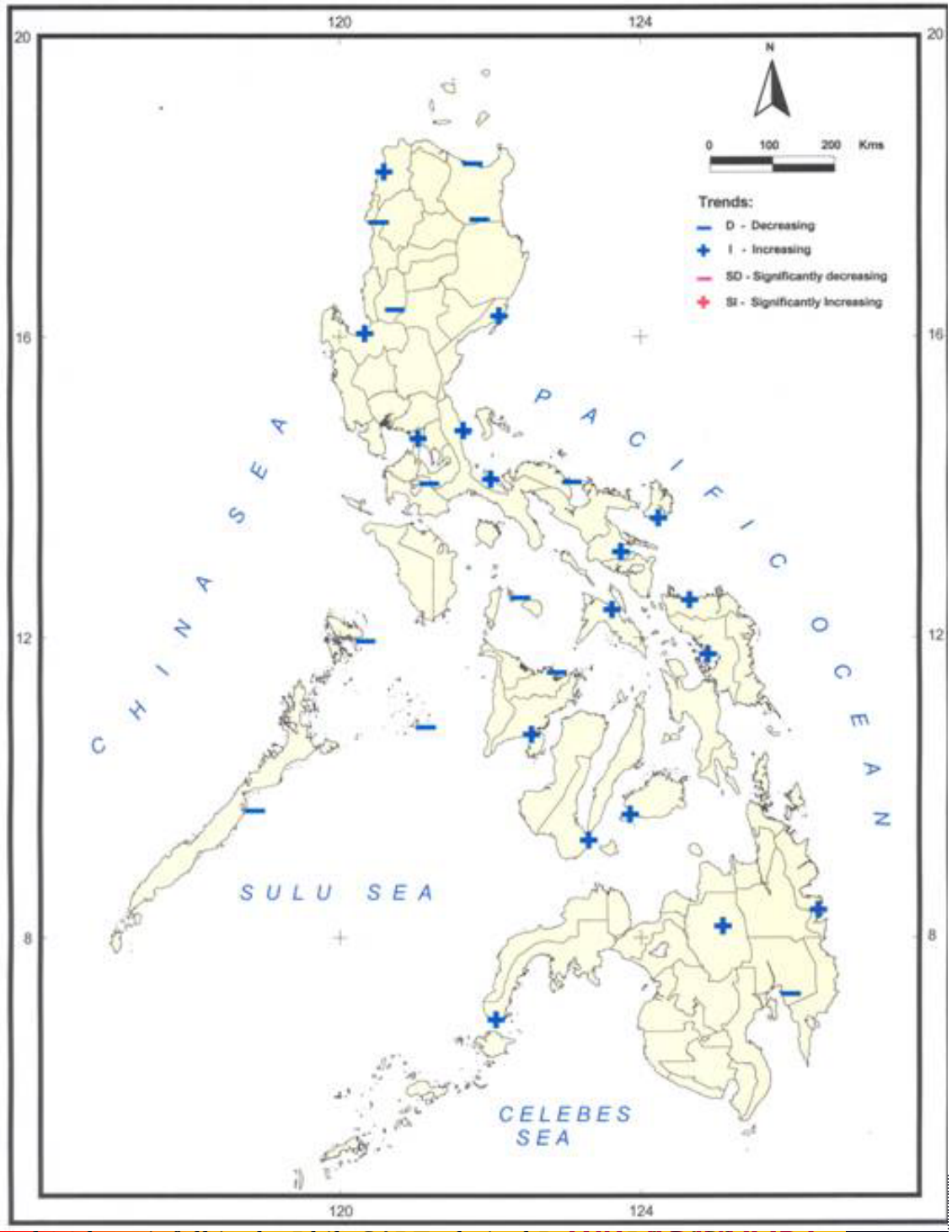
Annual Number Tropical Cyclones and five-year running mean



Trend in Annual Total Rainfall* (1961 – 2003)

- Decreases in the top northern part of Luzon.
- Increases in the Bicol Region (except Daet), Visayas and Mindanao

- Findings not statistically significant

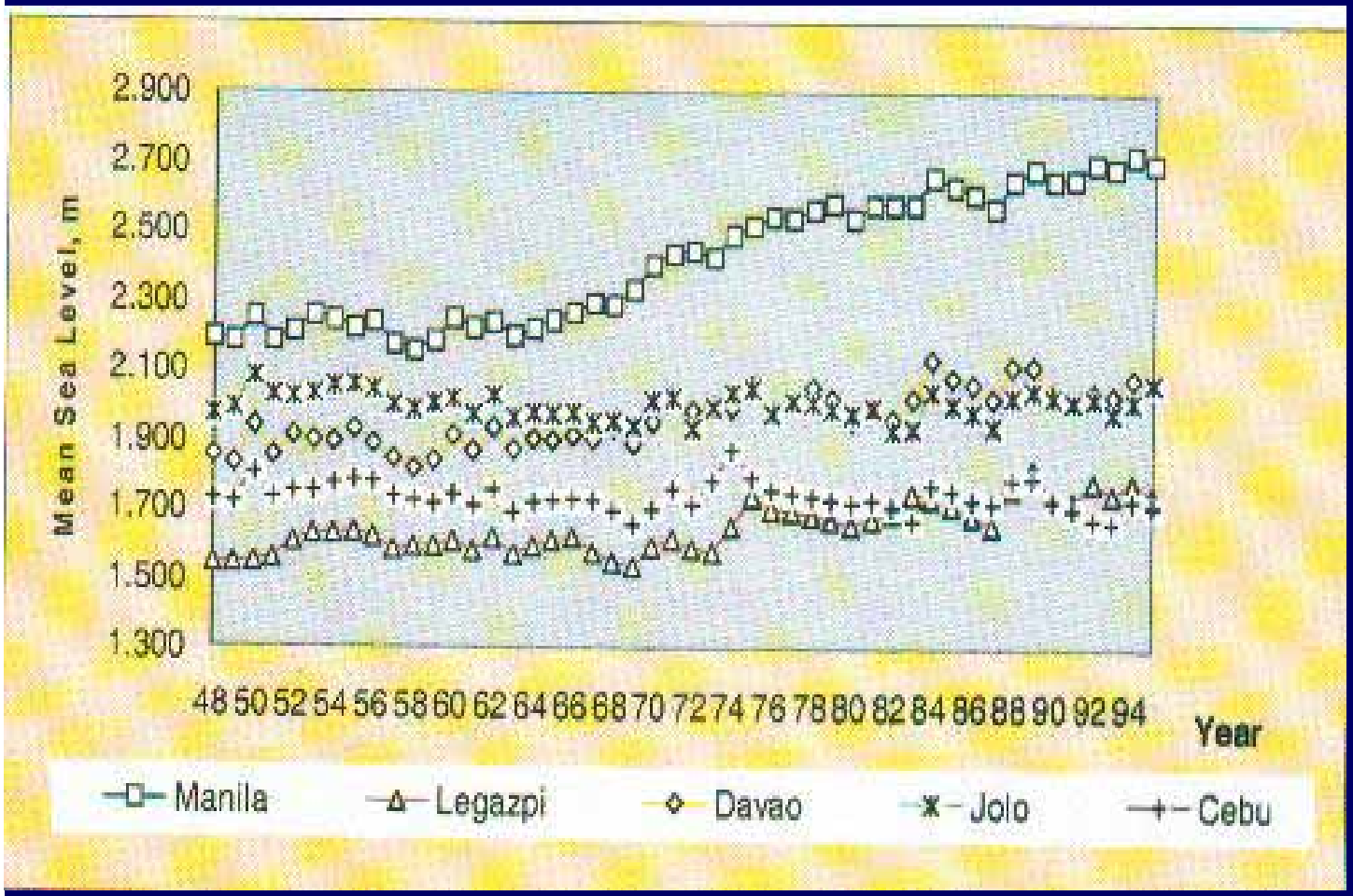


*Tibig, LV,et al (2004)Trends in extreme daily temperatures and 24-hr rainfall in the Phil. CABTechnical Report, PAGASA

SUMMARY

- Significant increasing trend in annual mean temperature
- Significant increase in the frequency of hot days and warm nights
- No significant rainfall trends
- No significant trend in the total number of annual tropical cyclones

Sea Level Rise



Possible Impacts

- Increased coastal flooding
- Enhanced coastal erosion
- Salt-water intrusion
- Impacts of storm surge magnified

Systems and sectors identified particularly vulnerable

- **Some ecosystems (mangroves along the coasts, coral reefs in oceans, etc.)**
- **Low-lying coastal regions**
- **Water resources in dry tropics and sub- tropics (decrease in rainfall and high evaporation rates)**
- **Agriculture in low-latitude regions (reduced water availability)**
- **Human health in areas with low adaptive capacity**

Adaptation

- We are not as well adapted as we should or could.

  - Environment and human society have always experienced losses as a result of extreme events

Climate is changing!

- amount and rate of change projected to be the significant

- changes
  - ➢ not only in the mean
  - ➢ but also in extreme weather and climate events

Vulnerability to current variability

- High frequency of tropical cyclones and floods
- Drought occurrences
- High variability of rainfall
- Extreme events

What can we do to lessen/reduce adverse impacts?

- We can adapt (ADAPTATION)

  and/or

- We can lessen emissions of greenhouse gases like methane, nitrous oxides, etc. from agricultural activities (MITIGATION)

Adapting to climate change can be a spontaneous or planned act.

People will need to plan

- ✓ To minimize costs of negative impacts (higher temperatures, long-term water availability, short-term floods, extreme winds, etc.
- ✓ To maximize benefits of positive impacts ("carbon fertilization" effect)

Range of adaptation strategies

- ✓ **Technological changes in agricultural management practices**
  - ➲ cropping pattern adjustments using climate information on onset of rainy season and frequency of tropical cyclones
  - ➲ redesigning crop mixes to ensure a guaranteed minimum yield even under the worst conditions
  - ➲ soil conservation (i.e., management of crop residues with a balanced use of organic and inorganic fertilizers)

Range of adaptation strategies

- ✓ **Technological changes in agricultural management practices**

  - ➲ improved farm management (i.e., diversified farming, use of farm weather advisories)
  - ➲ natural rainfall management i.e., increasing effectiveness of irrigation facilities)
  - ➲ protection of watersheds
  - ➲ improvement of post-harvest facilities

Range of adaptation strategies

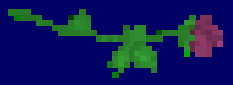
- ✓ **institutional**
  - ➲ putting in place a rational agricultural drought management which includes an early warning system
  - ➲ regulated land-use conversion
  - ➲ strengthening agricultural extension services
  - ➲ legislation on conservation of prime agricultural areas

Range of adaptation strategies

- ✓ **research**

  - ➲ **improving production (including drought-resistant cultivars) and processing/storage and marketing of products**

Thank you



“tracking the sky . . . helping the country”