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Climate Change Projection for the Philippines

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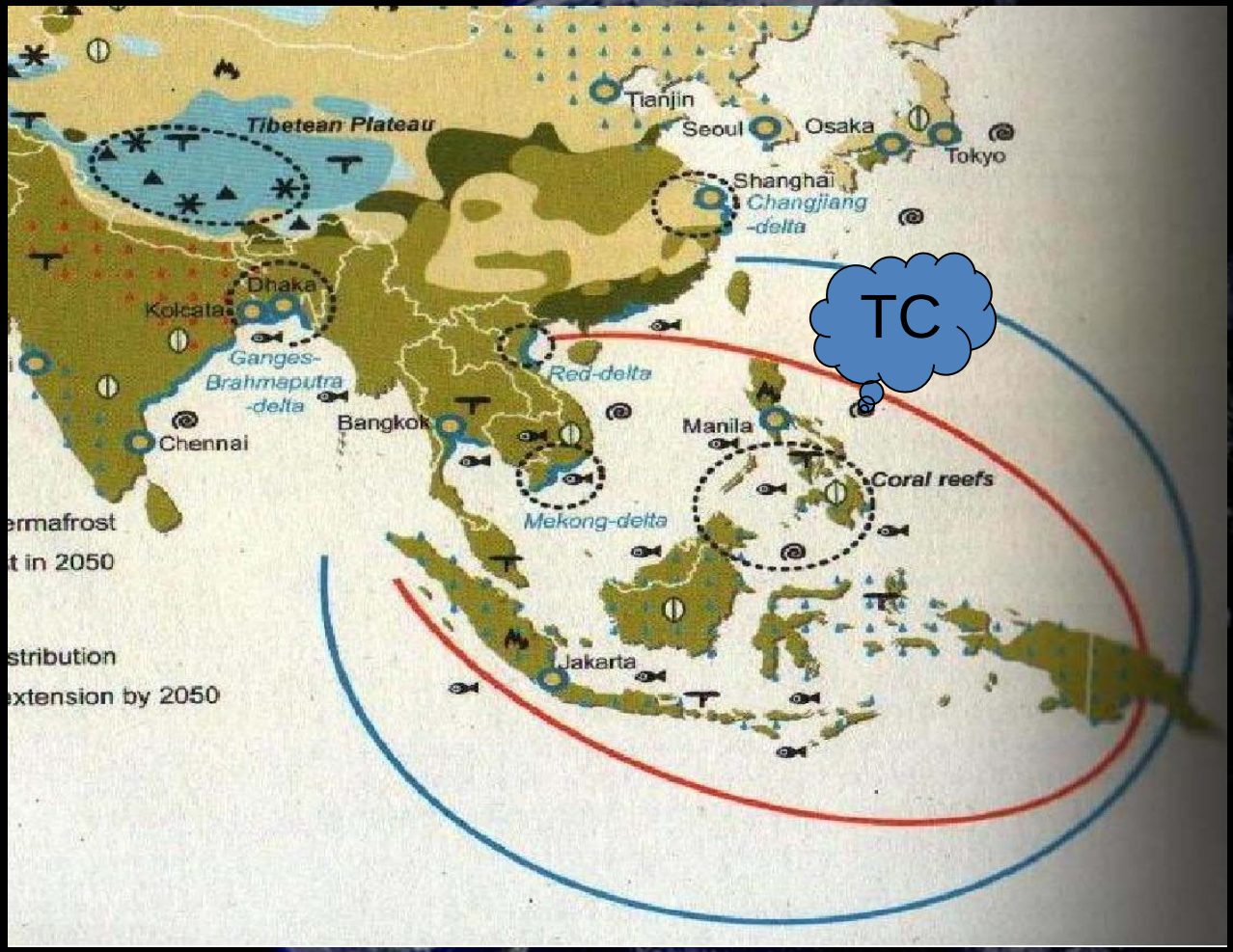
PAGASA/DOST

Outline :

- Introduction
- Climate Trends
- Climate Change Scenarios

Impacts of Climate Change in Asia (IPCC AR4)



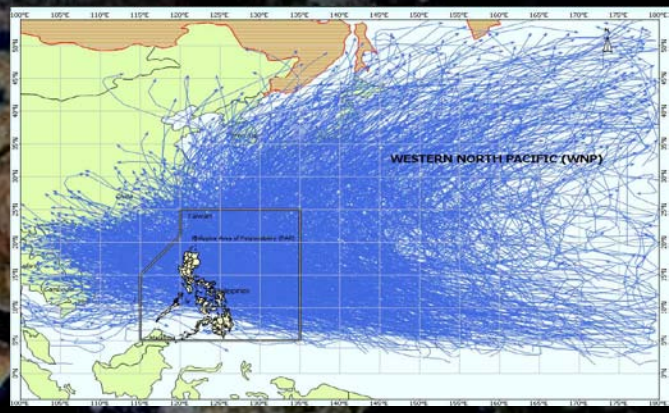
RP among the hot spot areas

HIGHLY SUSCEPTIBLE TO FLOODINGS AND INUNDATIONS

- Archipelago, composed of 7,100 islands with low lying areas
- Highly susceptible to sea level rise
- Among the longest coastlines in the world with 32,400 kms (susceptible to storm surges)

Climate Change over RP: The Concerns.

- **Projected increase in frequency and/or magnitude of extreme events esp. tropical cyclones, heavy rainfall, drought and extreme temperature**



- **Changes would result in adverse impacts on agriculture, water resources, health and coastal areas**

The Philippines has not been spared of the weather-related disturbances and disasters.
The past typhoons have been unusually heavy and devastating to our country and our people.

Landslide :Ginsaugon, Feb 2006

TY Reming (DURIAN) 2006

TY Milenyo, Sept 2006

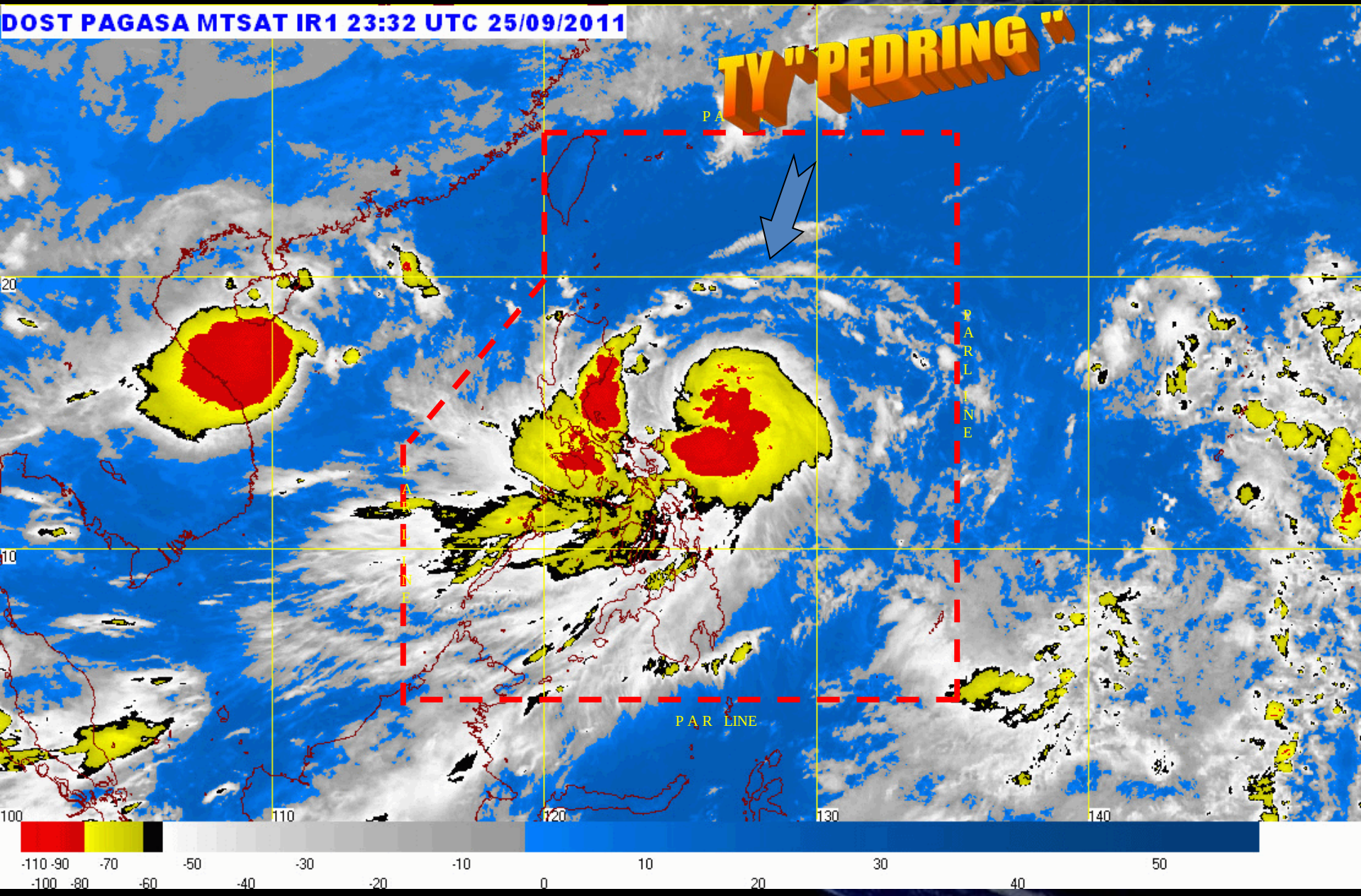
Typhoon Frank (Fengshen)

June 21, 2008. (MV Princess of the Stars)

Observed 24-hour rainfall – 455mm

Flooding in Metro Manila: Tropical Storm

TYPHOON"PEDRING" HAS JUST MADE LANDFALL OVER THE BOUNDARY OF AURORA AND ISABELA.



7 AM 27 SEPTEMBER 2011 TUESDAY

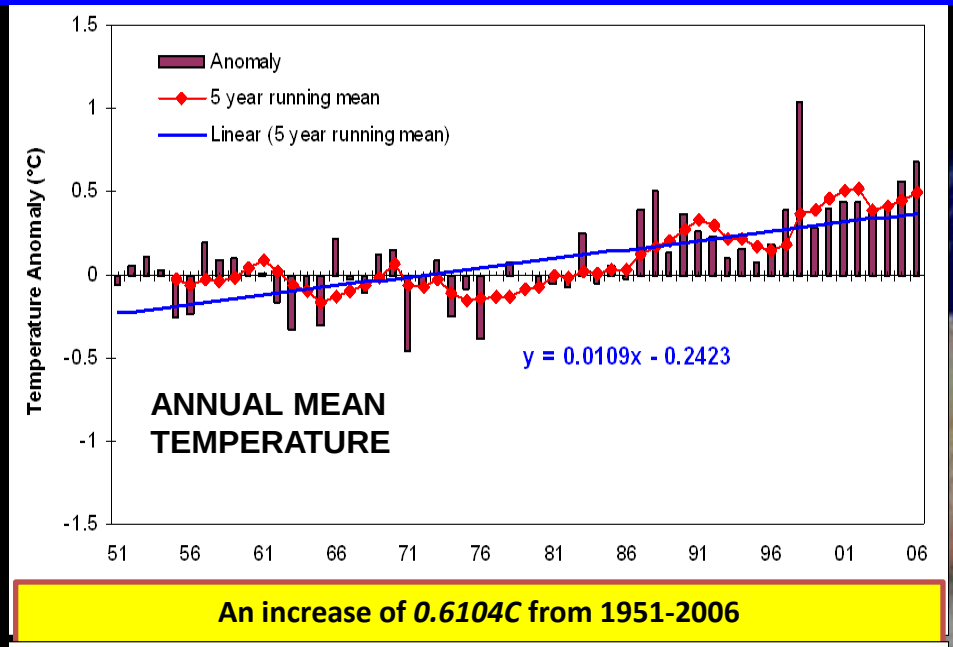
Climate Trends in the Philippines

What are the manifestations/signals of global warming in the local scale?

- In the Philippines, there already trends of increasing number of hot days and warm nights, but decreasing number of cold days and cool nights. Both maximum and minimum temperatures are generally getting warmer.

- Other extreme weather/climate events like intense rains have been seen to be more frequent.

BACKGROUND INFORMATION: observed changes



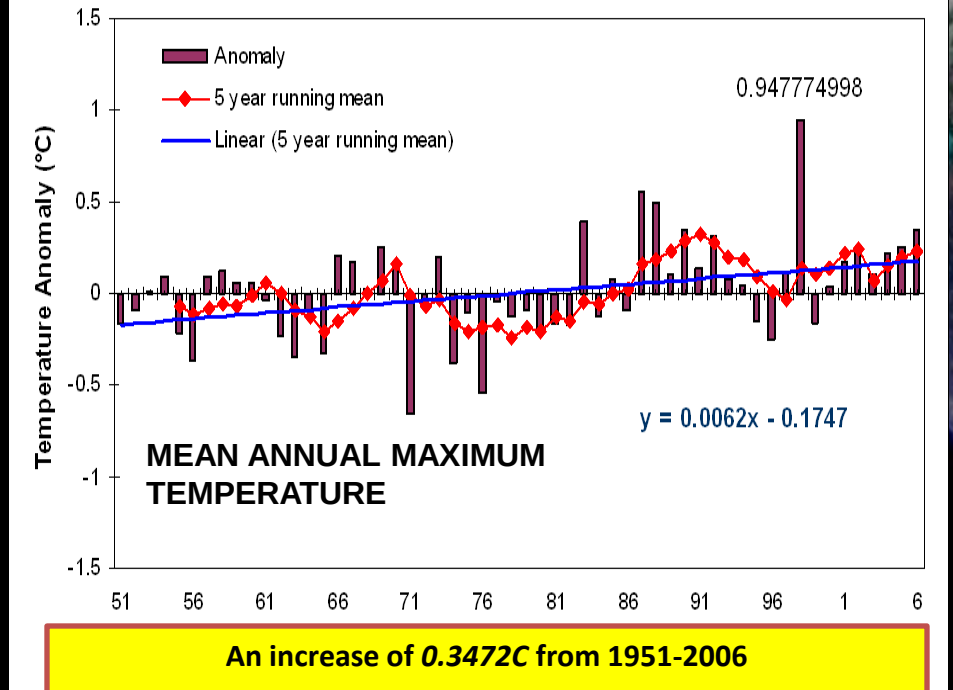
An increase of *0.6104C* from 1951-2006

Observed Temperature Anomalies in the Philippines

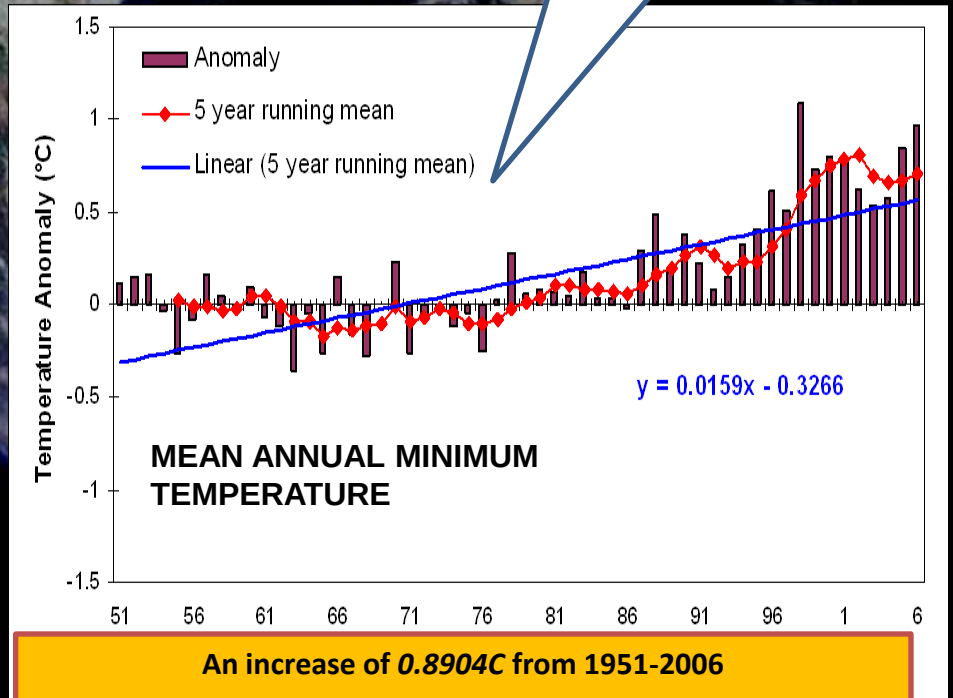
1951-2006 *(departures from the normal values)*

Period: *1961-1990*

almost 3 times increase



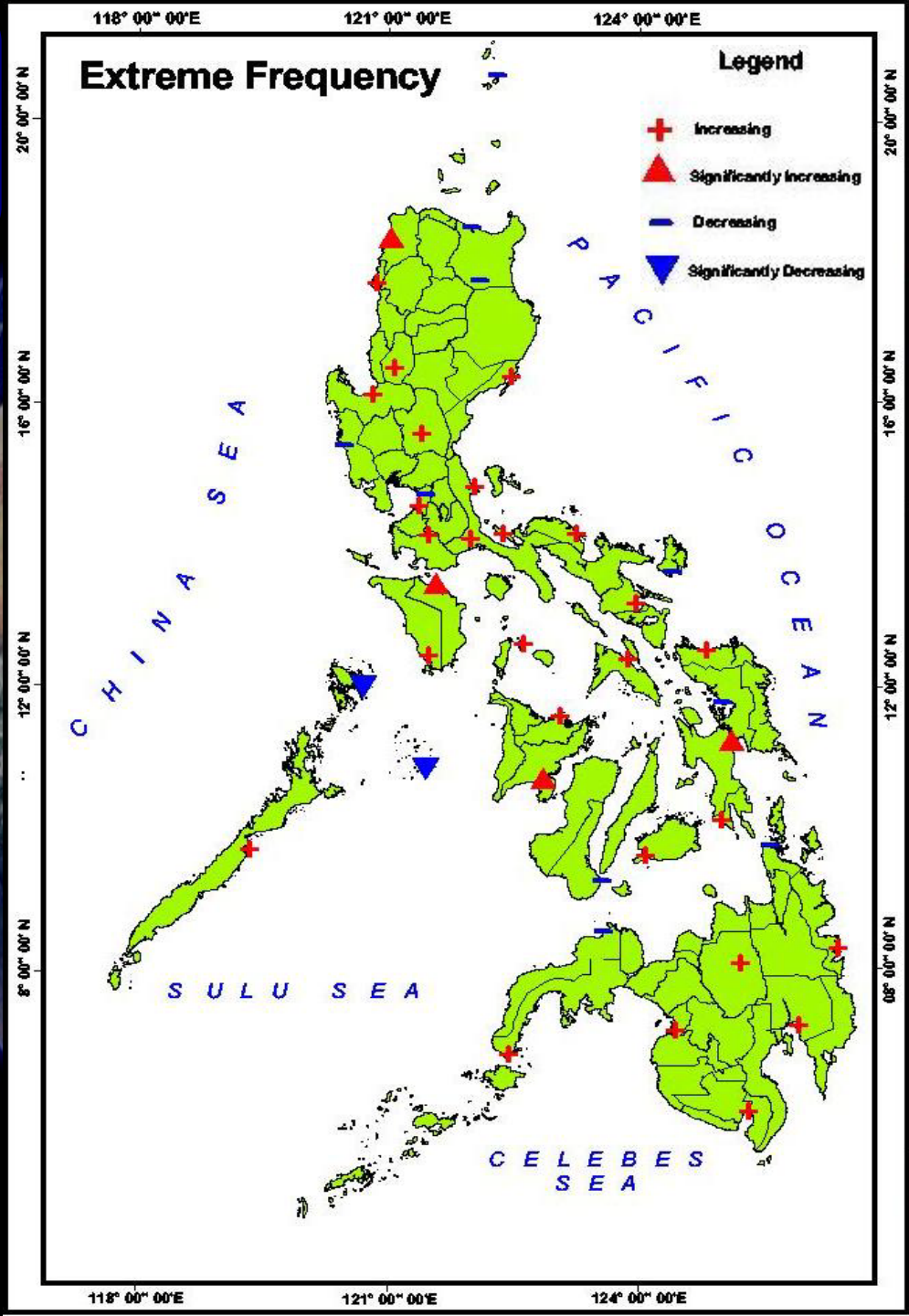
An increase of *0.3472C* from 1951-2006



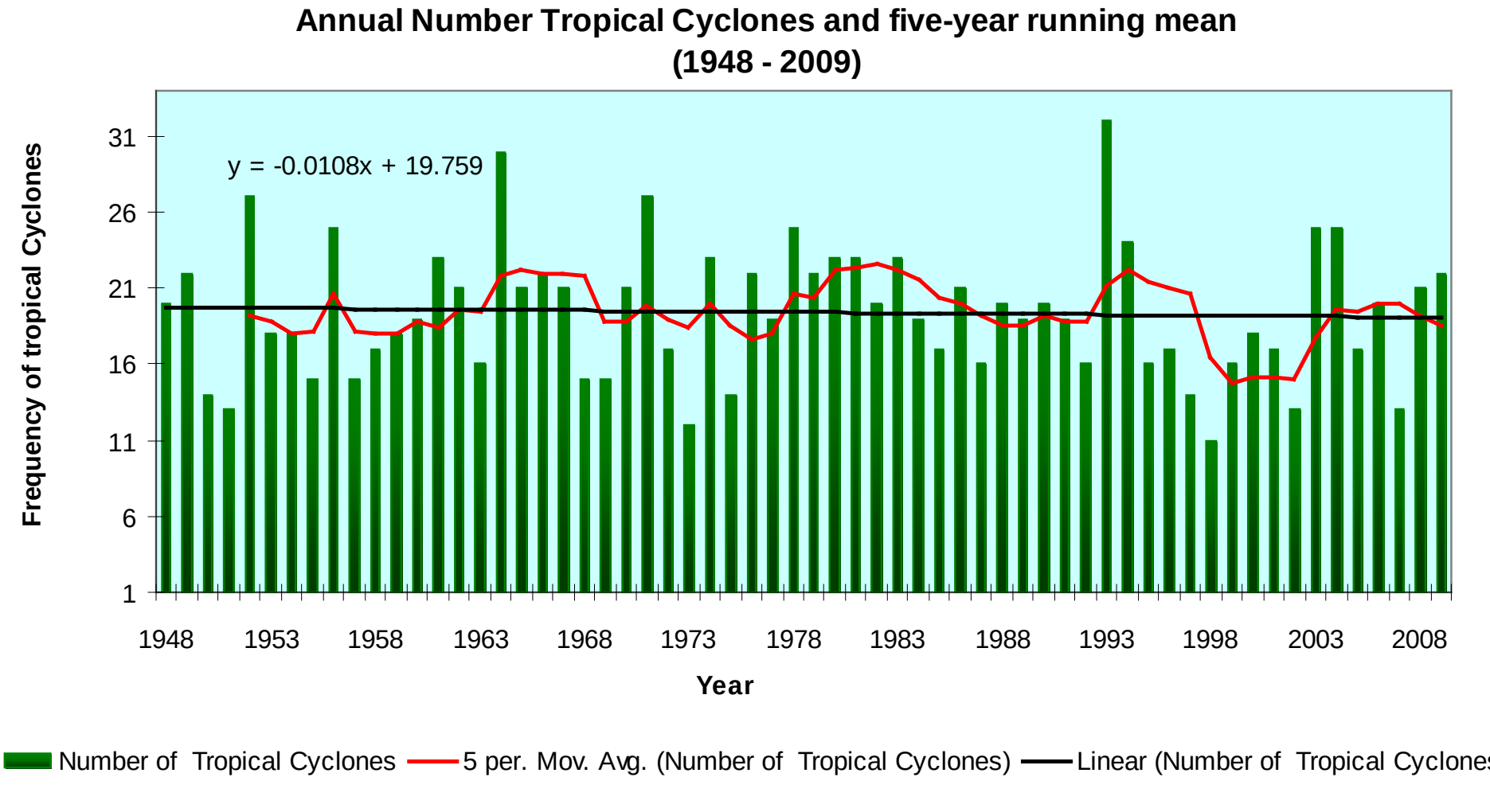
An increase of *0.8904C* from 1951-2006

Trends in the Frequency of Extreme Daily Rainfall in the Philippines* (1951 – 2008)

- Most parts of the country are generally increasing in trend but not all are significant.
- Only in Calapan, Laoag, Iloilo and Tacloban shows statistically significant increasing trend.
- While significantly decreasing trend is found in Palawan



Trends of the number of tropical cyclone in the Philippines



Recorded Maximum Gustiness during the passage of Tropical Cyclones (1950-2006)

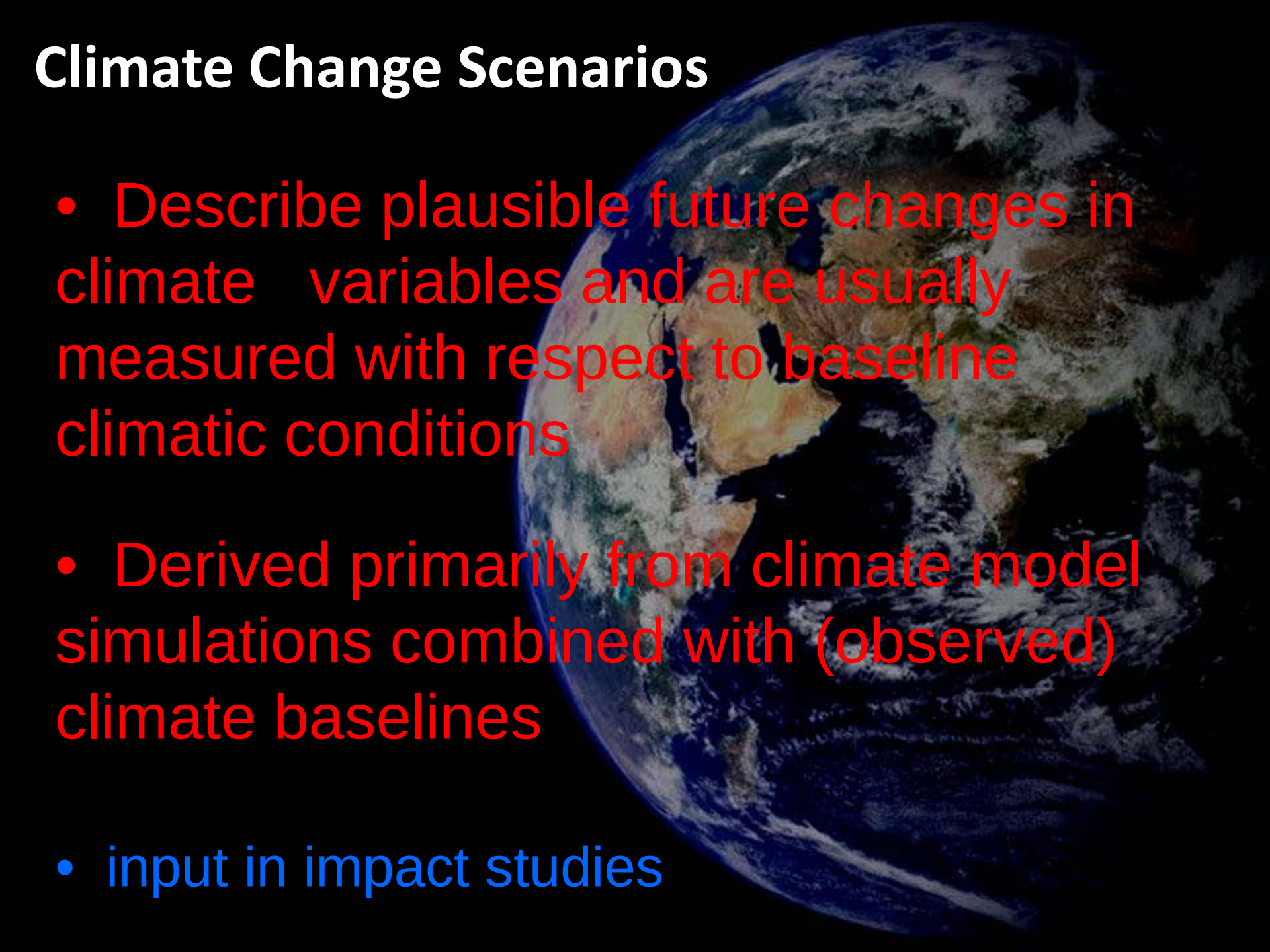
T.C. Name	Station	Max. Wind (Kph)	Date of Occurrence	Duration
TY REMING	Virac Radar	320	11/30/2006	NOV 28 - DEC 03
TY LOLENG	Virac S.	287	10/21/1998	OCT 15 - OCT 25
TY ANDING	Virac R.	280	11/27/1981	NOV 21 - NOV 27
TY SENING	Virac S.	276	10/13/1970	OCT 10 - OCT 16
TY WENING	Aparri	269	10/27/1974	OCT 25 - OCT 29
TY TRINING	Masbate	269	12/15/1987	DEC 14 - DEC 19
TY FREDA	Casiguran	258	11/16/1959	NOV 12 - NOV 19
TY YOLING	Alabat	258	11/19/1970	NOV 17 - NOV 21
TY GARDING	Guiuan	258	12/21/1994	DEC 17 - DEC 24
TS SALING	Ambulong	251	10/10/1989	OCT 08 - OCT 11
TY ROSING	Virac R	251	11/2/1995	OCT 31 - NOV 04
TY MAMENG	Basco	240	10/12/1975	OCT 09 - OCT 13
TY ATANG	Guiuan	240	4/19/1978	APR 18 - APR 26
TY SALING	Daet	233	10/18/1985	OCT 15 - OCT 20
TY SISANG	Legaspi	233	11/25/1987	NOV 23 - NOV 27
TY SUSANG	Aparri	230	10/10/1974	OCT 09 - OCT 12
TY ARING	Virac R	230	11/4/1980	NOV 01 - NOV 07

Greatest 24-Hr. Rainfall during the passage of Tropical Cyclones (1950-2005)

T.C. Name	Station	Greatest 24-Hr. Rainfall (mm)	Date of Occurrence	Duration
TY FERIA	Baguio	1085.8	07/04/01	JUL 02 - JUL 05
TY ILIANG	Baguio	994.6	10/14/98	OCT 10 - OCT 16
TY TRINING	Baguio	979.4	10/17/67	OCT 14 - OCT 19
TY SUSANG	Baguio	781.4	10/11/74	OCT 09 - OCT 12
TY TRINING	Baguio	760.0	10/27/91	OCT 20 - OCT 31
TY DITANG	Baguio	730.3	05/15/80	MAY 10 - MAY 20
TS CHEDENG	Dagupan	722.6	05/27/03	MAY 25 - MAY 29
TY GADING	Baguio	709.6	07/09/86	JUL 06 - JUL 10
TY ARING	Baguio	698.7	11/05/80	NOV 01 - NOV 07
TY WENING	Baguio	678.8	10/28/74	OCT 25 - OCT 29
TD SISANG	Alabat	673.0	12/27/75	DEC 26 - DEC 28
TY NITANG	Baguio	649.7	09/28/68	SEP 23 - OCT 01
TY DIDANG	Baguio	605.3	05/25/76	MAY 12 - MAY 27
TS ARING	Masbate	603.5	12/04/76	DEC 02 - DEC 07
TY REMING	Surigao	564.7	11/18/68	NOV 12 - NOV 22
TY CORA	Baguio	546.6	11/17/53	NOV 12 - NOV 19
TY OSANG	Baguio	536.3	07/25/80	JUL 20 - JUL 26
TS MIDING	Baguio	534.2	08/23/78	AUG 20 - AUG 27

Climate Change Scenario in the Philippines

Climate Change Scenarios



- Describe plausible future changes in climate variables and are usually measured with respect to baseline climatic conditions

- Derived primarily from climate model simulations combined with (observed) climate baselines

- input in impact studies

Downscaling Technique

PRECIS stands for "Providing REgional Climates for Impacts Studies."

PRECIS is based on the Hadley Centre's regional climate modelling system.

•PRECIS was developed in order to help generate high-resolution climate change information for as many regions of the world as possible.

• freely available to groups of developing countries in order that they may develop climate change

Methodology

Model Used

- Uk model : HadCM3Q0
  - resolution 2.5º x 3.75º downscaled to 0.22˚ x 0.22˚ (25 km x 25 km)

Scenario Used

(a globalized, technologically advanced world in which energy production includes a broad portfolio of fossil-fuel and non-fossil-fuel sources). Balance in all energy sources. Emissions are growing much faster than required for stabilization at either 450 or 650ppm.

Domain Used

- Longitude : 115˚E – 136˚E, Latitude : 2.7˚N – 23˚N

Time Slices

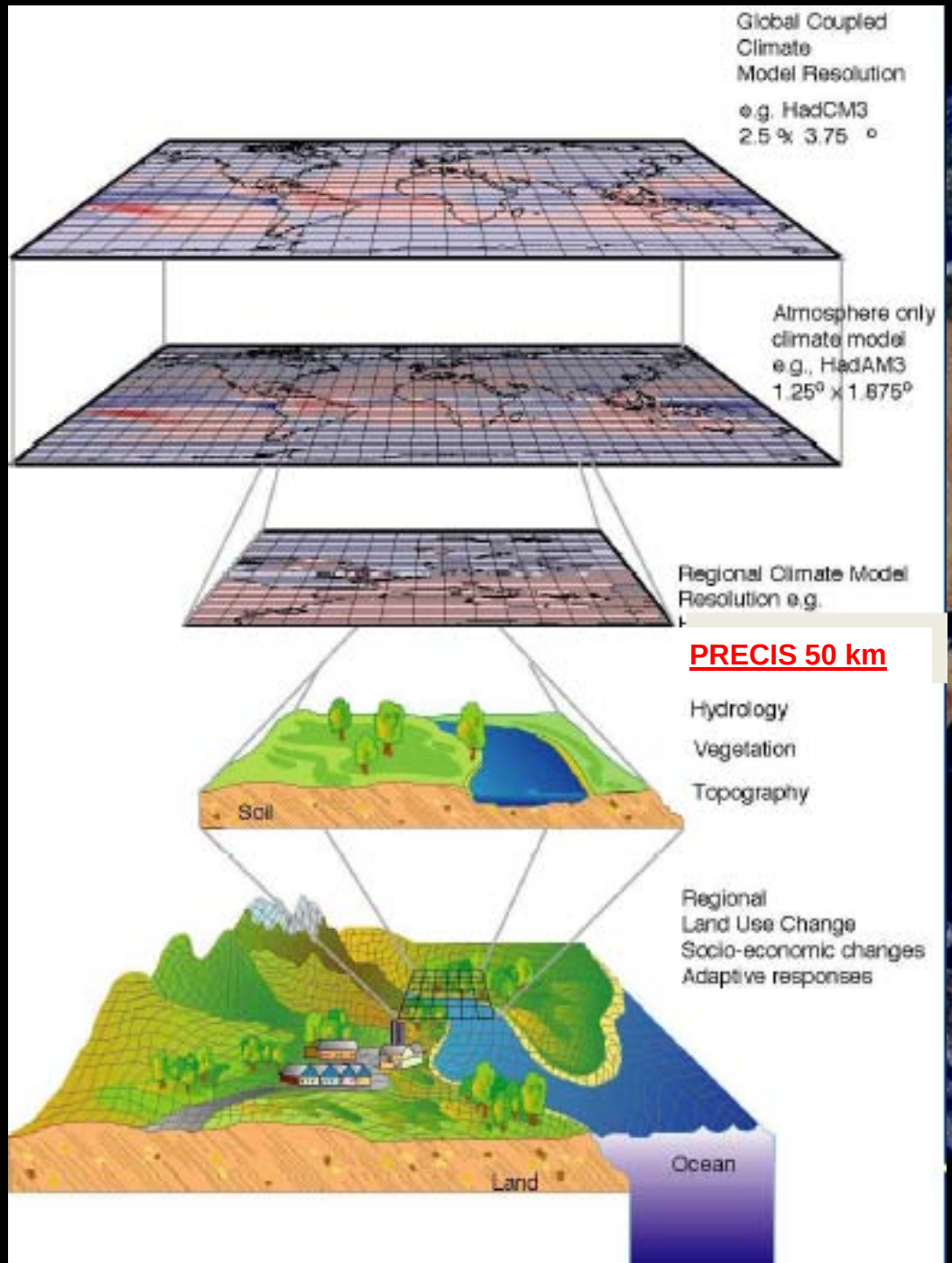
- Baseline period (Control Period)- 1971-2000 (Runs : 10 year run, 1969 – 1980, 1979 – 1990, 1989 - 2000)
- Projection for 2020 - 2006 to 2035 (1999-2010,2009-2020,2019-2030)
- Projection for 2050 - 2036 to 2065 (2029 – 2040, 2039 – 2050, 2049 – 2065)
- Spin up time : 1 year

Computers Used

- 5 Units of Desk Top Core2 Duo (continuous running for 4 months)
- Linux Suse Operating System

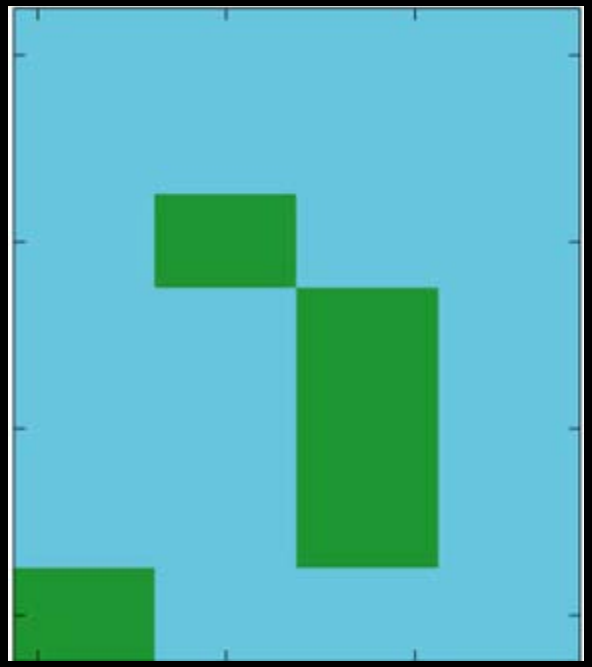
Tools Used

- PP Stat, ArcView, GenStat, Excel



GCMs to Regional Adaptive Responses: Modelling Path

REPRESENTATION OF THE PHILIPPINES WITH DIFFERENT MODEL RESOLUTIONS

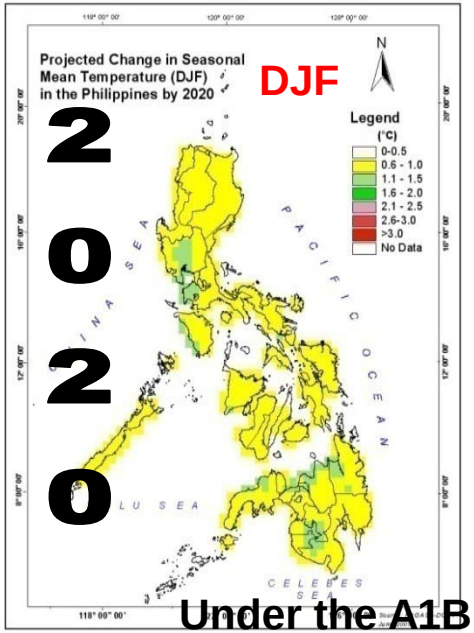


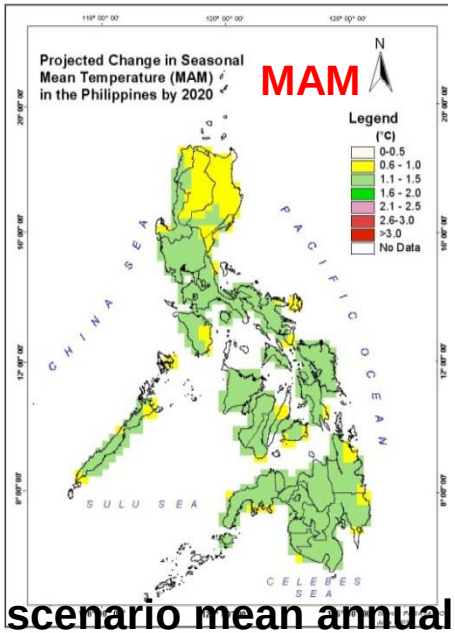
GCM 300km resolution

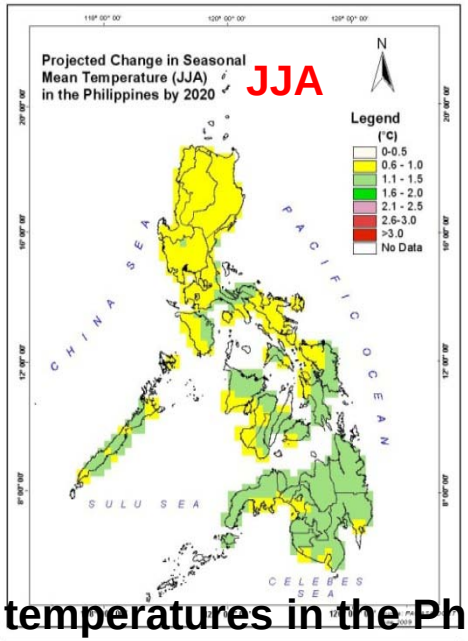
50km RCM

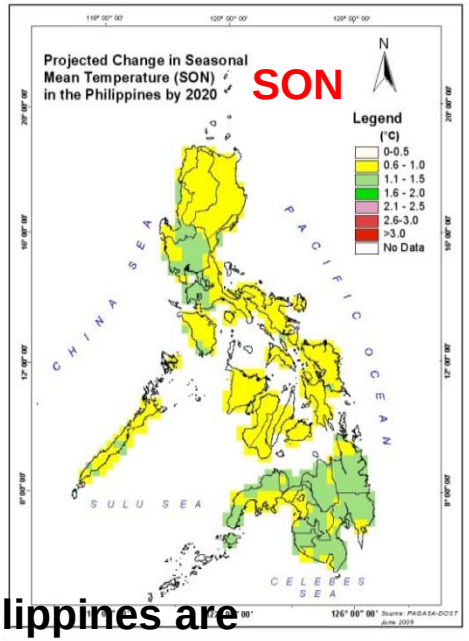
25km RCM

Projected changes in future climates in Mean Temp. For 2020 and 2050 under A1B scenario over Philippines

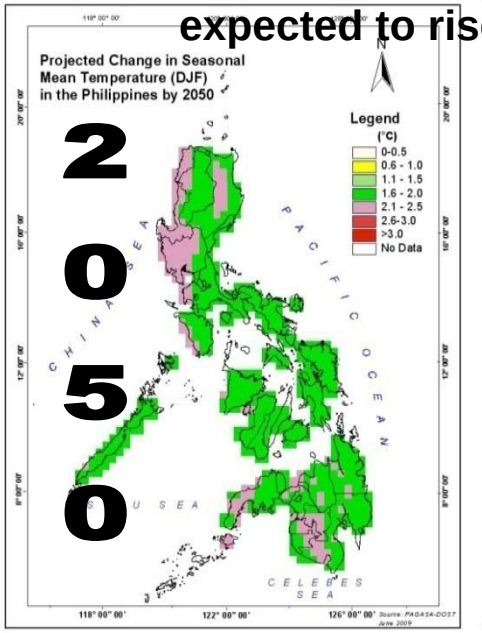


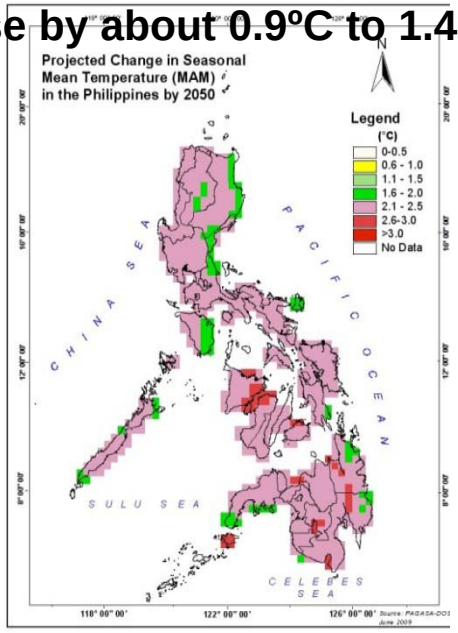


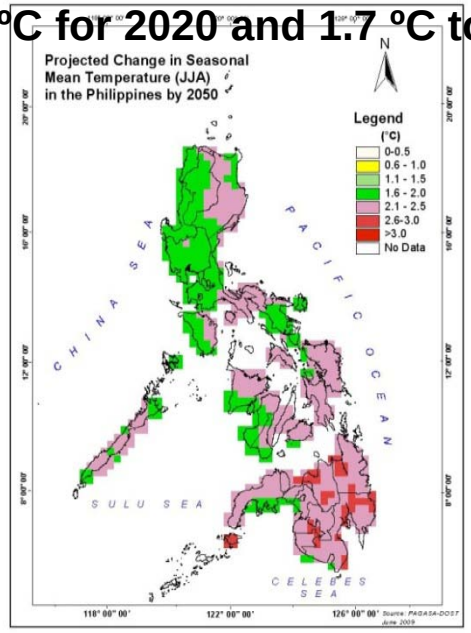


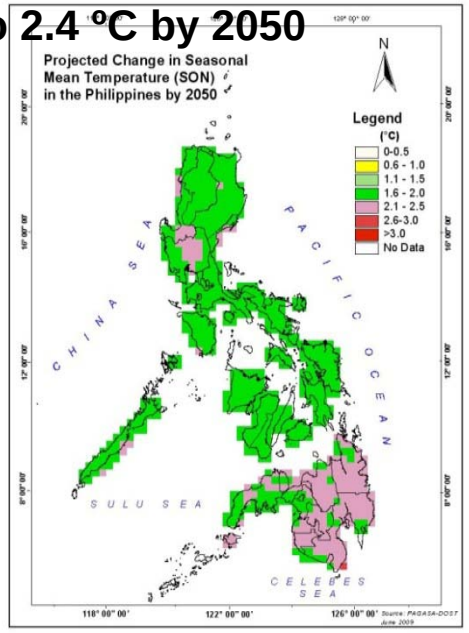


Under the A1B scenario mean annual temperatures in the Philippines are expected to rise by about 0.9ºC to 1.4ºC for 2020 and 1.7 ºC to 2.4 ºC by 2050



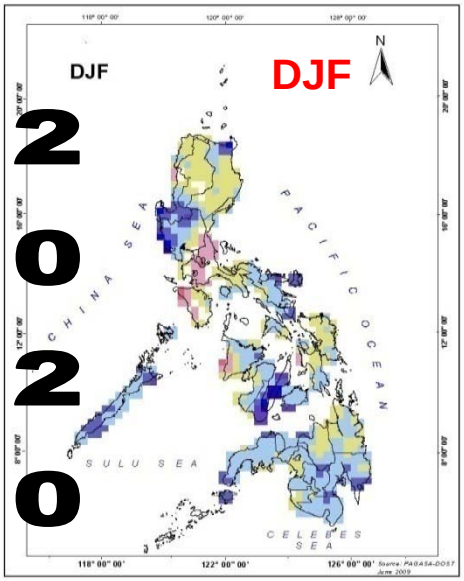


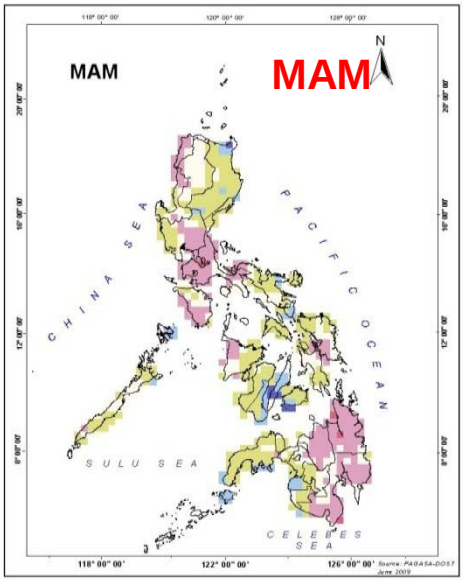


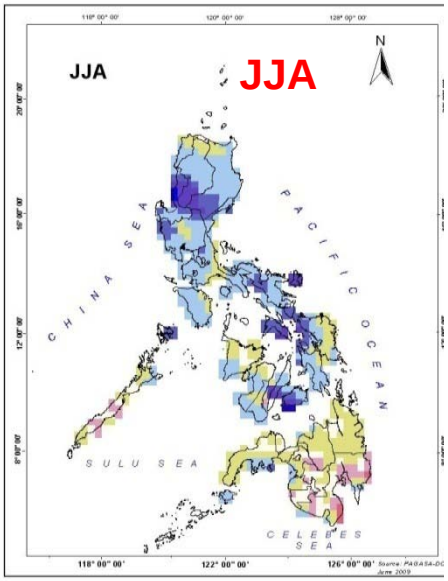


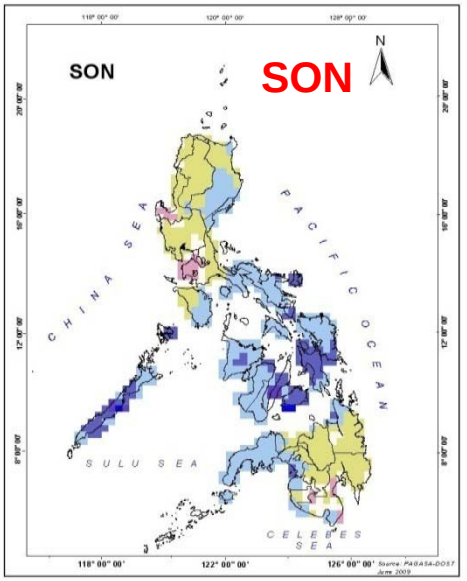
Projected changes in future climates in Rainfall for 2020 and 2050 under A1B scenario over Philippines

2020



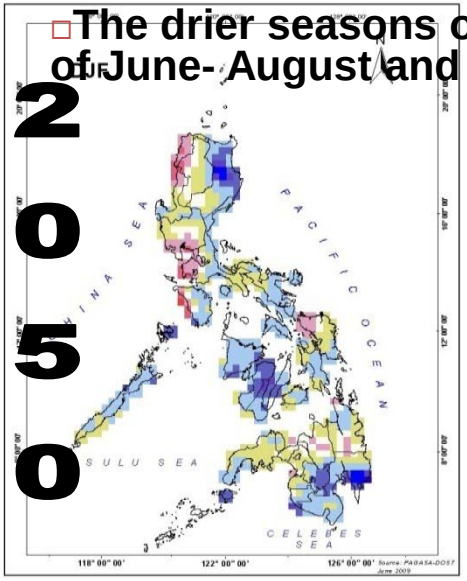


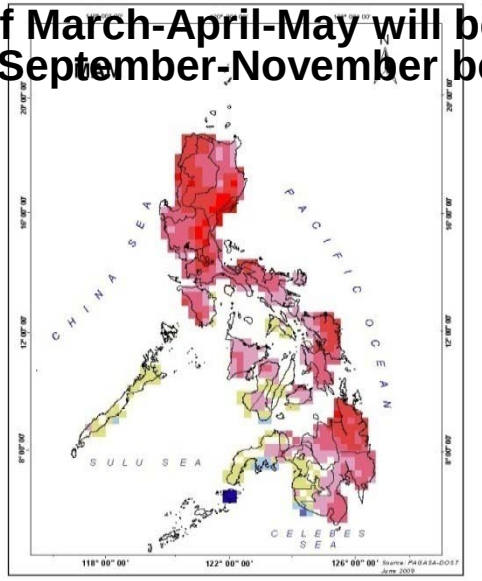


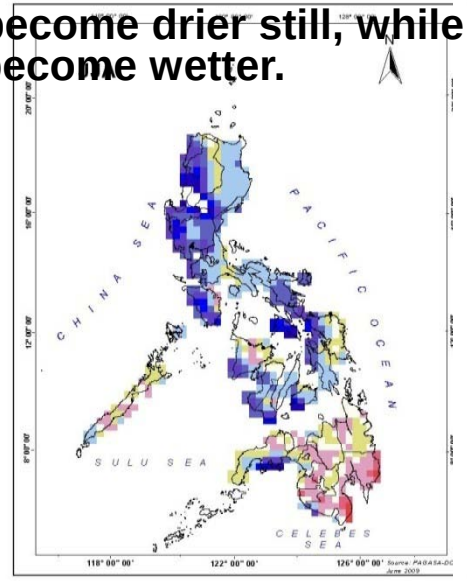


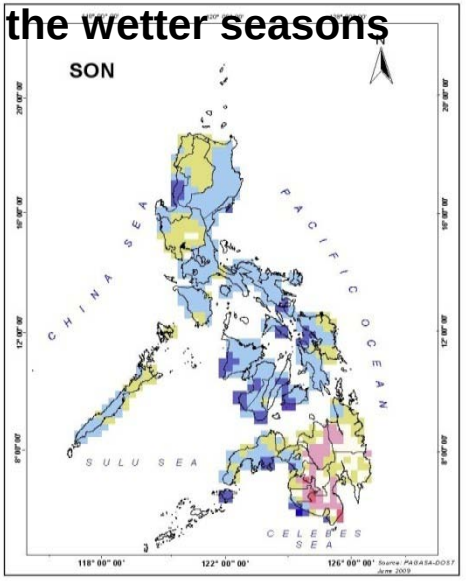
- The drier seasons of March-April-May will become drier still, while the wetter seasons of June- August and September-November become wetter.

2050









SUMMARY OF FINDINGS

- **Under the A1B scenario annual mean temperatures in the Philippines are expected to rise by about 0.9ºC to 1.1ºC for 2020 and 1.9 ºC to 2.2 ºC by 2050.**

- **Projection of seasonal temporal rainfall variation is largest (-35 % to 45%) during the seasons of JJA and MAM.**

- **The drier season of March-May will become drier, while the wetter seasons of June-August and September-November become wetter.**


THANK YOU