- Seasonal predictions do not provide predictions of the weather. Instead they provide estimates of whether certain conditions are likely to be unusually frequent, persistent or intense.

- For example, climatologists might predict that the coming period will be unusually wet without being able to predict when any storms may occur or how much rainfall they will produce.

- It is possible to use climate models to make projections of the effects of changing the composition of the atmosphere, whether from rising greenhouse gas emissions, air pollution or volcanic eruptions.

- These projections depend upon the extent to which societies reduce their emissions of greenhouse gases and other pollutants into the atmosphere.

- The aim is to estimate, according to different scenarios, how a changed atmosphere would differ from the current atmosphere and how the climate system might evolve over the decades ahead.

Trinidad and Tobago Meteorological Service

Contact us:

Rawinsonde Building

South Terminal,

Piarco International Airport,

Piarco,

Trinidad.

Phone: 868-669-5465/3964

Fax: 868-669-4009

Synoptic Branch

South Terminal

Piarco International Airport

Piarco

Trinidad.

Phone: 868-669-4392

Fax: 868-669-4727

Crown Point

Meteorological Office

A.N.R. Robinson International Airport

Crown Point

Tobago

Phone: 868-639-8780

Fax: 868-639-9987

Mailing Address:

Trinidad and Tobago Meteorological Service

P.O. Box 2141

National Mailing Centre

Piarco,

Republic of Trinidad and Tobago.

EMAIL: dirmet@metoffice.gov.tt

WEBSITE: http://www.metoffice.gov.tt/

FIND US ON FACEBOOK:
Trinidad and Tobago Meteorological Service

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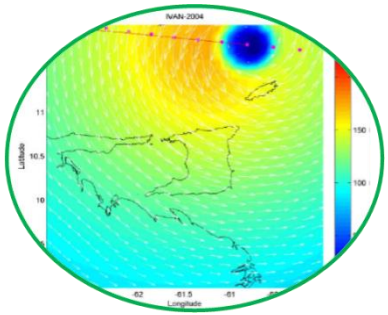
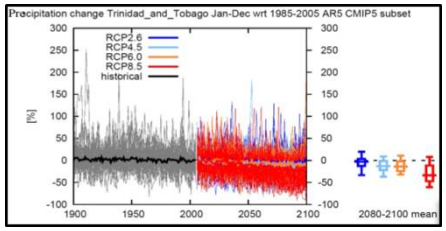
Product/Service Information

WEATHER FORECASTS, CLIMATE PREDICTIONS &CLIMATE PROJECTIONS





Why Weather Forecasts and Climate Predictions and Climate Projections are different?

Question: How can meteorologists and climatologists presume to say what the climate will be like months or years ahead when they are only able to forecast the weather a week or two ahead?

The answer lies in the distinction between "weather" and "climate" – which are subtly different concepts.

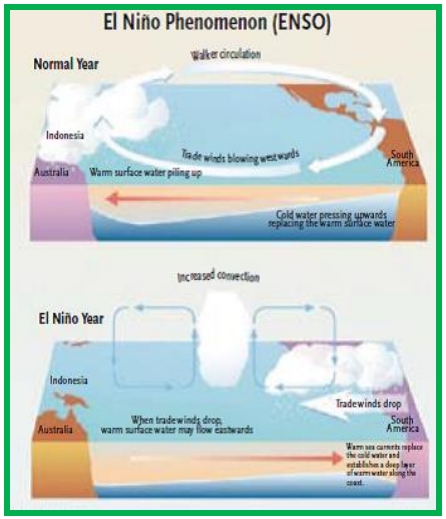
A simple definition of "weather" is that it is the state of the atmosphere as it is experienced at any one moment – wind, rain, sunshine, etc., whereas "climate" is the overall summary of weather conditions over many years, as represented by the patterns of averages and variability of the weather over the period.

Each concept has a fundamentally different basis for prediction.

- When meteorologists forecast the weather they need to know two things, firstly the state of the current weather conditions right now and secondly the physics of how weather conditions interact and evolve over time.

- Knowledge of the current state needs an extensive set of measurements and estimates of conditions both at the Earth's surface and higher up in the atmosphere, while the physics is represented by thousands of equations in the global weather model.

- The problem for the forecaster is that the models and input measurements are never perfect and small inaccuracies grow naturally in the calculations, resulting in large errors in forecasts a few days ahead.
- Generally, weather forecasts are more accurate in the mid-latitudes than in the tropics because of better observation systems there, especially in the northern hemisphere, and because mid-latitude weather systems are easier to model than those in the tropics.
- Weather forecasts are currently made out to approximately two weeks at best.
- Beyond two weeks or so, climatologists can draw on other aspects of theclimate system that may offer a basis for prediction.
- Forecasts on a timescale of a month or so are referred to as intra-seasonal predictions.
- Over longer periods ahead such as seasons, the oceans offer another basis for prediction.
- If the ocean surface is unusually hot or cold over large areas, the weather patterns above these areas are affected and since the ocean's conditions change fairly slowly, the heating or cooling effect may last a few months.
- These effects are greater in the tropical oceans so seasonal predictability is generally greatest in the tropical and sub-tropical regions owing to strong connections there between the atmosphere and the oceans, but even then uncertainty is still high.
- Therefore, seasonal predictions are more accurate in the tropics than in the mid-latitudes. The best known example is the El Niño phenomenon.
- Model-based predictions contain uncertainty because of the limitations of the observing system which limits ascertaining the total initial conditions; necessary approximations of the physics in computer models; and the chaotic and sometimes inherently unpredictable nature of the atmosphere system itself. Uncertainty is therefore an intrinsic characteristic of all weather and climate predictions and model outputs and is an important consideration in their use.



The El Nino Phenomenon