

# Climatology-Definition, Nature and Scope: A Review

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**Abstract** - Climatology, branch of the atmospheric sciences concerned with both the description of climate and the analysis of the causes of climatic differences and changes and their practical consequences. Climatology treats the same atmospheric processes as meteorology, but it seeks as well to identify the slower-acting influences and longer-term changes of import, including the circulation of the oceans and the small yet measurable variations in the intensity of solar radiation. From its origins in 6th-century-BC Greek science, climatology has developed along two main lines: regional climatology and physical climatology. The first is the study of discrete and characteristic weather phenomena of a particular continental or sub continental region. The second involves a statistical analysis of the various weather elements, principally temperature, moisture, atmospheric pressure, and wind speed, and a detailed examination of the basic relationships between such elements.

**Keywords:** Greek Science, Climatology, Influences, Climatic, Temperature etc.

## I. INTRODUCTION

Climatology is the scientific study of climate. Climate is defined as weather patterns that have been averaged over a given period of time to obtain a consistent pattern of the expected atmospheric conditions. Weather is the atmospheric condition of a particular place over a short period of time, normally a day. Weather averaging for a long and indefinite period of time makes it possible to predict the climatic pattern of an area. Climatology is regarded as a subdivision of physical geography, atmospheric sciences, and earth sciences in general. Aspects of oceanography and biogeography have also been considered as part of climatology. Climatology focuses on aspects such as atmospheric boundary layer, circulation patterns, heat transfer in the globe, ocean interaction with the atmosphere and land surface, land use and topography.

## II. DEFINITIONS OF CLIMATOLOGY

Climatology is the science of climate which study the Physical and spatial state of the atmospheric conditions

**According to Critic field:** - Climatology is the science that seeks to describe and explain the nature of climate, how it differs from place to place and how it is related to man's activities.

**According to Austin Miller:** - 'Climatology is that branch of science which discusses the average conditions of weather.'

## Nature of Climatology

1. Descriptive
2. Dynamic
3. Scientific
4. Interdisciplinary
5. Applied
6. Complex

## Descriptive Nature:

1. In ancient period, Greeks geographers study and describe nature of atmosphere and its influence on human health and culture.
2. Hippocrates (BC400), in his written document "Air, Water and Place" where he described the influence of climate on health.
3. Theophrastus described different aspects of wind
4. Ancient Greek described three temperature zone based on latitude
  - i) tropical zone, ii) temperate zone, iii) frigid zone
5. The knowledge of weather and climate up to 16th century was descriptive.
6. Because qualitatively observed data and description by non-professional individual.

## Scientific Nature: (Period Scientific Analysis)

- Climatology as science blossomed in 17th century when few instrument invented to measure climatic variable.
- Measurement and recording of temperature started with invention of thermometer Measurement of Pressure started with invention of barometer by Torricelli in 1643.
- Availability of data on temperature and pressure leads to formulation of few laws about atmospheric condition.
- Francis Bacon's treatise on wind in 1662, Boyle's law about the air pressure and atmospheric gases.
- Hadley's cell model on tropical circulation in 1735 know as Hadley Cell

## Age of Discovery and Exploration: (15th to 16th) Dynamic:

Discovery and exploration of new areas and there features of weather and climate.

Study of weather and climate outside the Europe.

**Interdisciplinary- Applied and Complex:****Modern nature: Period of Modern Climatology (20th century):**

Climatology reached to study upper circulation and weather phenomena, information obtained through advanced techniques. Period was marked by

1. Advancement in techniques to obtained detailed regular climatic data.
2. Concentration on classification of world climate.
3. Concerned about the climatic changes.
4. Weather forecasting.
5. International cooperation's to tackle the future problems of climatic changes at local, regional and global levels caused mainly by anthropogenic factors.

**Scope of Climatology:**

Content or Scope of any discipline largely depend on its aims and objectives.

The scope covering all the contents of climatology may be described through its major

**Branches:**

- Physical and Dynamic climatology
- Regional Climatology
- Applied Climatology

**Physical & Dynamic climatology:-****Physical climatology**

Deals largely with energy exchanges and physical processes. Dynamic climatology is more concerned with atmospheric motion and exchanges lead to and result from that motion

- seeks to explain the factors responsible for bringing out the temporal and spatial variations in heat exchange, moisture exchange and air movement -- Physical climatology is closely related to meteorology
- Physical climatology is a main aspect meteorology from which most of its basic principles are drawn the focus is on:-
  - i. The study of solar energy- its transformation at a location and its transfer through the atmosphere
  - ii. The complicated patterns and exchange of energy from one phase to another- from solid state to liquid state and from liquid state to vapor and vice versa

**Dynamic climatology:-**

- is global in scope
- it studies the thermodynamic processes in the atmosphere and the resultant atmospheric motions
- it investigate the impact of changes in various physical parameters on climate

**This branch of climatology includes:-**

- i. The effect of the increase of greenhouse gases in global temperature
- ii. The role of mountains in determining the dynamics of the atmosphere An investigation into sea-surface temperature

**Synoptic climatology**

- deals with local or hemispheric climate from the view point of atmospheric circulation
- different circulation patterns lead to differences in climates
- it studies the relationship between circulation features and severe weather conditions-E.g.- the effect of El Nino and La Nina in creating severe weather conditions

**Regional climatology:-**

- This branch of climatology seeks to determine and describe the various types of world climates
- it is also known as descriptive climatology because it is concerned with the identification of important climatic characteristics and the interaction of weather and climatic elements upon the life, health and economic conditions of the people and areas.

**Applied climatology:-**

- This branch of climatology is concerned with the application of the climatologically knowledge to practical problems
- It analyses the relationship of climatology to other sciences
- The main purpose is to find out the ways and means to make use of our knowledge of climatic elements for the betterment of human life on the Earth

**III. CONCLUSION**

Climatology has evolved rapidly as a credible and extremely important area of scientific activity. Its position today is the result of changing scientific, technological, social, economic, and political circumstances. These have created the opportunity for climatologists to not only conceptualise, observe and measure the nature of the climate system in different ways but also demonstrate that understanding the

nature and causes of climate can produce significant benefits for coping with and managing climate as a determinant, hazard and resource. Consequently, an expansion of the scope of climatology beyond its traditional base of synoptic, dynamic, physical and statistical climatology, explicitly embracing areas such as climate and human affairs, is to be encouraged.

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