

## Meaning Scope and Nature of Climatology

Meaning: 'Climatology' the word consists of two greek words 'Klima' meaning Slope of the earth and 'logos' meaning a discourse or study. Here Slope of the earth refers to our conception of latitude. At present climatology is a broad and diversified field. It seeks to describe and explain the nature of climate. In brief climatology may be defined as the scientific study of climate and the study of the varieties of climates found on the earth and their distribution over its surface.

Climatology may also be defined as the study of average atmospheric conditions at a place or region over long period of time. According to critchfield, 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. In his opinion climatology broadens the boundaries of meteorology in space and in time to cover the whole earth and periods of time as long as observations and indirect evidence will permit. According to Austin Miller climatology is that branch of science which discusses the average conditions of the weather.

Another climatologist Thornthwaite broadens the scope of climatology and defined it as the study of the atmosphere as well as that of the earth's surface because both are interrelated.

Thus climatology may be defined as that branch of atmospheric science which includes the study of long-term or weather conditions at a place or an area of varying spatial scales over long period of time, of frequent and infrequent weather phenomena, systematic study of climate

Spatial Scale, i.e. global, regional and local scales. climatology also involves the identification of relationships between climatic features and biota comprising plant and animal communities. Besides the scope of climatology also involves the investigation of palaeoclimates and their reconstruction, causes and factors of climatic changes and effective devices of weather forecasting.

The Scope covering all the contents of climatology may be described through its major branches - i.e. - ① Physical climatology ② Dynamic climatology ③ Regional climatology ④ Applied climatology.

Physical climatology deals largely with energy exchanges and physical processes. It deals with the interpretation of factors responsible for the spatial and temporal variations of exchange of air circulation, heat and humidity. It studies various elements of weather - insolation, temperature, air pressure, wind, evaporation and humidity, precipitation, visibility etc.

Dynamic climatology is more concerned with atmospheric motion and exchanges that lead to and result from that motion. Thus the main contents of dynamic climatology comprises the global radiation and energy (heat) balance, atmospheric temperature, atmospheric moisture, motions in the atmosphere, global atmospheric circulation, air masses and fronts etc.

Regional climatology aims at the study of different types of climates of the world and hence the subject matter of regional climatology comprises the classification of world climates of major spatial scale, location and distribution and systematic description involving temperature, air pressure and wind, precipitation and effects of climate on natural vegetation.

On the other hand  
Applied climatology includes the consideration of the impacts of climate on human activities and human society and human responses to climate, (physiological and psychological). It is concerned with the application of climatological knowledge to specific practical problems. In applied climatology, 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.

~~Development~~

### The developing Nature of Climatology.

Like other branches of knowledge, the discipline of climatology, as a part of physical geography has also its base in the philosophical ideas of ancient Greeks, Romans and Egyptians. The present status of climatology is the result of gradual development of climatological knowledge and concepts developed in different periods. The nature of the subject thus also have changed from a mere description to the present day applied field.

In ancient periods, the Greeks tried to understand the nature of atmosphere and its influences on human health and culture. In 400 B.C. Hippocrates produced documents on Air, water, and places, where he described the influence of climate on health. Some scholars described different aspects of winds and divided the globe

into three zones on the basis of latitudes -

① Tropical Zone ② Temperate Zone ③ Frigid Zone. In this period climatology was confined to simple description of the climatic phenomena:

The period from 15th to 16th century is known as the great age of discovery and exploration, when efforts were made to explore characteristics of atmospheric and weather conditions. The knowledge about weather and climate up to 16th century was purely descriptive and non-coherent (illogical); because this was based on qualitatively observed data and description by the non-professional individuals. The science of climatology blossomed in 17th century when a few instruments were invented to measure climatic variables. The proper recording of temperature started with the invention of thermometer by Galileo in 1593; and that of atmospheric <sup>air</sup> pressure with the invention of barometer by Torricelli in 1643. With the availability of measuring instruments systematic and regular measurement and observation of weather phenomena also started, specially in France.

The period from 18th to 19th century was characterised by the study of weather phenomena at regional and global levels. Maps were prepared for countries and continents, depicting climatic variables like - insolation, temperature, air pressure and winds, atmospheric disturbances, precipitation etc. on the basis of data measured by weather instruments. Luke Howard for the first time, presented a well documented classification of clouds in 1803 into two categories - Main clouds and Secondary clouds. Alexander von Humboldt in 1817 prepared a world map of mean annual temperature using isotherms. Efforts were made to devise instruments to measure

atmospheric humidity, movement of atmosphere storms etc. The data of precipitation at diff. meteorological centres world over enabled Berghaus to prepare first world map of precipitation in 1845. It was followed by the construction of Mean monthly temp. map in 1848 and Mean air pressure map in 1862.

By the turn of 19th Century, ample data about weather elements became available and Scientist started thinking about the classification of world climates. German meteorologist Koppen has credited for <sup>first</sup> using the world classification of climate in 1900. Thus the subject matter of climatology became more and more quantitative and scientific towards the late 19th Century.

In the beginning of 20th Century the climatological studies have enhanced with scientific data, new methodological and new instruments. The study of climatology was enriched by more and more information about atmospheric conditions, mainly upper air circulation and weather phenomena. This period was marked by — (i) Advancement in techniques acquiring regular climatic data; (ii) concerted efforts for classification of world climates; (iii) Importance on climatic changes; (iv) weather forecasts; (v) International cooperation in studying problems of climatic changes at local, regional and global level due to anthropogenic causes etc. The existence of Stratosphere and ozone layer was discovered in 1902 and 1913. During 1940s weather branches — Synoptic

climatology has emerged which is the study of local and regional climate as well as properties and motions of atmosphere.

Both recent scientific climatology and also characterised by formulation of better classification schemes of world climates by empirical and general approaches. Besides a growing concern over sea level rise about climatic change and internationally agreed for dealing with the problems. Various devices and methods were developed to reconstruct the paleoclimates based on glaciation, ancient sediments, forests etc. Sea level changes, fossils, continental drift etc. The main concern is about the nature and magnitude of present and future climatic changes due to global warming, ozone layer depletion and increased emissions of greenhouse gases caused by human economic activities.

Thus it is evident from the above discussion that the nature of climatology have become more and more scientific and quantitative in its approaches and the subject matter. It has become more and more dynamic.

### Importance of climatology

Weather and climate are dynamic factors of our physical environment. They affect a wide range of human activities to a greater degree. There is no denying the fact that weather and climate are important factors in determining our day to day activities and modes of life. Though it would not be desirable to produce an exhaustive catalogue of climatic impacts, it is true that the surge in which the elements of climate and weather include various forms of economic and social activities are now receiving ever increasing attention from climatologists.