



# Atmospheric sciences, hydrometeorology, hydrology and hydrobiology

David Marques\*

Department of Environmental and Engineering Sciences, University of Florida, 102 Phelps Labs, Gainesville, FL 32611, USA.

## DESCRIPTION

### ➤ Atmospheric sciences

It is the study of Earth's atmosphere mainly troposphere. It mainly tries to understand and focus on reasons and processes which give rise to our weather, some variable to be studied are temperature, pressure, gradients and their interactions with variables and also water vapor.

### ➤ Hydrometeorology

It is a branch of hydrology and meteorology. It aims in understanding the physics, chemistry water fluxes of atmosphere and energy. It also helps to understand coupling with the earth surface environmental parameters.

What is Hydrometeorology? It is a science which studies the cycle of water. It is related to meteorology, hydrology and climatology. It mostly studies the process of hydrological cycle, which occurs in atmosphere like evaporation, precipitation and condensation and in ground like surface runoff, rainfall, infiltration along with their interactions.

It bridges both hydrology and meteorology the major interest of hydrometeorology is precipitation and evapotranspiration. It aims to develop tools for water management and observation and also for the prediction of hydrometeorological phenomena. It also helps to develop models which may help in the early detection and warning of any floods.

Hydrometeorological Hazards: It is a phenomena or process of hydrological, oceanographic or atmospheric nature that may cause injury, health impacts or loss of life, property, livelihood and services and also social and economic disturbances or environmental damage.

Some of the hydrometeorological hazards include:

**Thunderstorms:** - It is also known as electrical storm. It is usually attributed by the presence of lighting and its consequent effect on Earth's atmosphere called thunder.  
**Hailstorms:** - it is a type of thunderstorm that usually precipitates ice. It is a severe weather condition which causes damage to livestock, crops and livelihood.

**Tropical cyclones:** - It is a rapidly circulating or rotating storm usually at low pressure centers with strong winds and with spiral arrangement of thunderstorm that usually produces heavy rains.

**Tornados:** - It is very strong and fiercely rotating wind consisting of a tall column of air that spins around and causes severe damage.

**Floods including flash floods:** - It is most frequent type of natural disaster and occurs when there is overflow of water due to heavy rainfall, rapid snowmelt or from cyclone and tsunami.

**Drought:** - It is usually determined as period of time when a region or an area experiences below-normal precipitation causing reduced soil moisture or groundwater, diminished stream flow, crop damage, and a general water shortage. It is considered second-most costly weather events.

**Heat waves:** - It is a period extremely high surface temperature condition accompanied with high humidity over an extended area.

**Blizzards:** - It is a severe snowstorm accompanied by strong winds with high speed and lasting for a prolonged period of time.

**Avalanches:** - it is a mass of snow, rocks or ice that falls rapidly down the hill or mountains

➤ **Hydrology**

It is a study of water distribution, movements and management on earth and other planets; it also includes study of water cycle, water resources and also environmental watershed sustainability.

Hydrologist is one who practices hydrology. They use various scientific techniques and analytical methods, to help solve problems related to water, natural disasters, and water management.

Hydrology is sub-divided into: groundwater hydrology and surface water hydrology

**Ground-water hydrology:** it is the subdivision of hydrology that majorly deals with the occurrence, quality and movement of water beneath the Earth's surface.

**Surface-water hydrology:** It is the sub-field of hydrology concerned with above-earth water, major applications of Surface-water hydrology are: rainfall and runoff, the routes that surface water takes, for Example Rivers or reservoirs, and the occurrence of floods and droughts

➤ **Hydrobiology**

It is primarily an ecological science. It studies the water population, their interactions with the habitat and significance for the transformation of energy and matter along with the biological productivity of the oceans inland waters and seas. It majorly studies the impact of human activities on biological communities along with re-establishing damaged ecosystems.