Paper CC5
Unit 2 Topic 2

Air Mass

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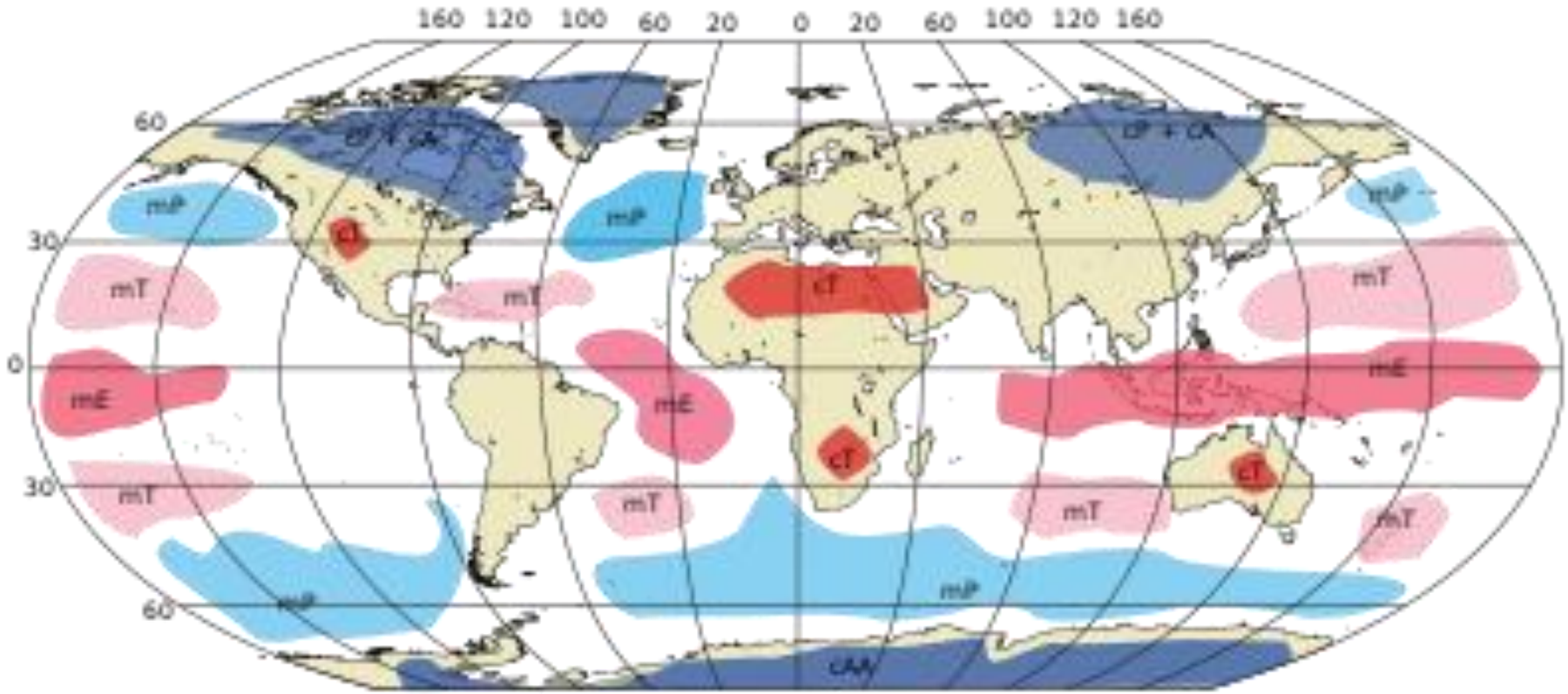
What is an Air Mass?

- An **air mass** is a volume of air defined by its temperature and water vapour content.
- Air masses cover many hundreds or thousands of miles, and adapt to the characteristics of the surface below them.
- They are classified according to latitude and their continental or maritime source regions.
- Colder air masses are termed polar or arctic, while warmer air masses are deemed tropical.
- Continental air masses are dry while maritime and monsoon air masses are moist.
- Weather fronts separate air masses with different density (temperature or moisture) characteristics.
- Once an air mass moves away from its source region, underlying vegetation and water bodies can quickly modify its character.
- Classification schemes tackle an air mass' characteristics, as well as modification.

Classification and notation

- Air mass classification involves four letters.
- The first letter describes its moisture properties, with c used for continental air masses (dry) and m for maritime air masses (moist).
- Its source region: T for Tropical, P for Polar, A for Arctic or Antarctic, M for monsoon, E for Equatorial.
- For instance, an air mass originating over the desert southwest of the United States in summer may be designated "cT". An air mass originating over northern Siberia in winter may be indicated as "cA".

Source Regions of Air Mass



Modification

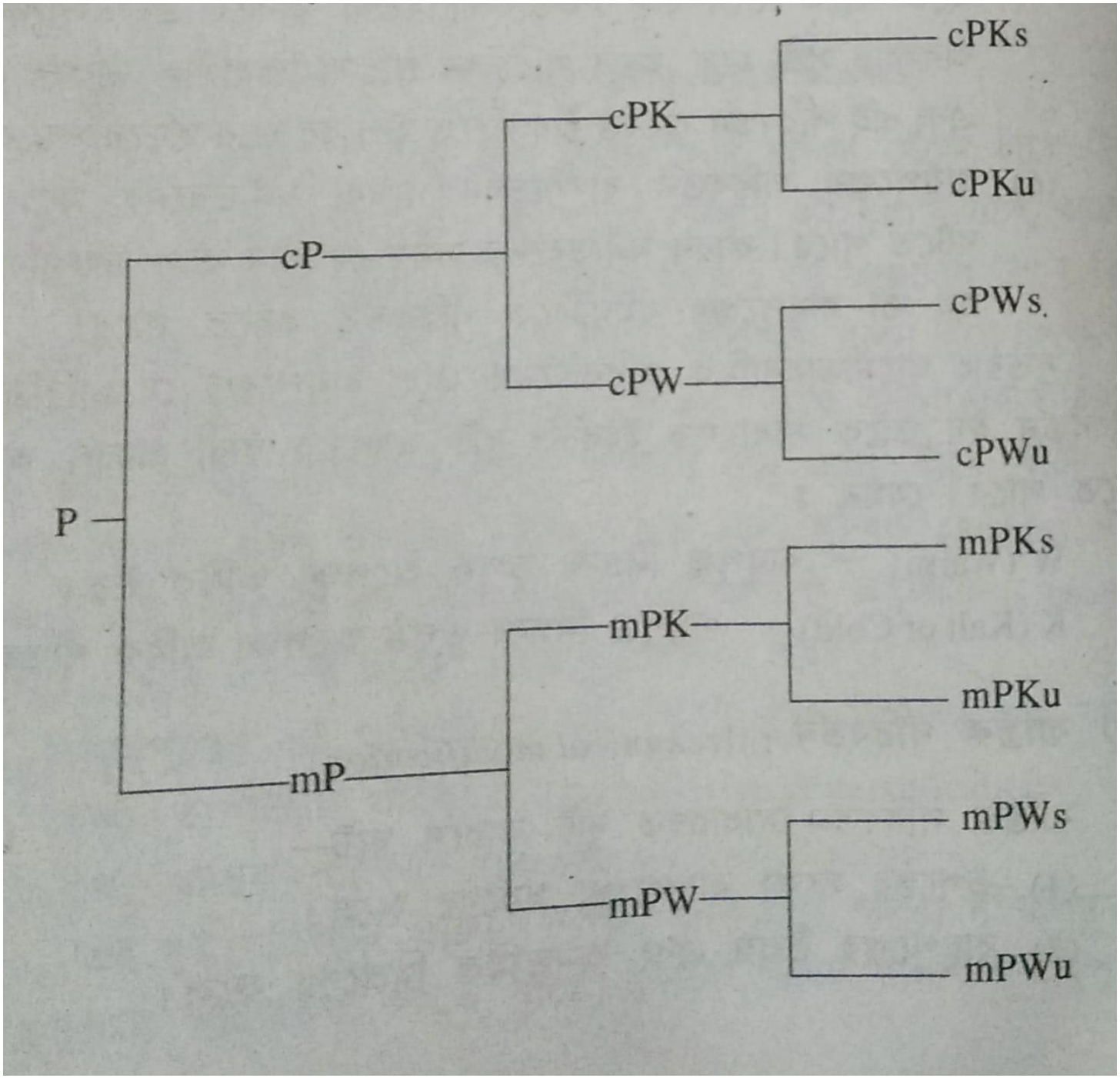
- Air masses can be modified in a two ways:

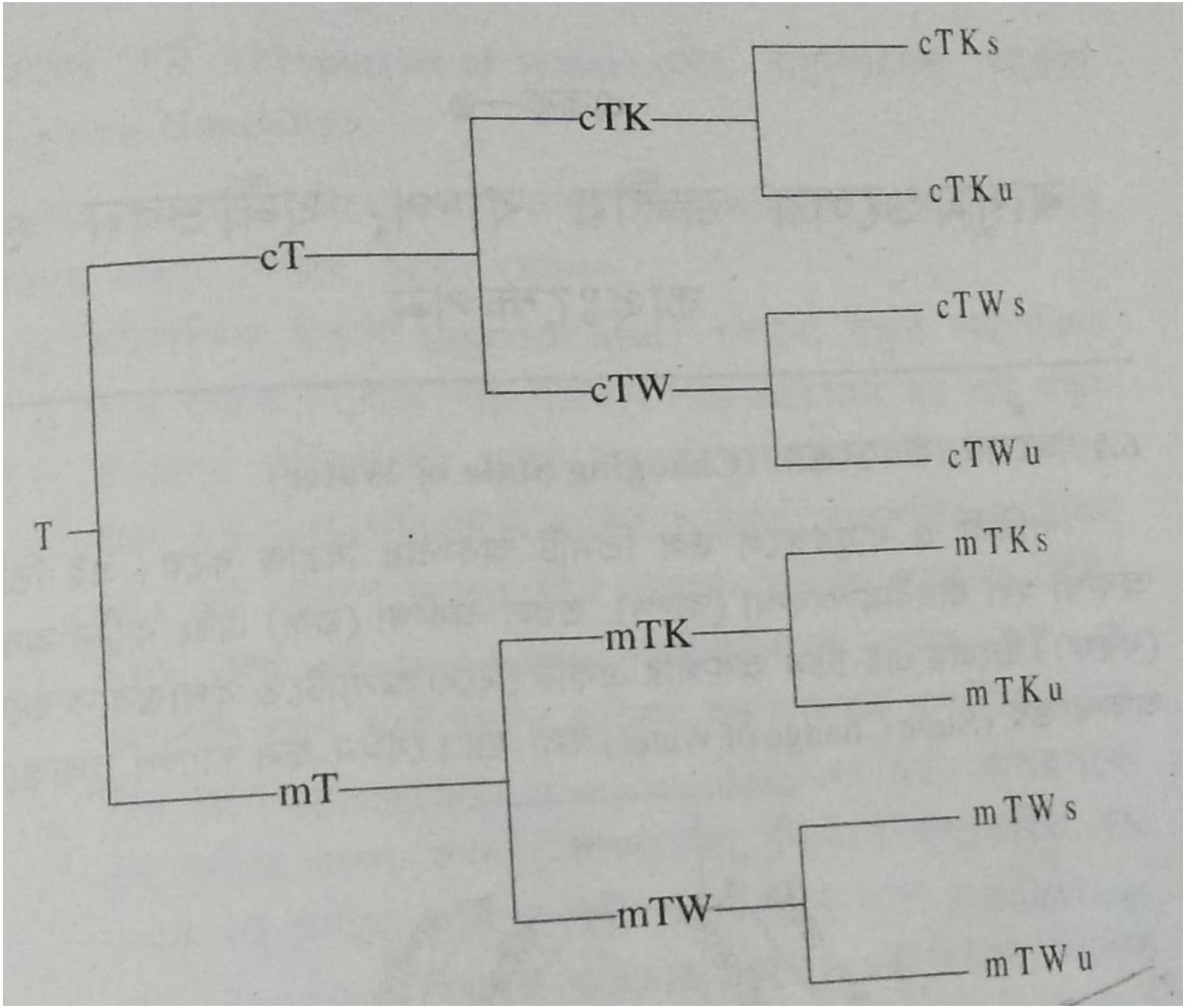
  i. Thermodynamic Modification

  ii. Mechanical Modification

Classification and notation

- The thermodynamic modification of an air mass may be shown using a third letter, either “K" (air mass colder than the surface below it) or “W" (air mass warmer than the surface below it).
- An example of this might be a polar air mass blowing over the Gulf Stream, denoted as "cPK".
- The mechanical modification of an air mass may be shown using a fourth letter, either “s” (stable aloft) or “u” (unstable aloft).


cPKs
cPK
cPKu
cP
cPWs
cPW
cPWu
P
mPKs
mPK
mPKu
mP
mPWs
mPW
mPWu


cTKs
cTK
cTKu
cT
cTWs
cTW
cTWu
T
mTKs
mTK
mTKu
mT
mTWs
mTW
mTWu

Characteristics

- An **air mass** is a large volume of **air** in the atmosphere that is mostly uniform in temperature and moisture.
- **Air masses** can extend thousands of kilometres in any direction, and can reach from ground level to the stratosphere—16 km (10 miles) into the atmosphere.
- An **air mass** forms whenever the atmosphere remains in contact with a large, relatively uniform land or sea surface for a time sufficiently long to acquire the temperature and moisture properties of that surface.
- The area over which an **air mass** originates is what provides **its characteristics**. The longer the **air mass** stays over **its** source region, the more likely it **will** acquire the properties of the surface below.
- Tropical and equatorial air masses are hot as they develop over lower latitudes. Those that develop over land (continental) are drier and hotter than those that develop over oceans, and travel poleward.
- Maritime tropical air masses that affect the United States originate in the Caribbean Sea, southern Gulf of Mexico, and tropical Atlantic east of Florida through the Bahamas.
- Monsoon air masses are moist and unstable.
- Continental Polar air masses (cP) are air masses that are cold and dry due to their continental source region. Continental polar air masses that affect North America form over interior Canada.

Characteristics

- Continental Tropical air masses (cT) are a type of tropical air produced over large areas of land and typically originate from low-latitude deserts such as the Sahara Desert in Africa, which is the major source of these air masses. Other less important sources producing cT air masses are the Arabian Peninsula, the central arid/semi-arid part of Australia and deserts lying in the Southwestern United States.
- Continental tropical air masses are extremely hot and dry.
- Arctic, Antarctic, and polar air masses are cold.
- The qualities of arctic air are developed over ice and snow-covered ground. Arctic air is deeply cold, colder than polar air masses.
- Arctic air can be shallow in the summer, and rapidly modify as it moves equatorward.
- Polar air masses develop over higher latitudes over the land or ocean, are very stable, and generally shallower than arctic air. Polar air over the ocean (maritime) loses its stability as it gains moisture over warmer ocean waters.

THANK YOU