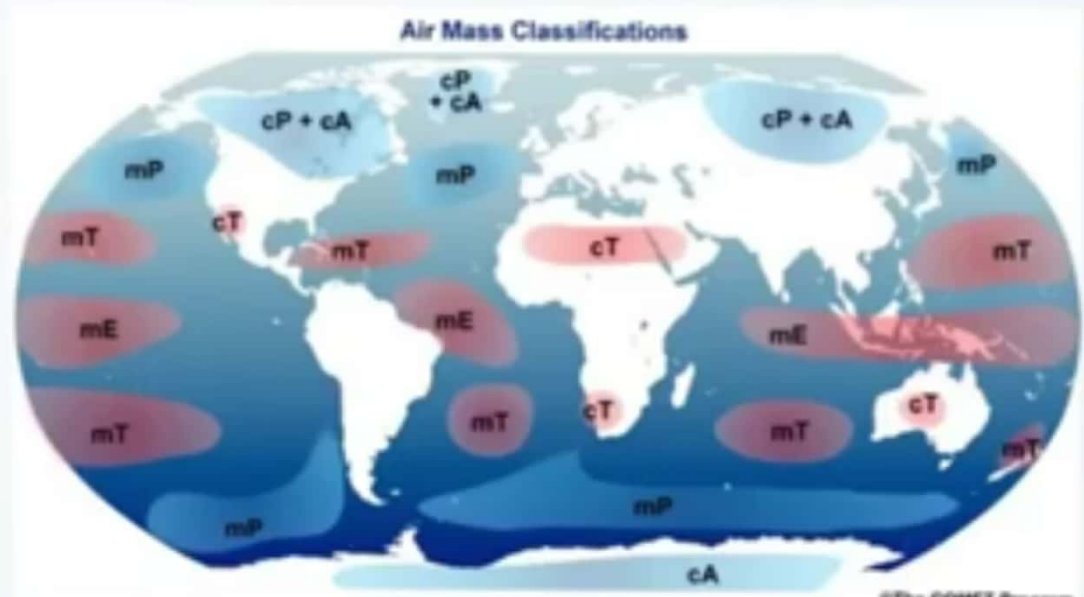




Air Mass



Air Mass

Characteristics

Source region of airmass

Classifications of Air mass

Modification of Airmass

Airmass of North America

Airmass of Asia

inkers

Air Mass

- concept given by V. Bjerkenes and J Bjerkenes with a view to explain frequent weather changes in Europe.

- Extremely large body of size
- Similar phy. Properties – throughout stretch
(T, moisture content, lapse rate)

- Phy. Properties- determined – surface feature:
- it formed
- through which it travels



- Cold air mass:

T lower than underlying surface

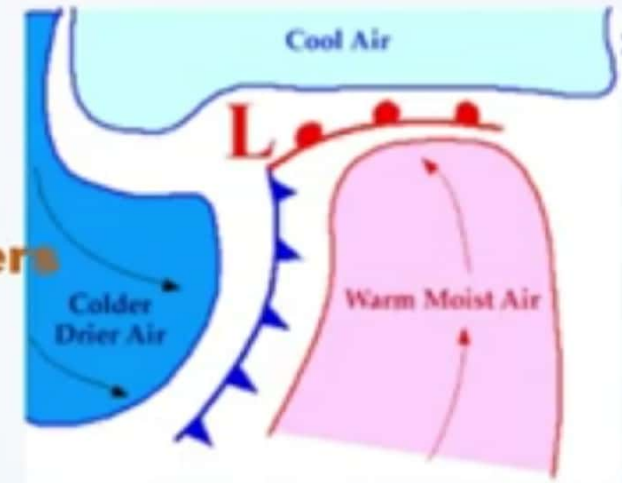
- Warm air mass:

T higher than underlying surface

-Affects and modifies- T and moisture of area- travels.

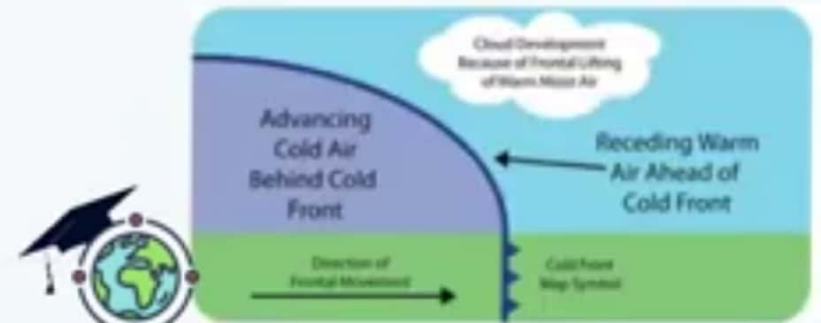
-Also modified by local condition of that area

-Boundaries between 2 airmass – Front



Characteristics:

- Extend over large portion of area- Continental
 - Maritime
- Horizontal + vertical stretch →
T Gradient – fairly uniform
- Cover 100s of 1000s of square miles
- Can be small variations (change experienced across airmass boundaries)



 **Smart Rankers**

Airmass Properties determined by;

1. Properties of source area.
2. Direction of movement of airmass.
3. Changes introduced – while movement away from source area.
4. Age of airmass.



Smart Rankers

Factors controlling weather conditions of area affected by airmass;

1. Vertical distribution of temperature in an airmass.
2. Moisture content of the air.

Source region of airmass

- Extensive area over which – airmass originate.
- Area's Nature and properties determines → Temperature of airmass
moisture
- Once formed , airmass- seldom stationery (in source region)



Airmass origination – require condition;


1. Atmospheric conditions – stable and uniform – long period



Smart Rankers



(Air lying over that area attains the temperature and moisture characteristics of ground surface)

2. Nature of source region- should either  land surface
ocean surface



Smart Rankers

3. Ideal condition- divergence of airflow
- anticyclonic condition with low pressure gradient

 Air stay over- longer period of time

Conditions obstructing airmass formation;

1. Irregular Surface e.g. Mountain



2. Surface – both land and water
(can't have uniform temperature and moisture conditions)

3. Regions- cyclonic conditions (instability)
(convergence – air flow)



Classifications of Air mass

1. Geographical Classification

(Based on latitudinal and weather characteristics)
at source region

2. Thermodynamic classification

(Based on thermodynamic and mechanical
modification during the journey of Air mass)

1) Geographical Classification

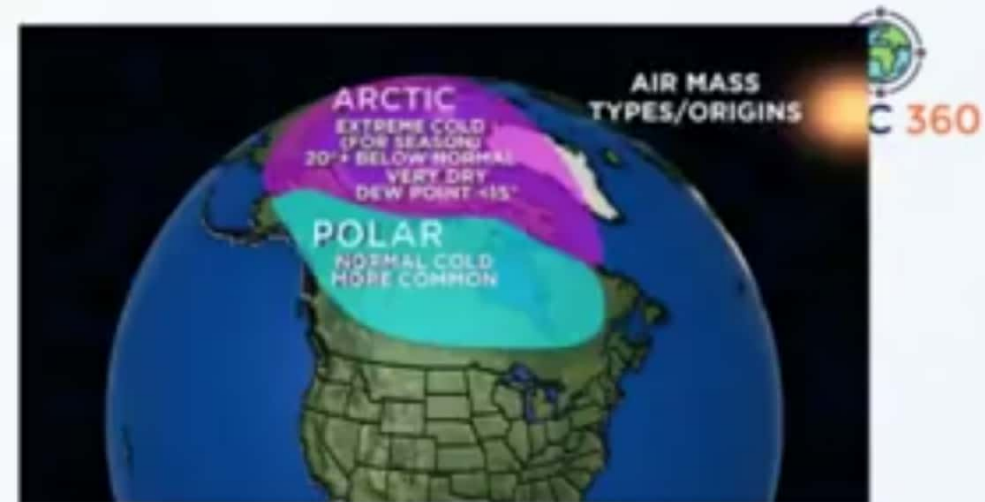
- Based characteristics feature – source region .
- Trewartha Classified – 2 broad categories
 - 1) Polar air mass (P)
 - 2) Tropical air mass (T)

1) Polar air mass(P)

- originate in polar region
- Arctic air – mass included in the category

2) Tropical air mass (T)

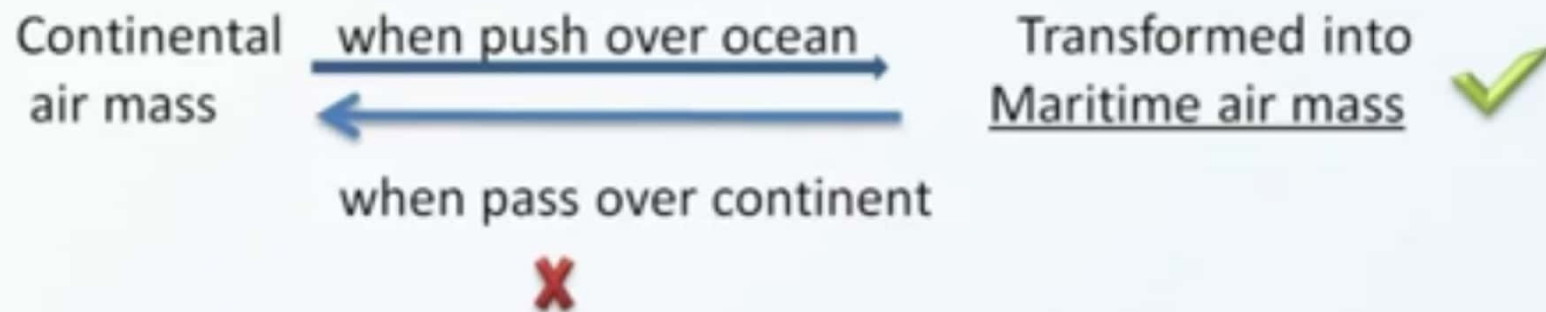
- originate – Tropical area
- Equatorial air mass - included



-Further divided – 2 types

- basis of nature of surface of source region

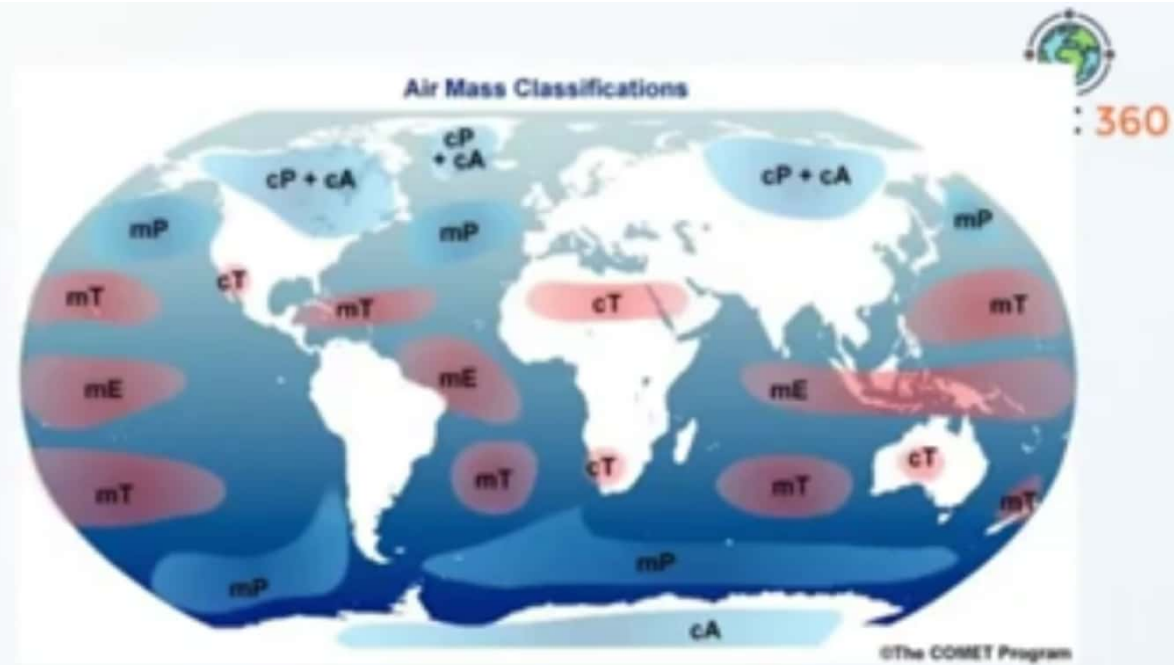
- 1) Continental air mass (C)
- 2) Maritime air mass (m)



-Based on above

4 principle types;

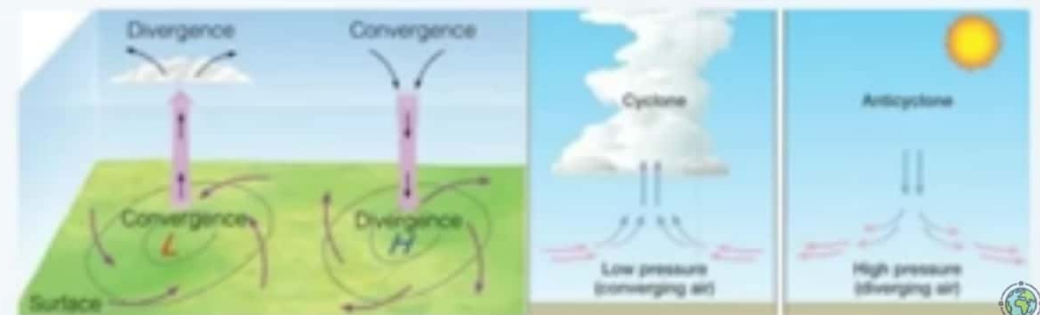
- 1) Continental Polar air mass (CP)
- 2) Maritime Polar air mass (mp)
- 3) Continental Tropical air mass (CT)
- 4) Maritime Tropical air mass (mT)



2. Thermodynamic Classification:

While moving out of source region:

- Modify weather condition of other region.
- Also, gets modified by surface condition of other region



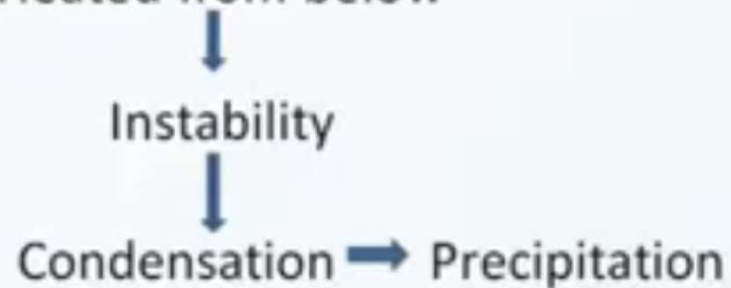
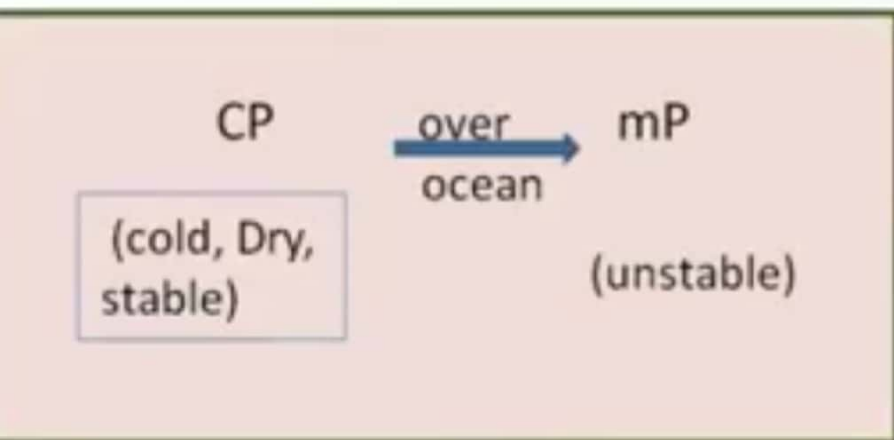
This is called **Thermodynamic modification**

include

- Heating or cooling from below
- **Evaporation of water into airmass** from below
- **Condensation or precipitation** by extracting moisture from the airmass.
- **Addition\ loss of latent heat of condensation** accompanying condensation and precipitation

Example:

- Airmass cooler than Ground – Heated from below



- Airmass moving over colder surface → cooled from below
 - ↓
 - surface inversion
 - ↓
 - oppose cloud formation and precipitation
 - ↓
 - any cloud formed – stratus variety
(light precipitation)

Modification of Air mass depends;

- i) Initial characteristics - T , moisture content.
- ii) Nature of land or water surface over which air mass moves.
- iii) Path followed by air mass : source \rightarrow destination.
- iv) Time taken by air mass.

Warm air mass (W)

$T_{\text{air mass}} > T_{\text{surface}}$ of region visited.

Cold air mass (K)

$T_{\text{air mass}} < T_{\text{surface}}$ of region visited.

Mechanical Modifications

Dynamic modifications.

Associated with;

Downward movement - stable airmass.

upward movement - unstable airmass.

Introduced due to - Cyclonic & Anticyclonic conditions.
(convergence) (divergence, subsidence)

- Turbulent mixing by eddies & convection.

- Divergence & convergence affecting
lapse rate of Tempⁿ.

- Advection.

• T starts decreasing
• Warmed from below - Normal lapse rate ↑
↓
unstable
↓
convective current.

• When lie over warm ocean surface
↓
specific humidity increases.

↓
Cumulonimbus clouds formed
↓
Precipitation.

• When lie over warm continent
↓
clear weather.

• When lie - Partly over - Warm ocean surface
- cold land surface.

Cyclonic conditions induced.

2. Warm air mass (M)

- $T > T_{\text{surface}}$ (destination)

- Cooled from below - lower layer stable
- vertical movement stops.

- Generally originate - Subtropical region
(Characterised by Anticyclonic conditions)

- Divided:

Continental warm Air mass

Maritime warm Air mass.

fortunapix



Air masses

- Continental
- Maritime
- Tropical
- Polar

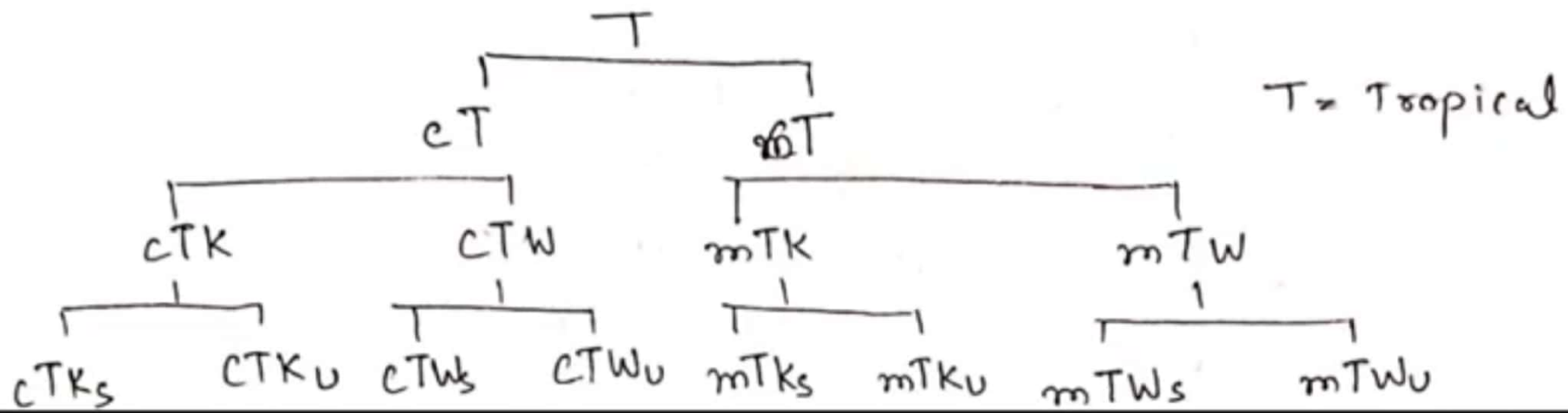
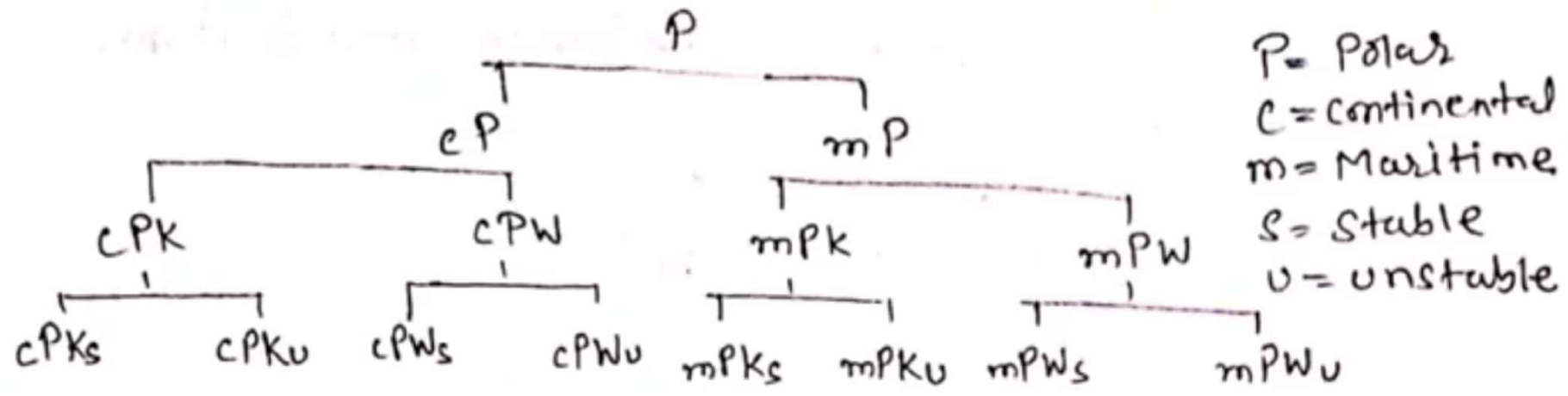
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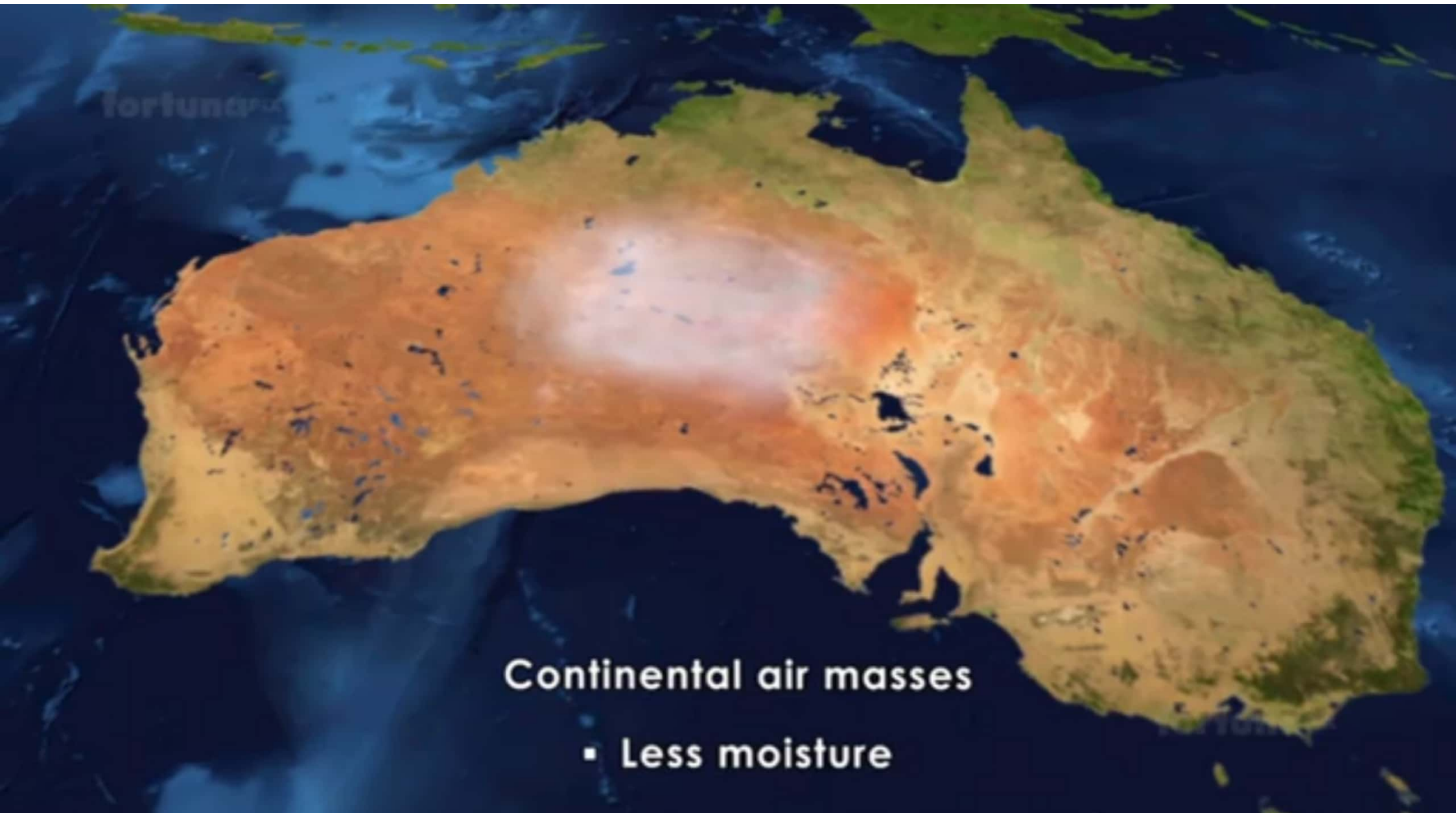


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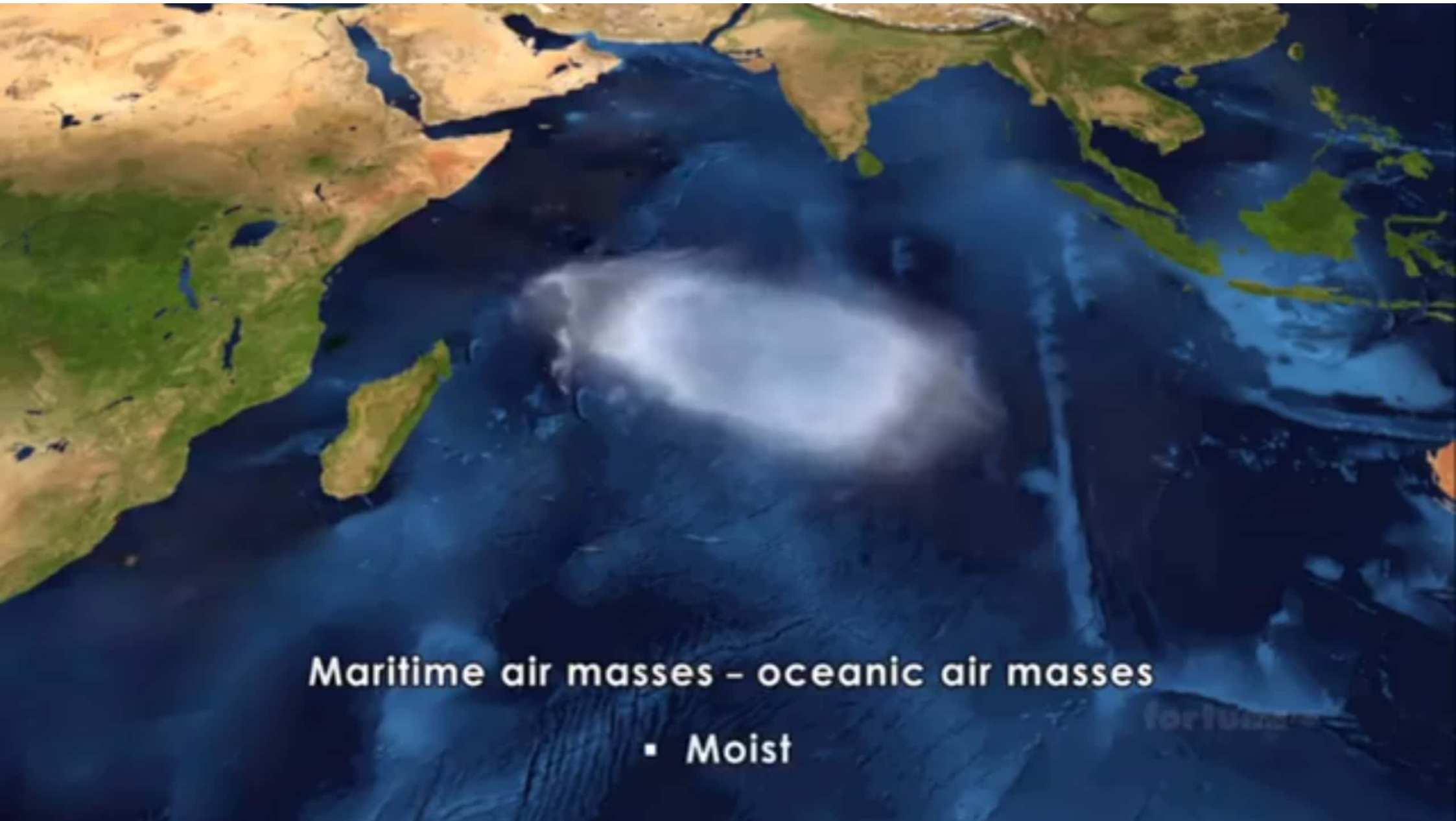
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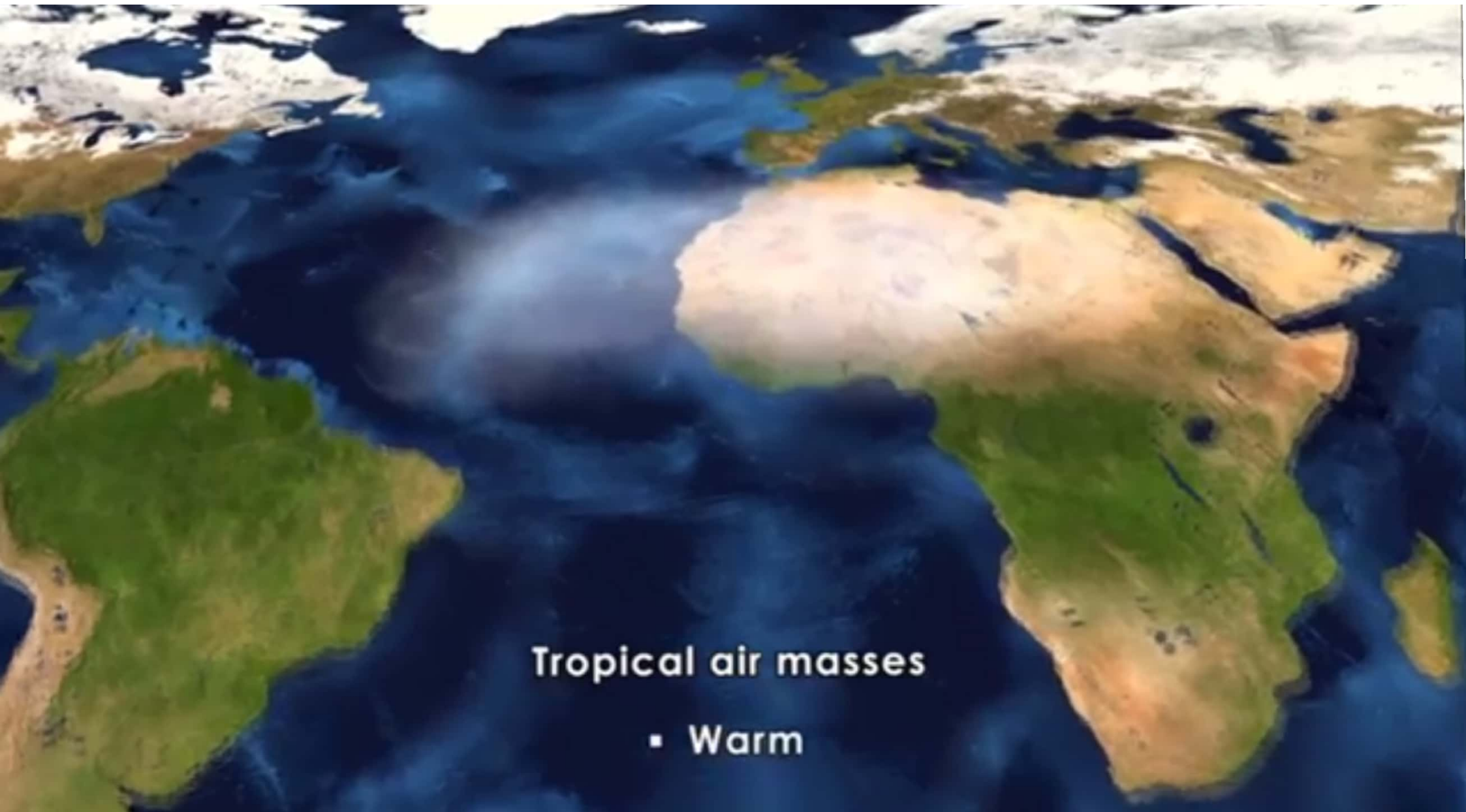
Continental air masses

- Less moisture



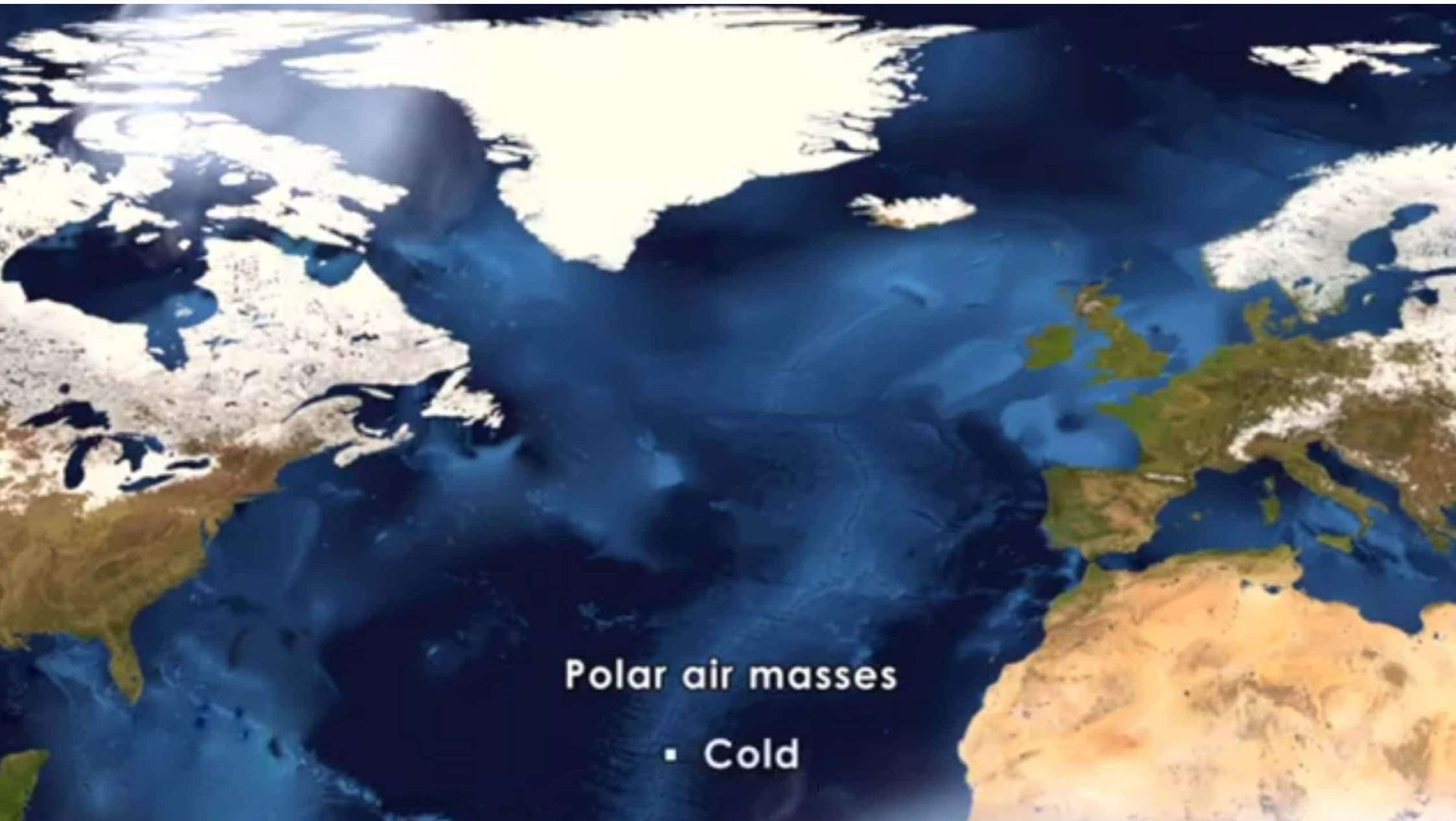
Maritime air masses - oceanic air masses

- Moist



Tropical air masses

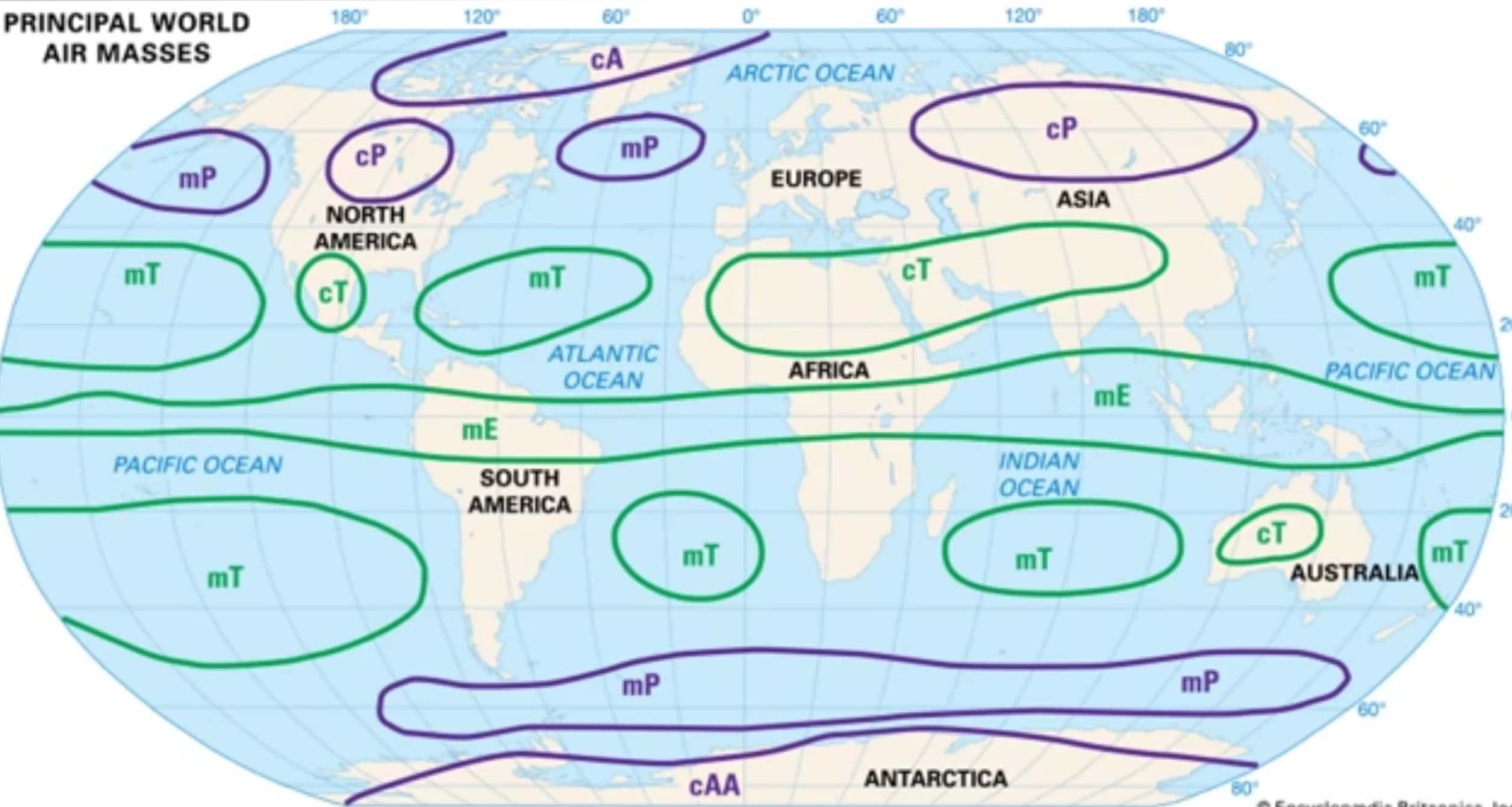
- Warm



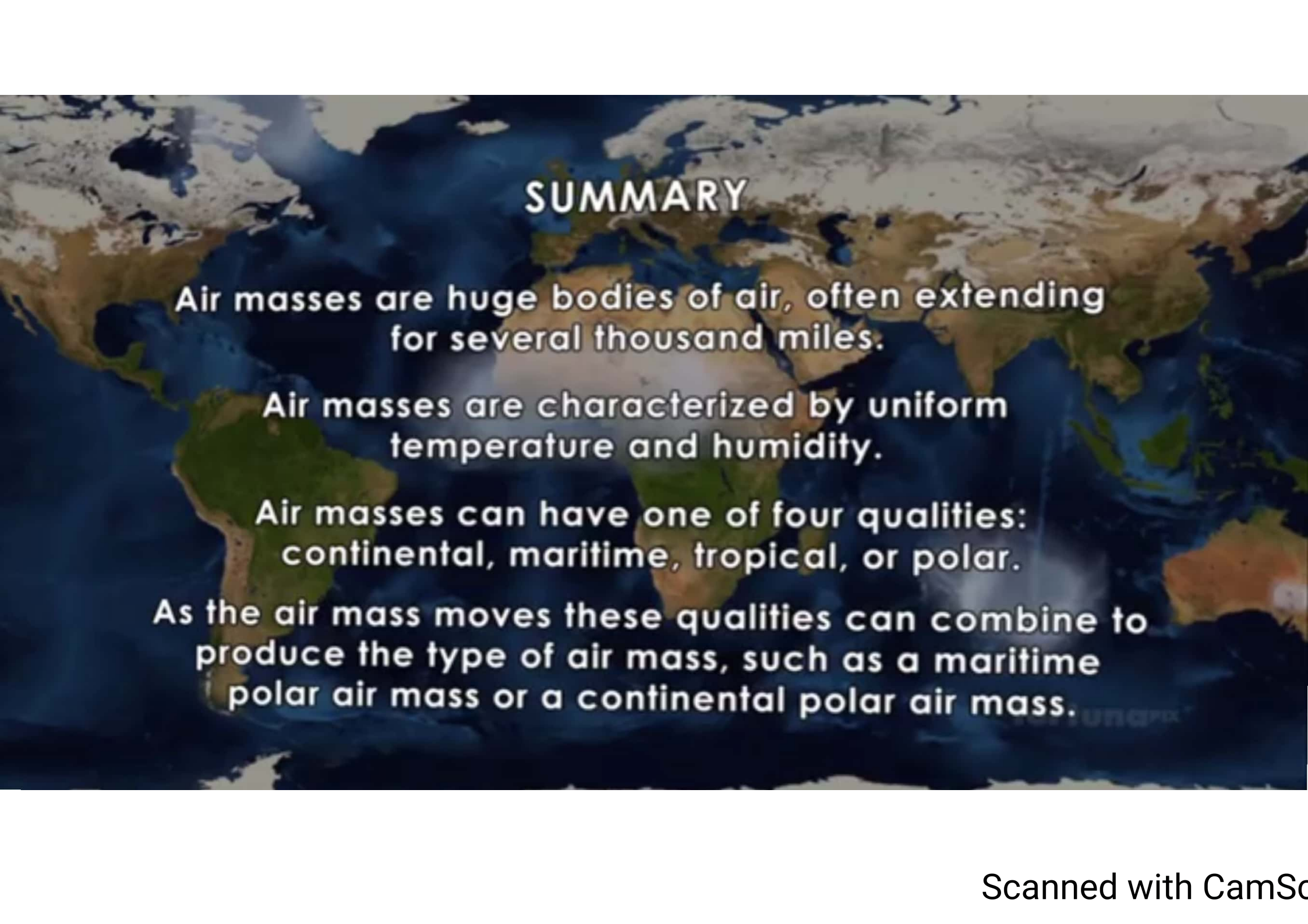
Polar air masses

- Cold

PRINCIPAL WORLD AIR MASSES



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A world map showing the continents of North America, South America, Africa, Europe, and Asia. The map is rendered in a dark, muted color palette with blue oceans and brown/green landmasses. The text is overlaid on the map.

SUMMARY

Air masses are huge bodies of air, often extending for several thousand miles.

Air masses are characterized by uniform temperature and humidity.

Air masses can have one of four qualities: continental, maritime, tropical, or polar.

As the air mass moves these qualities can combine to produce the type of air mass, such as a maritime polar air mass or a continental polar air mass.