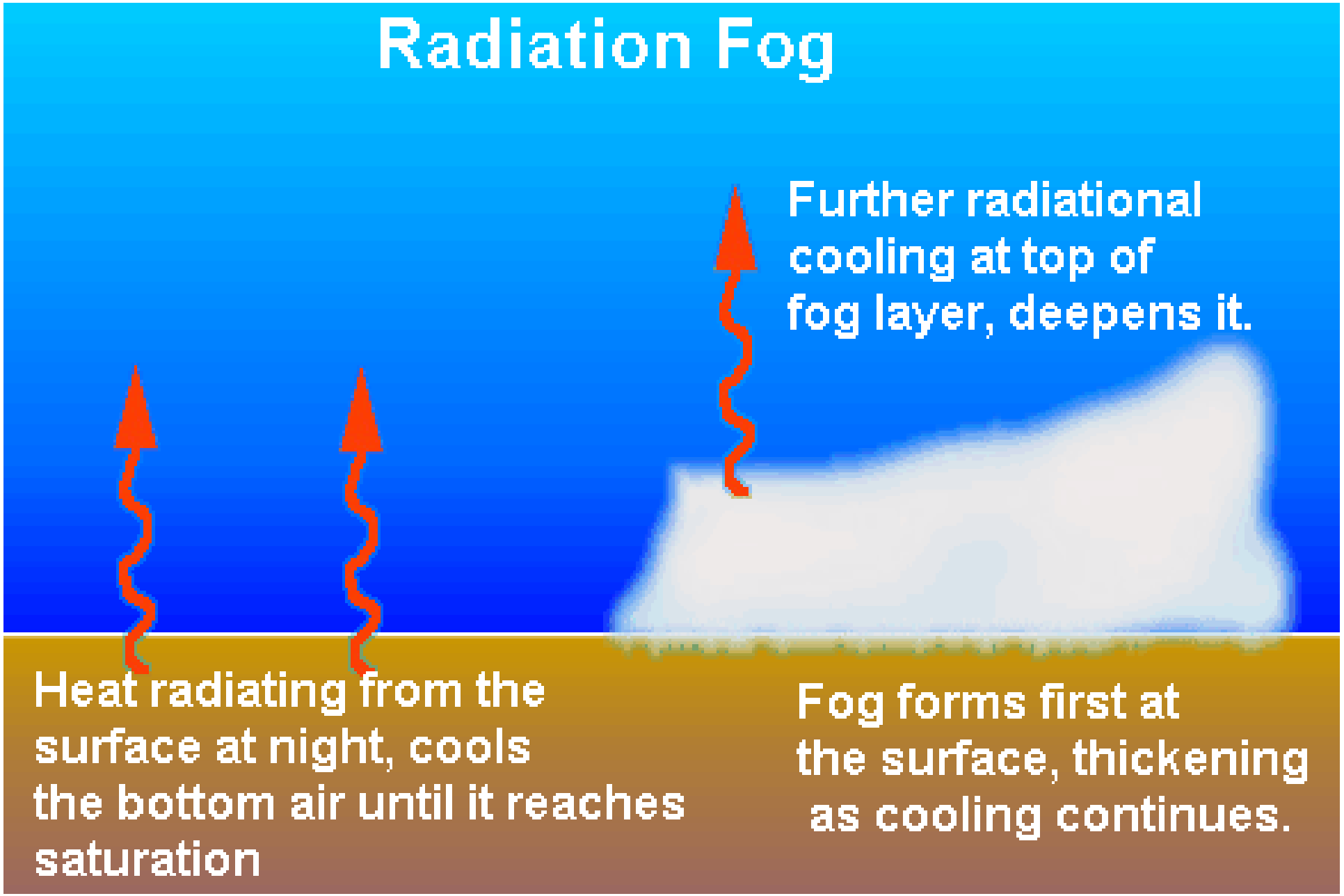
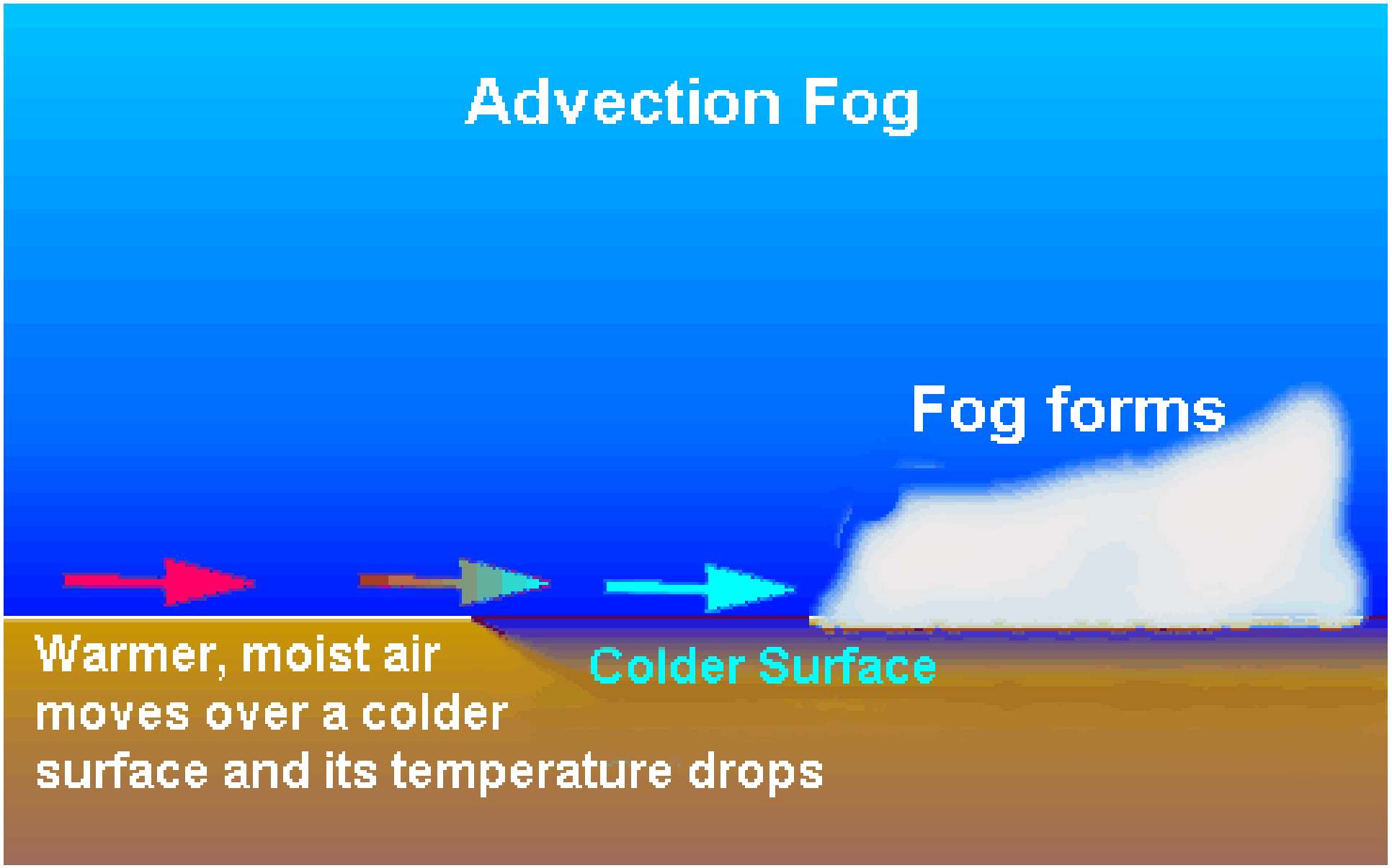
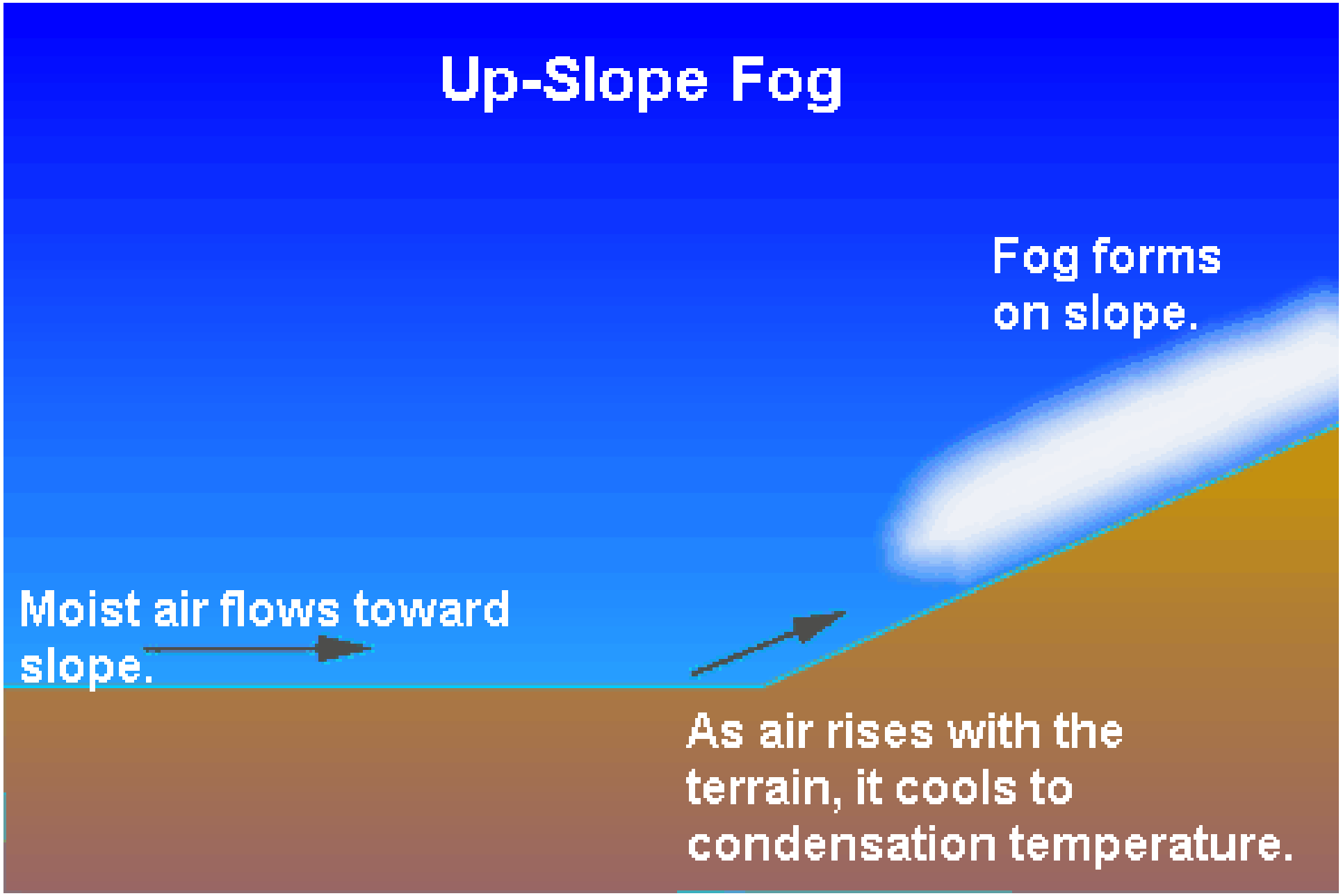
Types of Fog

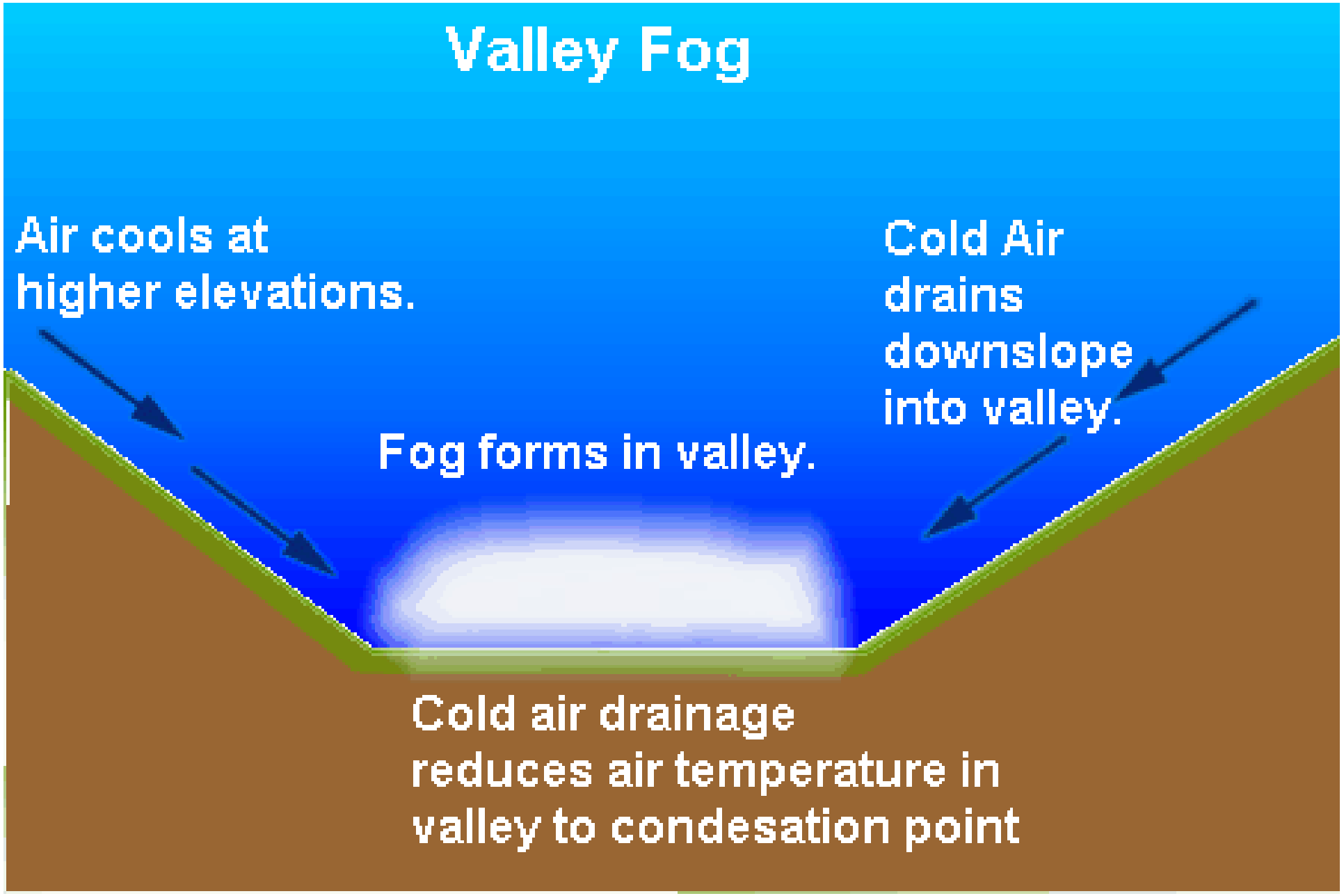

Radiation Fog
Further radiational cooling at top of fog layer, deepens it.
Heat radiating from the surface at night, cools the bottom air until it reaches saturation
Fog forms first at the surface, thickening as cooling continues.

- *Radiation fog* generally forms when the air near the surface cools to its saturation temperature due to radiational cooling at night when the sun has set.
- We start with a clear evening with moderate or high humidity and light winds. As the sun's energy diminishes at dusk, the ground surface radiates its heat away faster than it can gain it from other sources, and thus its temperature drops. The cool surface then cools the air in contact with it. Throughout the night, the surface and overlying air continue to cool (unless warmer air moves in, or a cloud deck forms above); the degree of cooling depends on several factors including cloud cover, wind speed and number of hours of darkness.
- If the air reaches its condensation, or *dewpoint*, temperature during that nocturnal cooling, fog will form. A wet surface — moist soil or pools of standing water — significantly increases the chances of radiation fog formation, so the radiation fog potential is high after a rainfall, particularly if followed by a cold front which clears the skies and lowers the air temperature. Radiation fog is not as common over water surfaces since the cooling of the water surface by radiation is much slower during the night than the cooling occurring over the land.

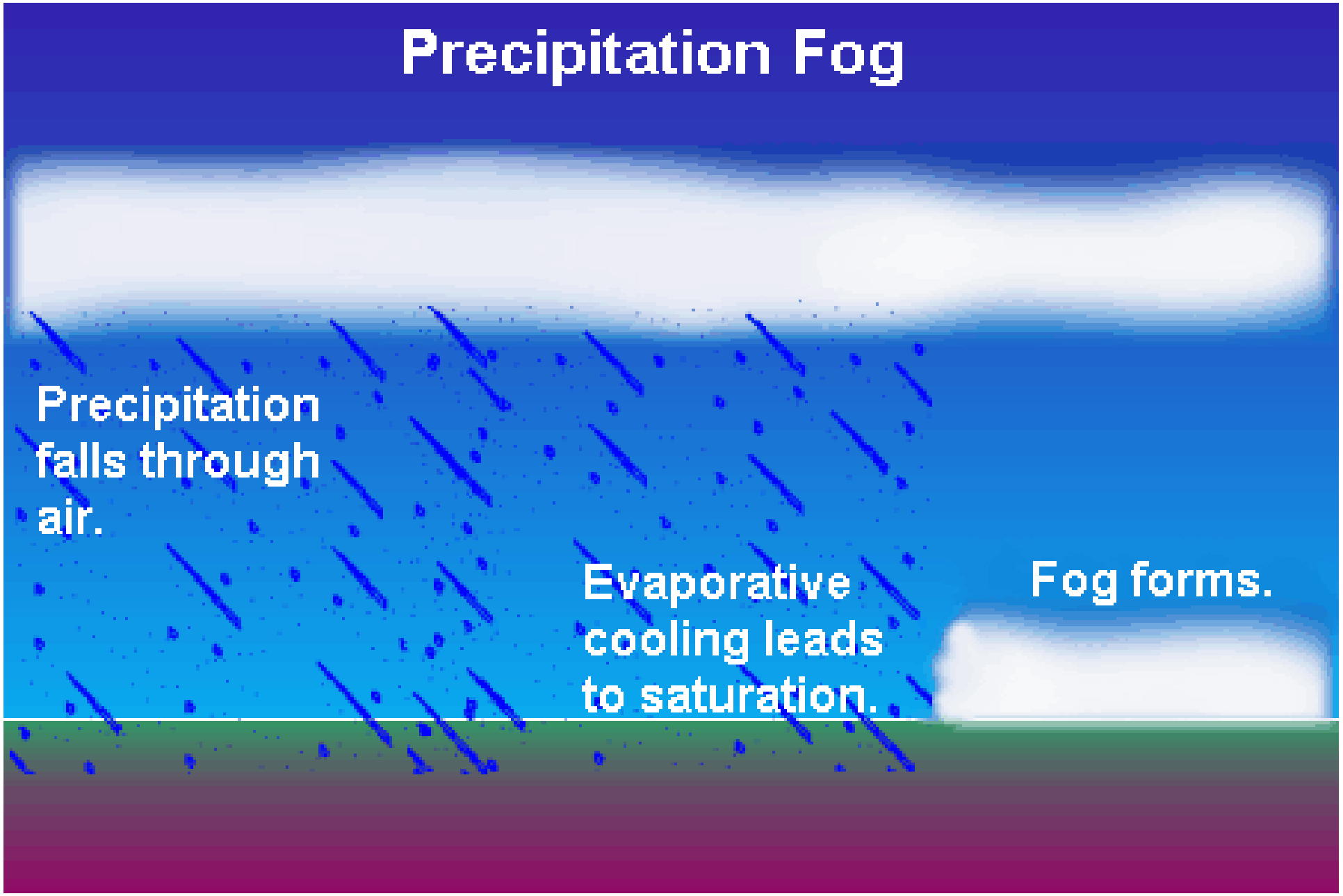

Advection Fog
Fog forms
Warmer, moist air moves over a colder surface and its temperature drops
Colder Surface

- *Advection fogs* are fogs formed when air moves either over a cooler surface or over a warmer, moist surface, and as a result the air mass reaches saturation. Most often this occurs when a moist air mass moves over a cold surface, such as a large, cold body of water or snow/ice cover, whose temperature is below the dew point of the advecting air mass, and its lowest reaches are cooled to condensation.
- The formation of advection fogs is enhanced when the distance (fetch) over which the advecting air moves is large. A low wind speed heightens the likelihood as the air remains in contact with the surface long enough to cool the air layer sufficiently. Advection fogs are often persistent since the weather situation that forms them can last a day or more. Usually, either a frontal passage and change of air-mass or a major change in wind direction are needed for dissipation of advection fog to take place.


Up-Slope Fog
Fog forms on slope.
Moist air flows toward slope.
As air rises with the terrain, it cools to condensation temperature.


Valley Fog
Air cools at higher elevations.
Cold Air drains downslope into valley.
Fog forms in valley.
Cold air drainage reduces air temperature in valley to condesation point

- *Upslope* and *valley fogs* are two special cases
- They form when air moving in hilly or mountainous terrain cools to condensation.
- For example, when air tries to move over a terrain obstacle, it cools to some degree as it rises, the degree of cooling depending on the amount of rise. During that cooling, if the air temperature falls below the dew point, the resulting condensation will form a cloud. If that cloud hugs the ground, it becomes fog at that surface. For example, an air mass moving over a water body may gain moisture until it is very near its saturation level. While still over the water, it may not cool enough to reach condensation, but when forced over the shore, the rise from water level may cause enough cooling to form a cloud/fog.
- When we see clouds hugging a mountain summit, you can be sure it is foggy on the mountainit embraces. In areas like the raincoast of the Pacific Northwest of North America, upslope movement of moist Pacific air can cause extensive fog at higher elevations which disappears when the air descends on the lee of the ranges.
- Valley fogs form when the air near the terrain heights cools — usually by radiation at night — and descends through its greater density into the surrounding valleys, flowing like water. Pooled in the valley, the cold air may condense the water vapour present into a fog which fills the valleys to a depth. Satellite photographs show the dramatic regionality of valley fog, bright fingers of fog lying between mountain ridges.


Precipitation Fog
Precipitation falls through air.
Evaporative cooling leads to saturation.
Fog forms.

- *frontal fog*, which may also be called *precipitation fog*. This fog type generally occurs when rain falling from warm air aloft evaporates at or near the surface under light wind conditions. The evaporating precipitation as it falls through colder air thus increasing the surface air's moisture burden until condensation is achieved. Such fogs are most common in the vicinity of warm or stationary fronts, but they can form at cold fronts as well. However, cold fronts generally move and mix too quickly to allow the condition to persist for long.
- *Precipitation fog* can also occur under other conditions, such as beneath an area where rain falls from air driven upslope over terrain. It may also form briefly in areas where hot surfaces are quenched by showers. In this situation the hot surface forces evaporation of the rain hitting it and the vapour mixes with the cool air surrounding the falling rain to become over-saturated.

The fog comes on little cat feet. It sits looking over harbor and city on silent haunches and then moves on.

Carl Sandburg, Fo

- **A Foggy Situation**
- Because of its obscuring nature, fog is often used as a metaphor for the hidden, unknown or unclear. Poet Emily Dickenson's last words were reported to be: "The fog is rising." Its image fills literature and poetry and song. But fog as fog has its own place in the hearts of many writers. My favourite, and perhaps the best known, is Carl Sandburg's short poem *Fog*.
- Even before my eyelids rose to greet the dawn, I knew fog had settled over the city. The repeated moan of the Victoria Harbour foghorn had been my distant town crier, spreading the news over the sleepy city. When I first looked out my window, the fog was thick around me and closed around the neighbourhood. Trees and buildings only tens of metres distant were swallowed by the fog's embrace. I settled back and enjoyed a few more minutes of sleep.