Figure 1: Different Ways to Make a Cloud

1. Calm air; ground cools radiatively at night
2. Air moves over cooler underlying surface
3. Various situations (small-scale)
4. Mixing of warm, moist air parcels with cooler air
5. Sun heats the ground beneath air
6. Heating by conduction from the surface below
7. Upwardly-perturbed air parcels find themselves warmer (less dense) than immediately surrounding air at the same altitude
8. Individual air parcels rise spontaneously (unstable air)
9. Air under pressure, released suddenly (very small scale)

Condensation

Water vapor
Condensation nuclei

Cooling of air below its dew-point
Diabatic cooling
Adiabatic cooling

Divergence aloft and surface convergence
Frontal wedging (cold and warm fronts)
Orographic lifting (mountains)

Large-scale layers of air forced to rise (stable air)

Locally-heated air parcels at surface become warmer (less dense) than surrounding air

Sun heats the ground beneath air
Air moves over warmer underlying ocean surface

Heating by conduction from the surface below

Upwardly-perturbed air parcels find themselves warmer (less dense) than immediately surrounding air at the same altitude

Individual air parcels rise spontaneously (unstable air)

Evaporation of warmer water into cooler air

Mixing of warm, moist air parcels with cooler air

Cooling of air by conduction of heat into a cooler underlying surface

Various situations (small-scale)

Calm air; ground cools radiatively at night
Air moves over cooler underlying surface

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Various situations (small-scale)