

# The Roles of Aerosols in Air Quality and Regional Climate in Texas

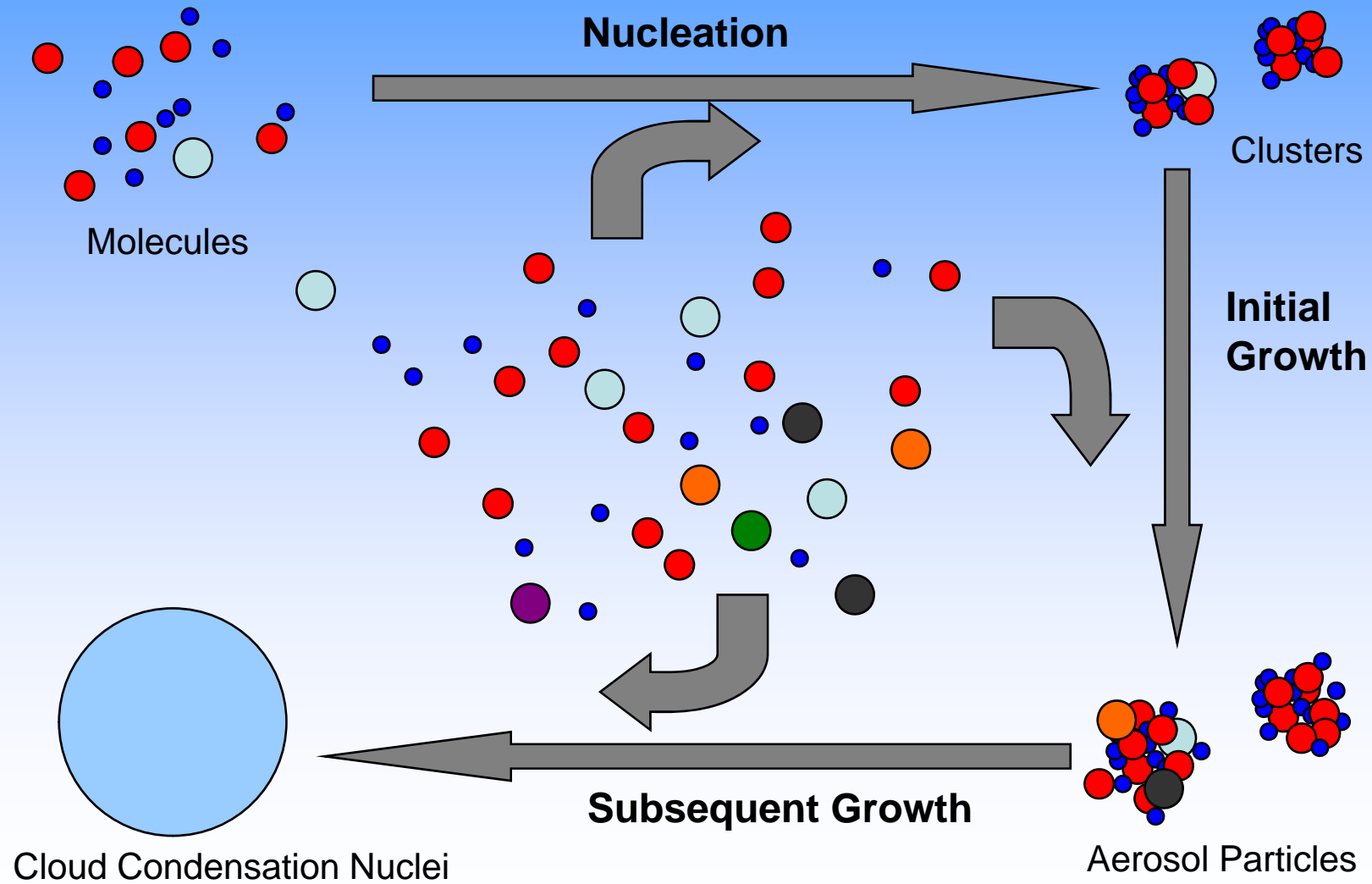
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# Nucleation & Particle Growth



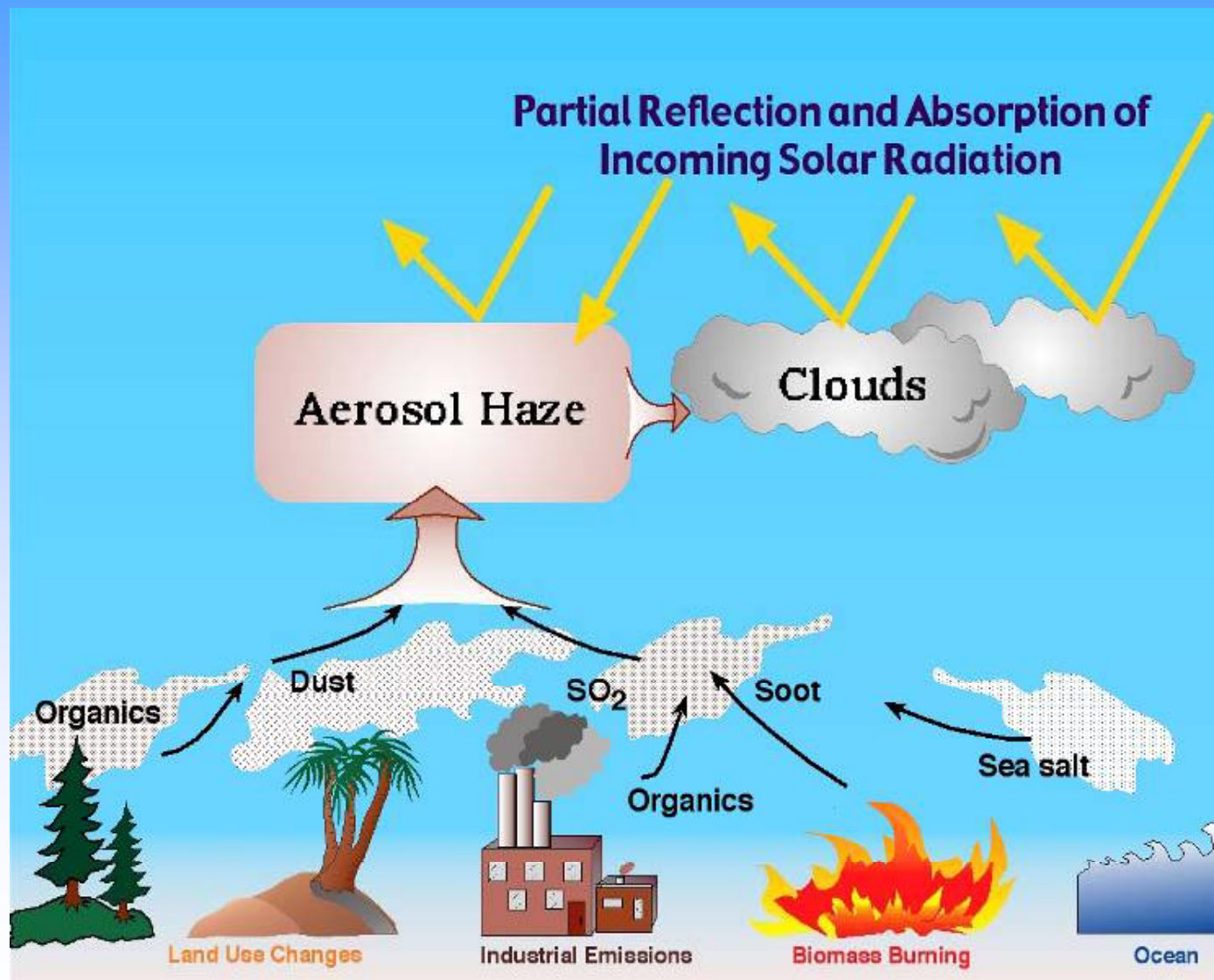
## Aerosol Nucleation and Growth Processes

- What species contribute to nucleation and growth of nano-sized particles:  $\text{H}_2\text{SO}_4$ ,  $\text{NH}_3$ , organics, or ion-induced?
- What species and chemical mechanisms are responsible for the subsequent growth of aerosols: condensation, partitioning, or heterogeneous reactions (hydration, protonation, polymerization, oligomerization, etc.)?

## Aerosol Chemistry and Properties

- What is the role of heterogeneous chemistry in partitioning of chemical species, such as nitrogen-containing compounds,  $\text{HNO}_3$ ,  $\text{HONO}$ , and  $\text{N}_2\text{O}_5$ ?
- What are the properties of aerosols, such as optical and hygroscopic properties?

# Effects of Aerosols on Air Pollution and Regional Climate



## Effects of Aerosols on Air Pollution and Regional Climate

- How do aerosols affect radiative transfer, photochemistry, and PBL development?
- How do aerosols affect cloud formation?
- What are pollution-cloud feedbacks?

## Proposed Methodology

- Laboratory studies of nucleation, growth, transformation, and chemical and physical properties
- Field measurements of gaseous and aerosol properties
- Modeling of aerosol formation, transformation, and atmospheric effects