Atmos. Chem. Lecture 6, 9/23/13: Atmospheric radiation, pressure, and temperature

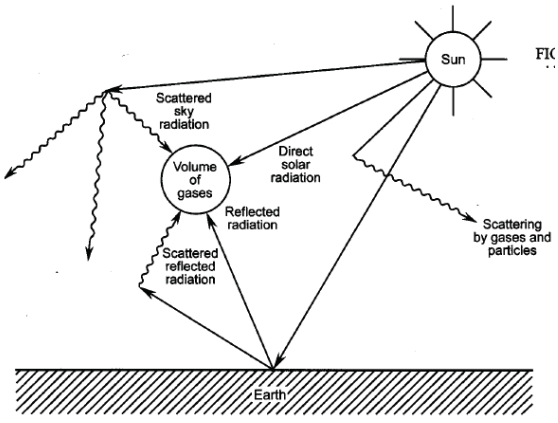
Jaclyn: large-scale field campaigns

Key atmospheric factors that influence reactivity:

- Atmospheric radiation
- Pressure
- Temperature

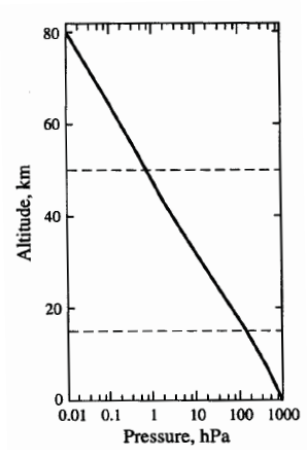
Lower atmospheric structure: troposphere, stratosphere

Actinic flux I(λ)

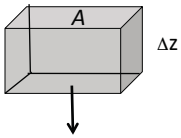


see FP&P for detailed discussion of the role of different factors governing I (and sample I values)

Pressure as a function of altitude



1 atm = 760 mm Hg = 760 Torr
= 101,325 Pa = 1.01325 bar = 14.696 psi



[*Note: Additional material is discussed here during lecture.*]

Jacob

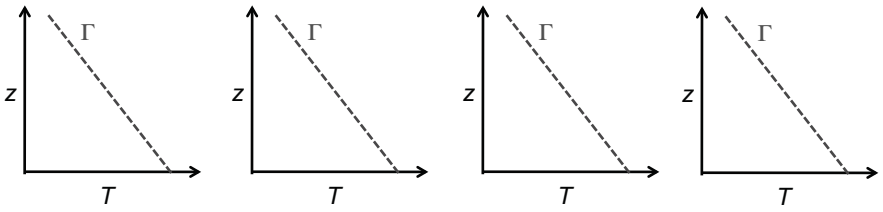
Temperature as a function of altitude

How does the T of an air parcel change as it rises adiabatically (no exchange of heat with its surroundings)?

$dU = dq + dw$

[Note: Additional material is discussed here during lecture.]

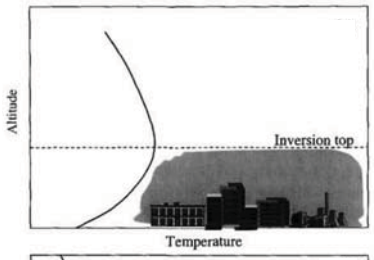
Atmospheric stability



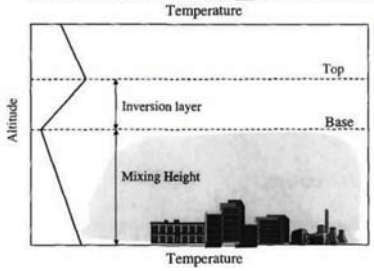
[Note: Additional material is discussed here during lecture.]

Temperature inversions

radiation (surface) inversion



subsidence inversion

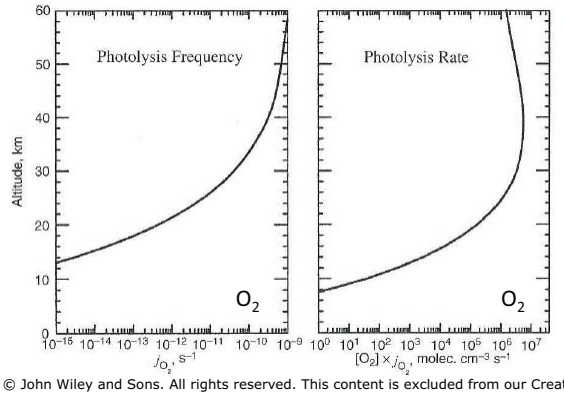


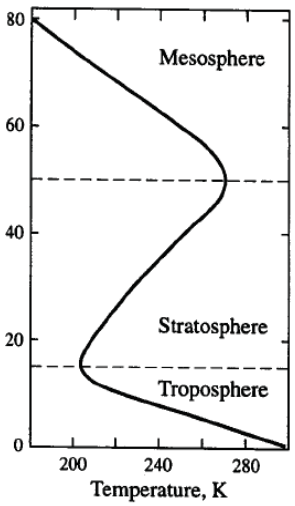
S&P

Putting it all together: light, pressure, temperature

$O_2 + h\nu \rightarrow O + O$

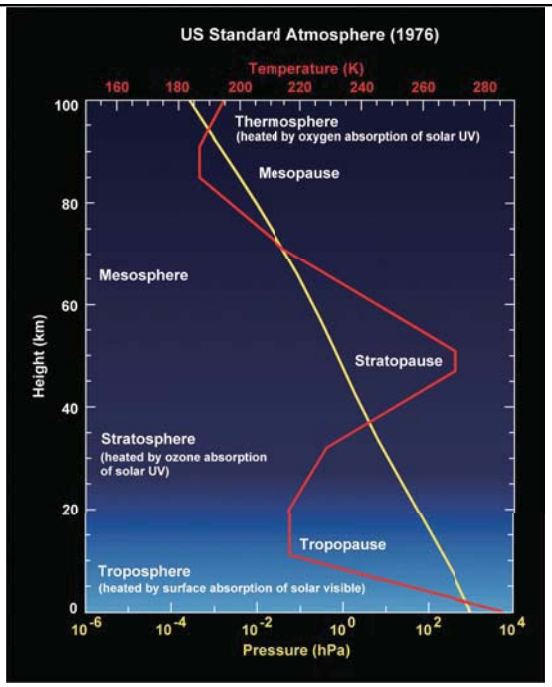
$O + O_2 + M \rightarrow O_3 + M$





S&P *Jacob*

U.S. Standard Atmosphere (1976)



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1.84J / 10.817J / 12.807J Atmospheric Chemistry
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