

## Some Gas Abundances (Surface)

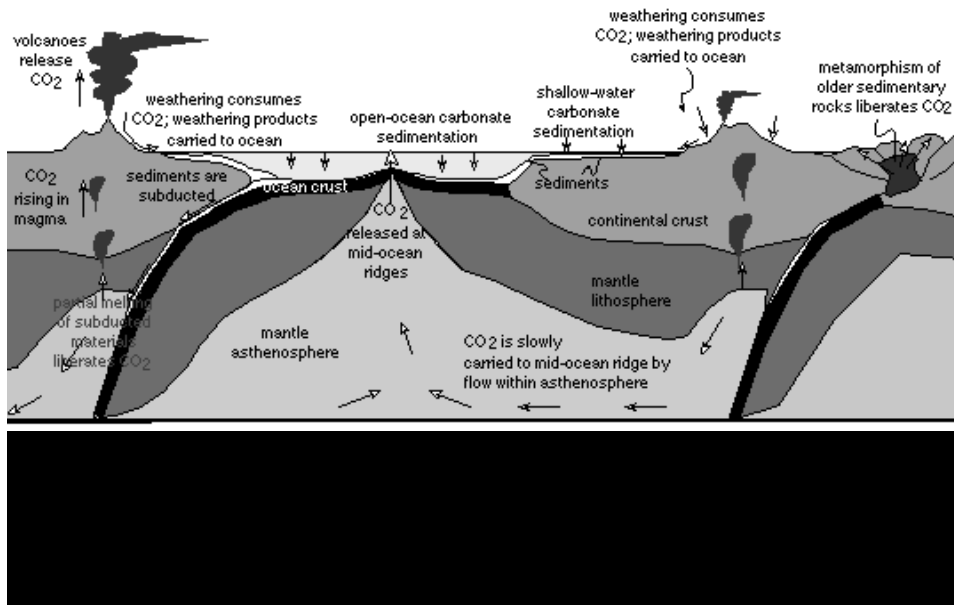
Nitrogen	78.1%
Oxygen	20.9%
Argon	0.93% (99.93%)
Carbon dioxide	0.035% (350 ppm)
Methane	0.00017%
Ozone	~0.000002%

## Residence Times

Residence Time = Reservoir Size/Flux

Oxygen (O <sub>2</sub> )	6,000 years (biosphere)
Carbon dioxide (CO <sub>2</sub> )	10 years (biosphere)
Methane (CH <sub>4</sub> )	3 - 8 years
NO, NO <sub>2</sub>	less than a month
Ammonia (NH <sub>3</sub> )	1 day
Sulfur Dioxide (SO <sub>2</sub> )	hours to weeks
Chlorofluorocarbons	45-68 years

## Long-Term Carbon Cycle



### Atmosphere

750

500 Plants

Soil

2000

### Estimated Fossil Deposits

About 65,000

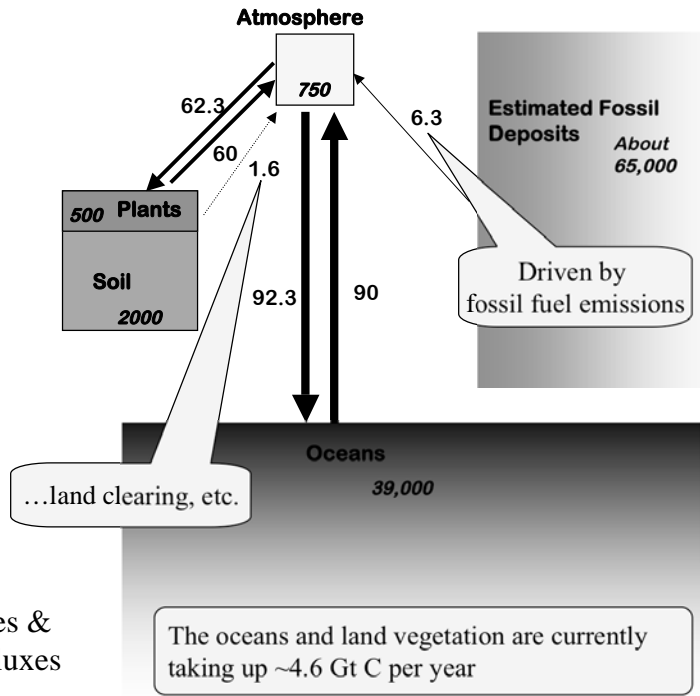
(16k is in Fossil fuels)

### Oceans

39,000

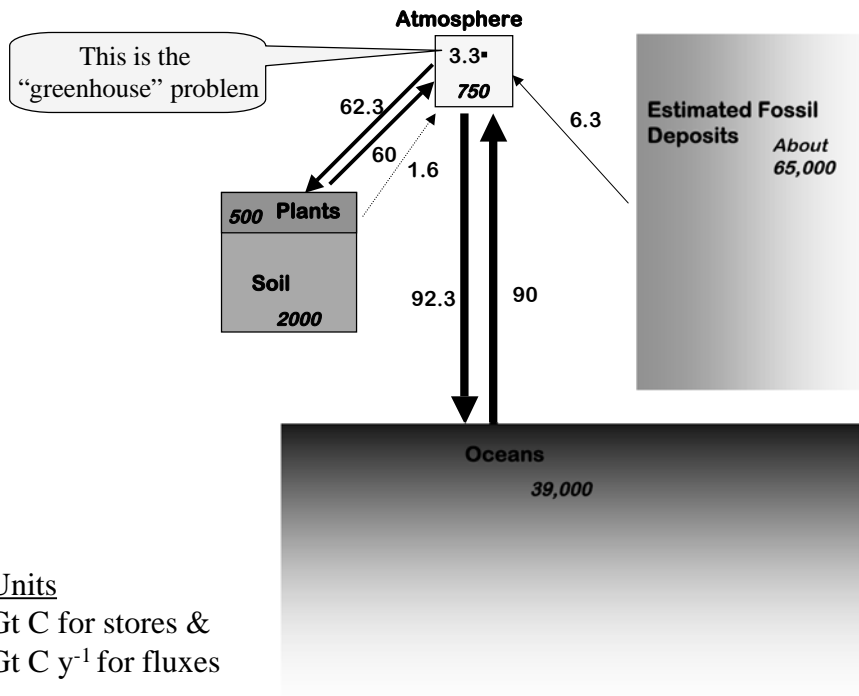
### Units

Gt C for stores &  
Gt C  $y^{-1}$  for fluxes



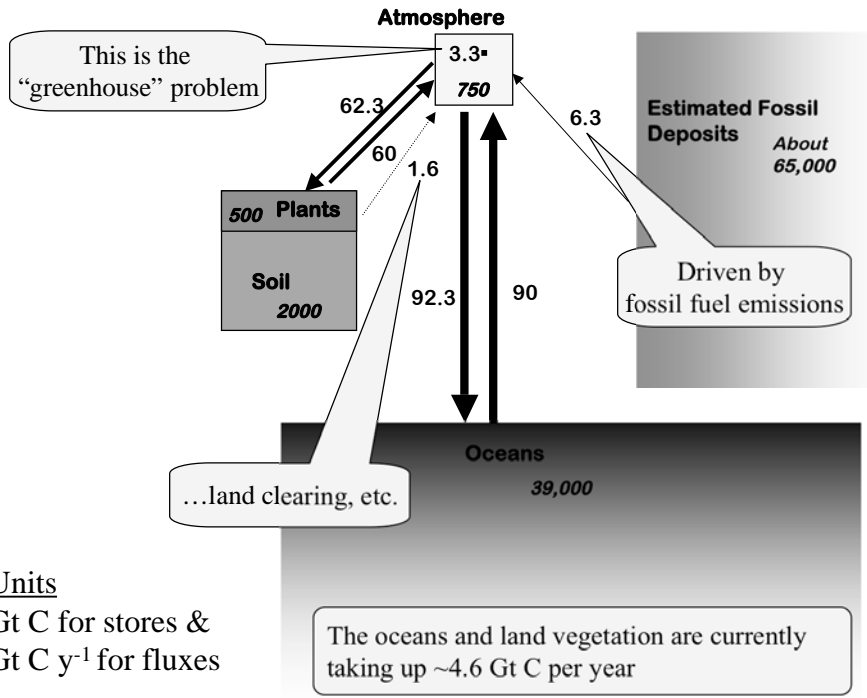
Units

Gt C for stores &  
Gt C y<sup>-1</sup> for fluxes

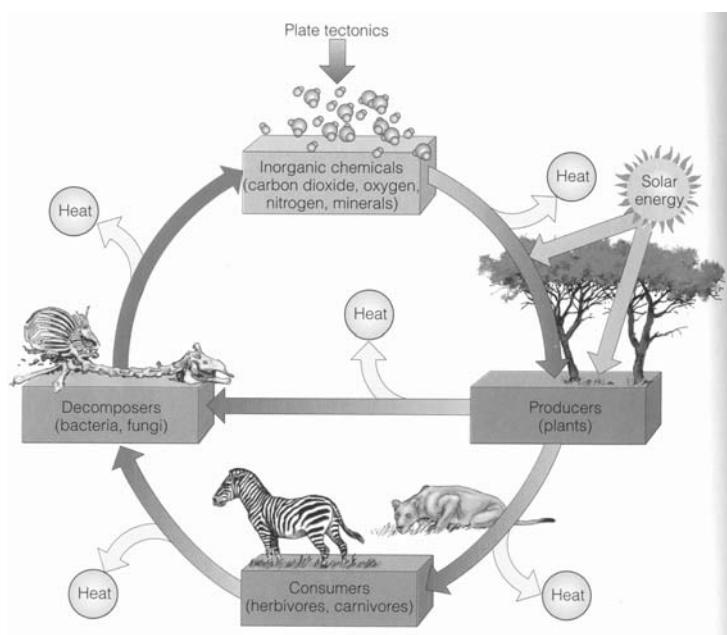


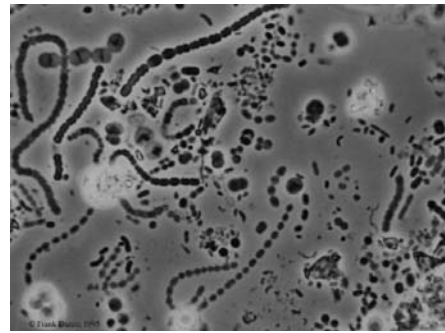
Units

Gt C for stores &  
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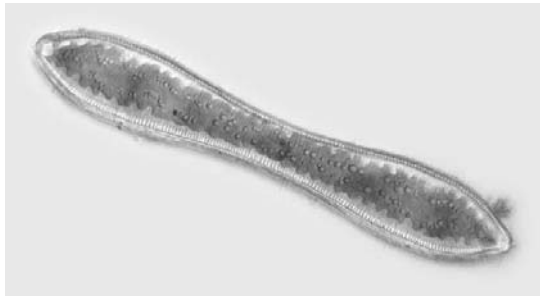
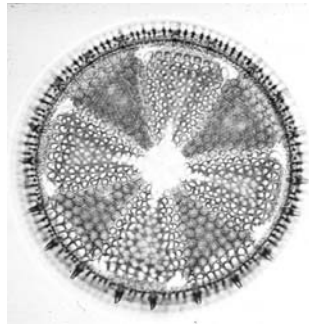
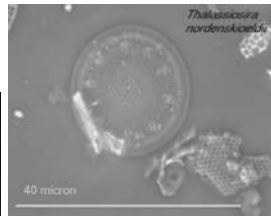
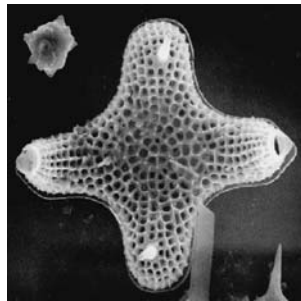


**Biosphere: The "other" part of the carbon cycle**



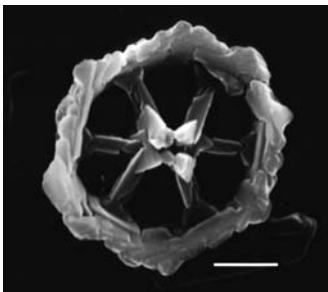
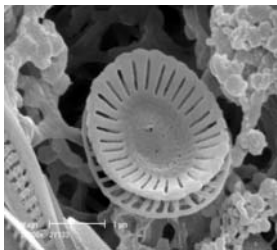
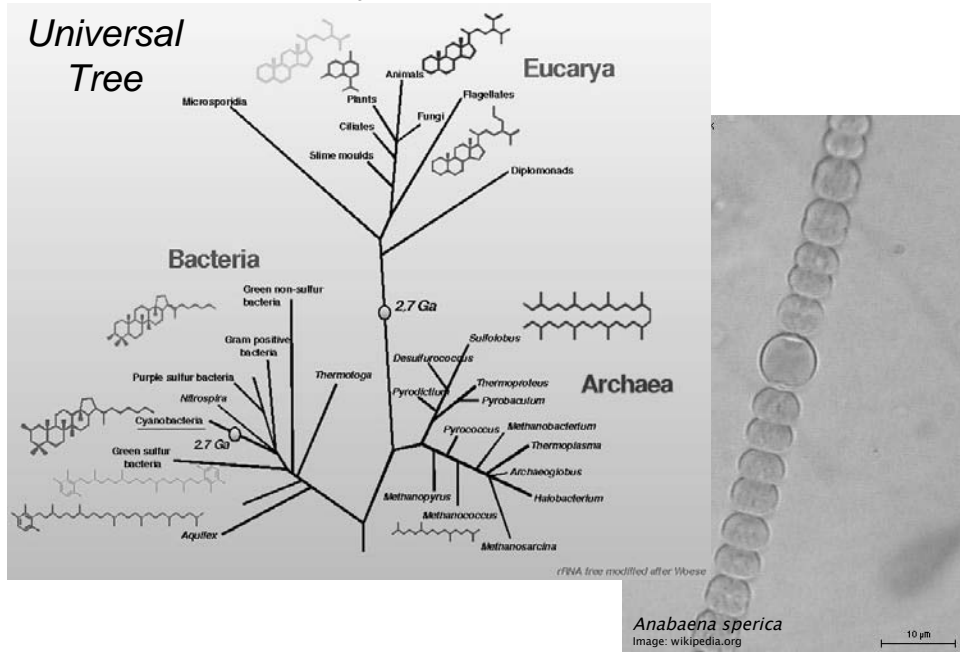


## Diatoms

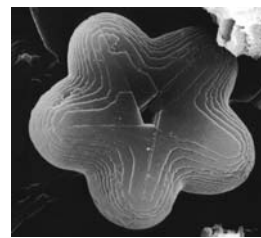
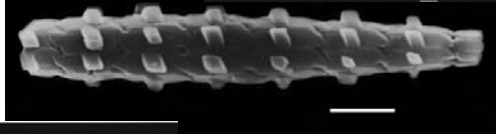


Photos: [www.ucmp.berkeley.edu/chromista/baciliariophyta](http://www.ucmp.berkeley.edu/chromista/baciliariophyta)

# Cyanobacteria

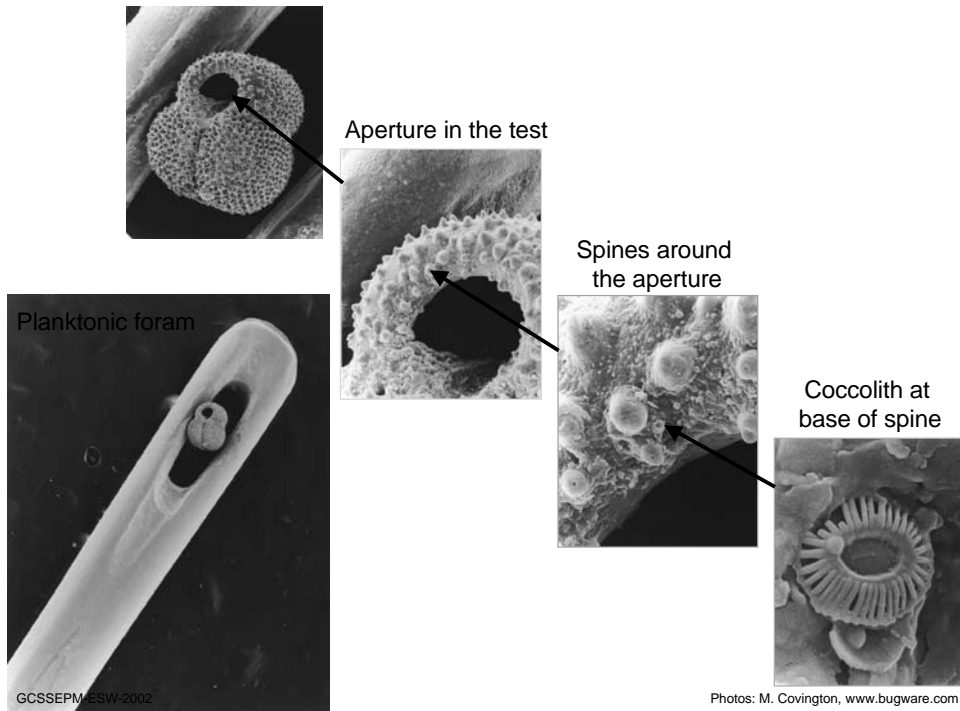


## Coccolithophores

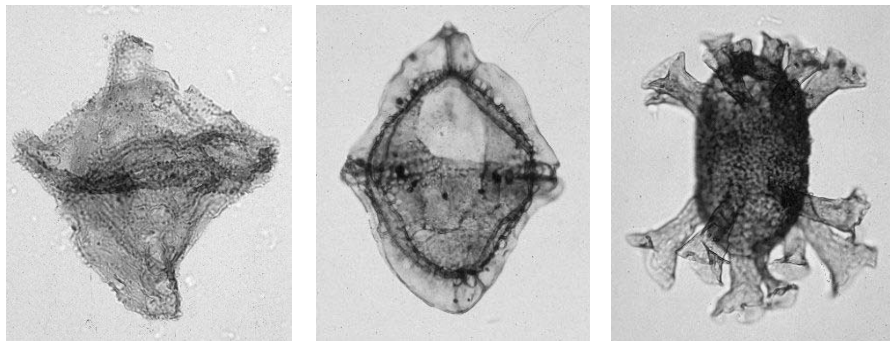
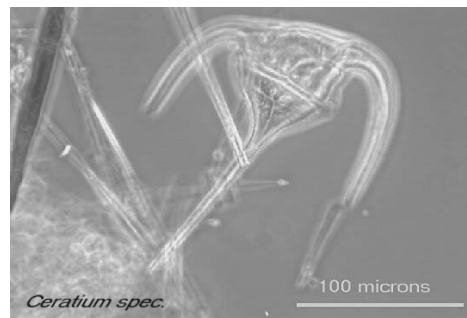


GCSSEPM-ESW-2002

Photos: <http://oceanlink.illinois.edu/education/ibdg/learn/arc.html>

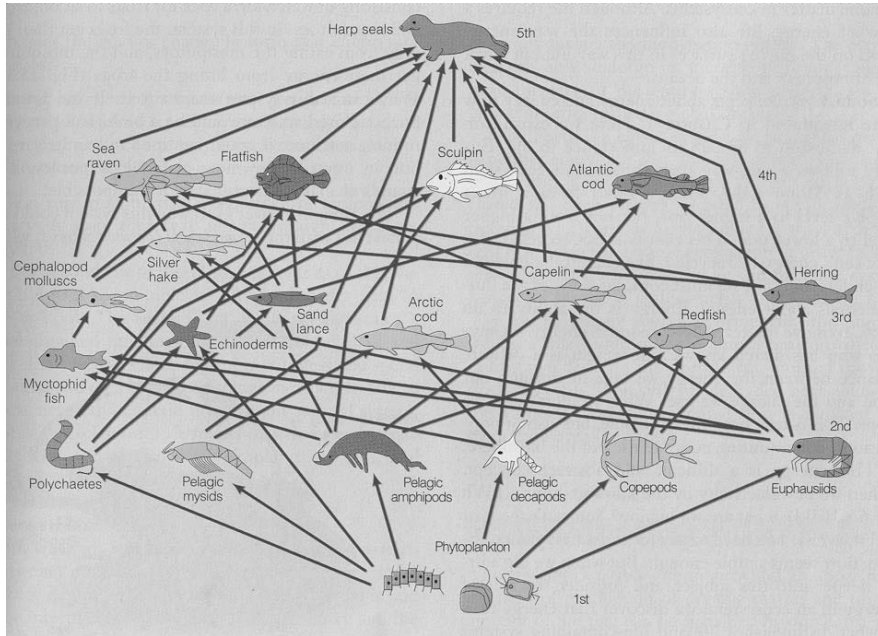


## Dinoflagellates

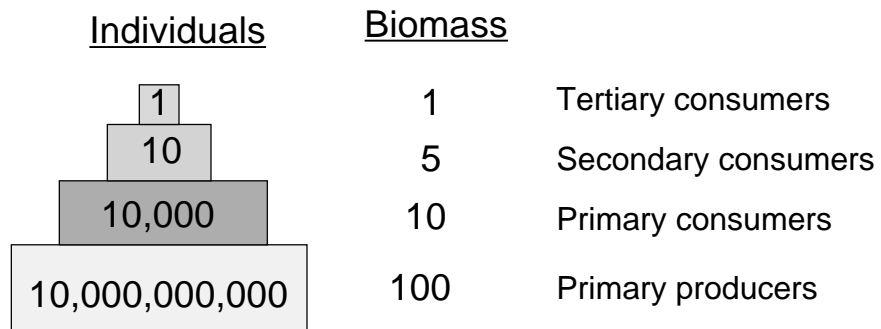


Photos: <http://oceanlink.island.net/oinfo/radiolarians/radiolarian.html>

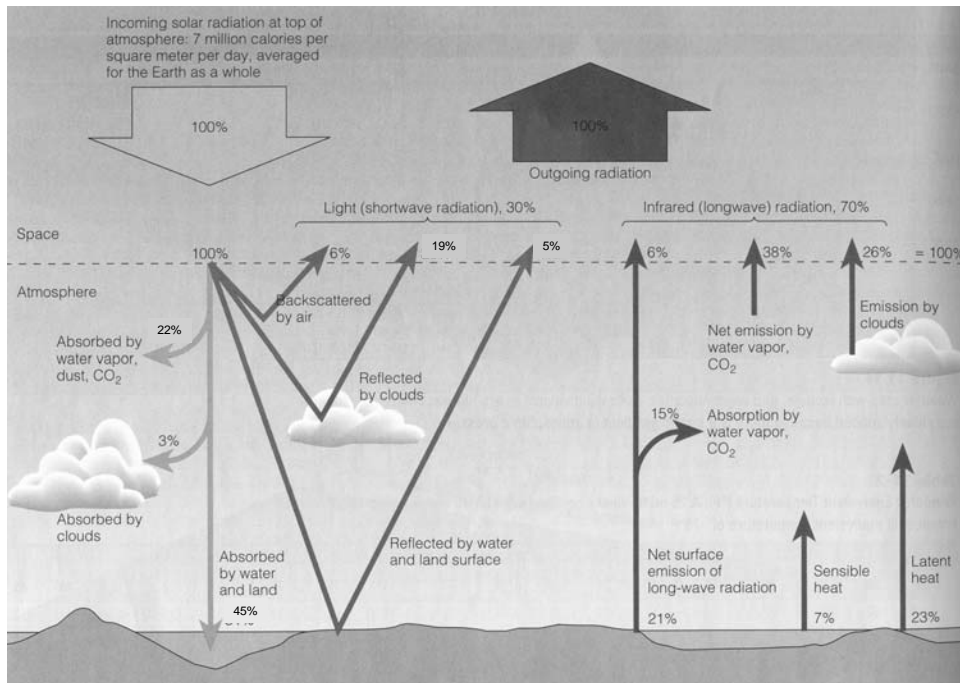
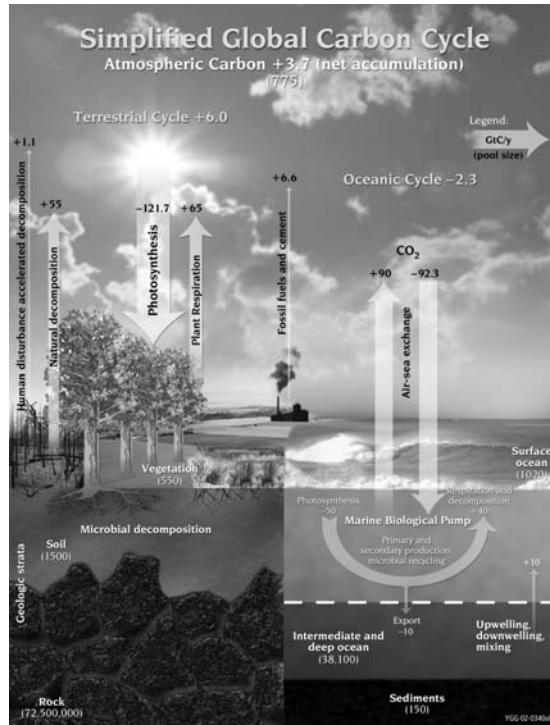
# Food Web



# Trophic Pyramid







% incoming  
radiation  
reflected

**TABLE 2-1 Average Albedo Range of Earth's Surfaces**

<b>Surface</b>	<b>Albedo range (percent)</b>
Fresh snow or ice	60-90%
Old, melting snow	40-70
Clouds	40-90
Desert sand	30-50
Soil	5-30
Tundra	15-35
Grasslands	18-25
Forest	5-20
Water	5-10

*Adapted from W. D. Sellers, Physical Climatology (Chicago: University of Chicago Press, 1965), and from R. G. Barry and R. J. Chorley, Atmosphere, Weather, and Climate, 4th ed. (New York: Methuen, 1982).*