

as we have seen....

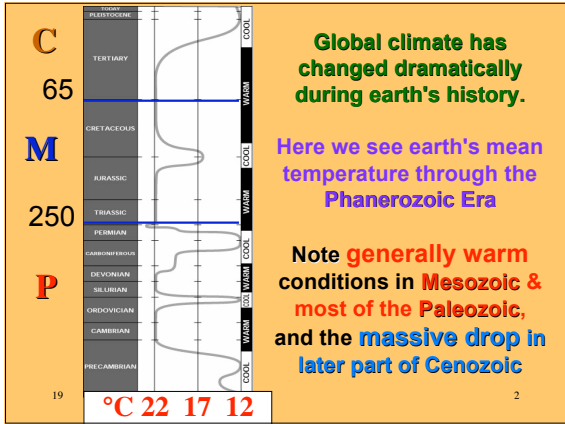
BIOMES are the biota's adaptive response to earth's climate zones

but climate too has a history -
- it has evolved through time

- mean global temperature
- levels of aridity
- latitudinal stratification

have all changed appreciably

19 1



here we look at climate development since the Mesozoic, focusing on **North America**, as a preparation to our look at specific biomes

FIRST : global picture

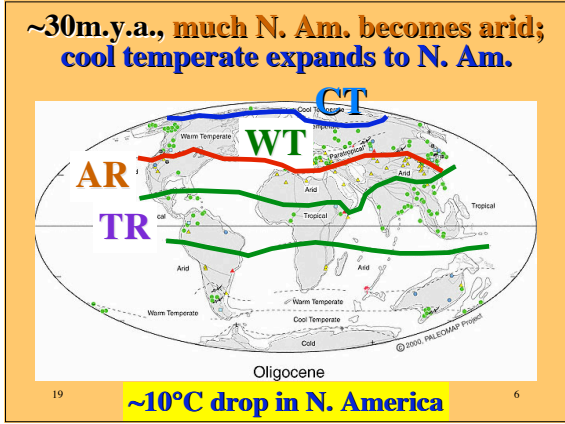
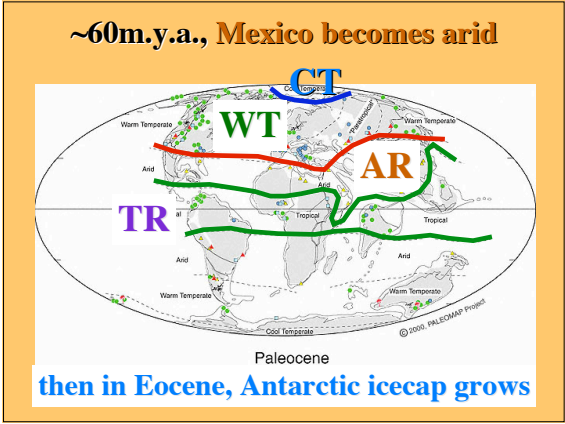
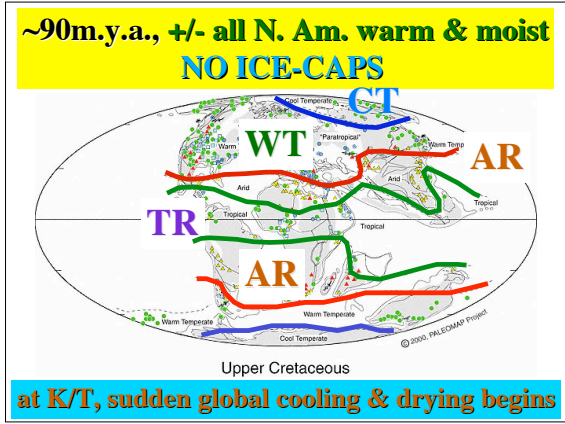
SECOND : local picture

note the take-home message:

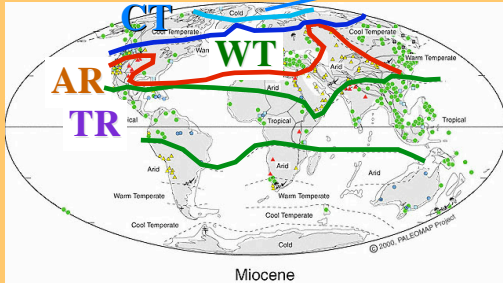
COOLING

DRYING

19 3



~15m.y.a., e. N. Am. becomes moist;
cool temp. expands south; new **COLD**



so, by mid-Miocene (= ~15 m.y.a.),
global climate is much as today,
(though Ice Ages yet to come)

cooler; dryer;
marked latitudinal zonation

during **Pliocene** (~6 m.y.a.)
& **Pleistocene** (~2 m.y.a.)
strong, rapid climate changes
as both ice-caps grow

19

8

this cooling and drying caused a great
shrinking of forests, and the expansion
of **savannas** - a largely new biome

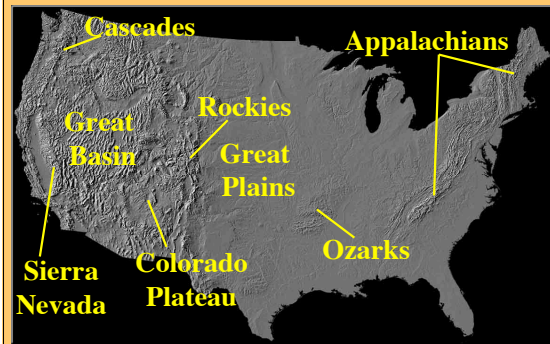
further drying caused these savannas
to become **grasslands** and **shrublands**

phanerophytes decreased;
chamaephytes, **hemicryptophytes**
& **therophytes** increased

19

9

MORPHOLOGY OF U.S.A.



local N. American factors

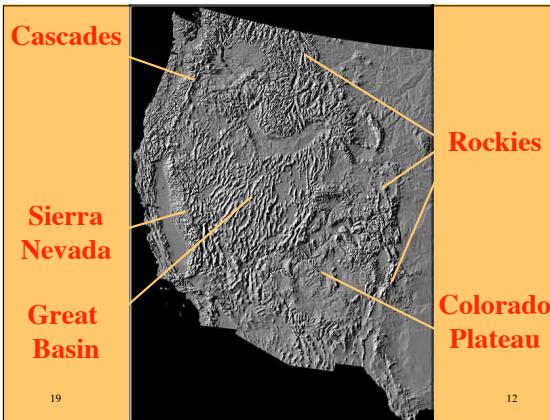
America west of Great Plains
has long been geologically active:
vulcanism + uplift + faulting

but up to Miocene, uplift almost
matched by erosion - **domed uplands**

in early Miocene, great crustal stretching
as California moves northwest (25-10 m.y.a.)
forming Great Basin

19

11



19

12

10-8 m.y.a, uplift accelerates, strongly lifting Rockies & Colorado Plateau; **Grand Canyon begins to form**

4-6 m.y.a, Sierra Nevada also rises, to **4.3km**.

2-4 m.y.a, Rockies & Colorado Plateau rise rapidly again; Rockies to similar heights; **Grand Canyon completes**

19

13

Grand Canyon - cut in 2-3 m.y.!



what impact does this new topography have?

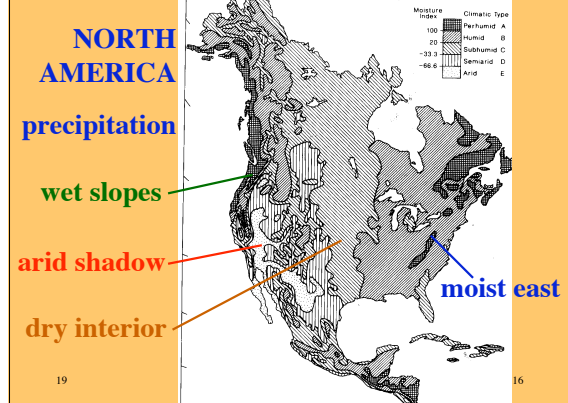
these massive N-S ranges force precipitation on their w. slopes, but to their east cause MASSIVE RAIN-SHADOWS

this explains why N. Am. has longitudinal belts of precipitation

vegetation types show same pattern

19

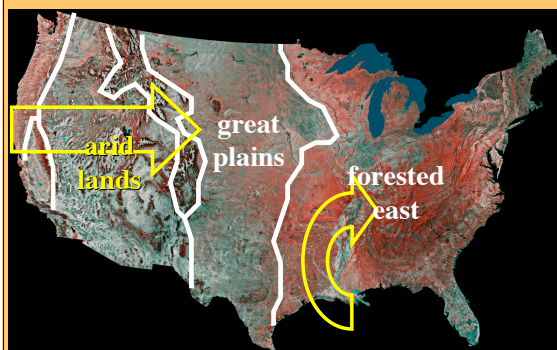
15



19

16

Forest cover across the U.S.



finally, we add to this the **PLEISTOCENE GLACIATIONS**

80-90% of last 1.5 m.y. has been occupied by glacial times

- life-zones pushed south and down
- sea-level drops

last interglacial began ~10K y.a. - almost at an end?

19

18

