**Sea Level Changes**

1. Now let’s examine how sea level is affected by the creation and destruction of supercontinents, because sea level changes will have a profound influence on the geology of our National Parks. This graph shows the relative changes in worldwide sea level over the last 600 million years or so. We will try to understand how the supercontinent cycle produced these changes.
2. This chart shows several processes that affect sea level and emphasizes an important concept. Sea level can change by either changing the volume of the ocean basins or the volume of water in those basins. Most of the processes listed here, however, do not affect worldwide sea level, which is what we’re interested in.
3. Although its effects *are* worldwide, we won’t consider warming of the ocean’s water and thermal expansion, because the associated sea level changes are relatively minor and difficult to link to the supercontinent cycle.
4. Another worldwide influence, storage of water as ice in glaciers, *does* have a significant influence on sea level and by being influenced by the global distribution land masses, *is* linked to the supercontinent cycle. However, superimposed on the long-period supercontinent influences are short-period cycles due to changes in the earth’s astronomic position in space that cause the glaciers to advance and retreat. The result is that over large-scale geologic time, glaciation has little influence on sea level.
5. When supercontinents are breaking up and sea floor spreading rates become fastest, mid-ocean ridges expand, the holding capacity of the ocean basins is reduced and sea level rises.
6. The collision and over thrusting of landmasses decreases total land area, increases the area of the ocean and by giving the water more area to spread over, lowers sea level.
7. But collision’s affects on sea level are temporary. As the mountains wear down and their erosional products are deposited in the ocean as thick DCM sediments and thus sea level rises.
8. Alright, now let’s put it all together. Here’s where the two supercontinents fit that existed during this time period. Note that both correlate with very low sea level.
9. Which of these mechanisms could account for the low sea levels that accompany supercontinents?
10. Did you pick Collision Orogeny? Well if you did, then congratulations!
11. Slower sea-floor spreading rates would also do the job, which makes sense because continental collisions would definitely slow down spreading rates.
12. What about the rapid rise in sea level seen as supercontinents rift?
13. Which of these mechanisms could account for the rapid rise in sea level following the rifting of Pannotia and Pangaea?
14. Initially sediment transfer from the eroding collision-built mountains would raise sea level, but later rapid sea floor spreading rates contribute to reducing the volume of the ocean basins, thereby raising sea level.
15. Let’s add those processes to the diagram.
16. Now what about the general drop in sea level that follows the period of rapid sea floor spreading?
17. The lower sea levels are due to a general slowdown in the rate of sea floor spreading and various orogenies that occur as the closing phase of the Wilson Cycle works itself through.
18. Note that subduction orogenies also lower sea level by removing sediment from the ocean floors.
19. Let’s add all that to the diagram as well.
20. Now one more point and we’re done. Notice the gradual rise in sea level that follows each orogeny. Do you have any idea what might cause that?
21. If you picked sediment transfer to the oceans, then Great! You are really putting it together now.
22. Try to determine how and why sea level would be affected during each phase of the Wilson Cycle above. When you think you’ve got it, take the Wilson Cycle/Sea Level Quiz.