**Great Basin National Park 1**

1. Great Basin National Park is one of our newest and least-visited national parks.
2. It is located both within the Basin and Range geomorphic province and the Great Basin hydrographic province. The two are often confused since they are related and cover similar areas. As we have seen, the Basin and Range is an area of extensional tectonics characterized by basin and range topography. The Great Basin, on the other hand, is defined on the basis of drainage. It is a vast area of internal drainage where not one drop of rain that falls there will flow into the ocean. The two provinces are related because the extension that produced basin and range topography also thinned and lowered the crust so much that the Great Basin formed.
3. Mental images of central Nevada vary…
4. … but rarely does this come to mind. It’s hard to believe this is in Nevada. Stick a chalet in the picture and you’d think it was Switzerland! Spanning altitudes between 6,000 and 13,000 feet, the park contains diverse biological zones ranging from desert sagebrush in the lower elevations to mountain meadows and pine forests at higher elevation. Above the tree line there is an alpine zone containing low, delicate plants and rocky outcrops.
5. The park’s central landmark, Wheeler Peak, at 13,063 feet is the second highest point in Nevada. Note the vertical cliff here indicating that it must be made of very strong, durable rock. If you look closely you should be able to see regular, continuous layering indicating that this must be derived from some kind of sedimentary rock. This is metamorphosed quartz sandstone…
6. … or quartzite! Comprised of fused quartz sand grains, quartzite is the most durable rock I can think of, and I can think of a lot of rocks. The park contains a lot of quartzite. It’s found mostly at higher elevations due to its resistance to erosion.
7. Elsewhere in the park, like here at Lexington Arch, limestone is the dominant rock type.
8. What tectonic situation does this assemblage of rocks suggest?
9. Did you picture our old friend the divergent continental margin? I hope so. We see a lot more limestone here compared to the Grand Tetons, because Great Basin National Park is further west. That put it more offshore during the time period when western North America was a DCM.
10. Now try this question: In what geologic era was western North America a DCM? I’ve given you a stupid hint.
11. Yah, just like the Flathead Sandstone in the Grand Tetons, DCM sediments in Great Basin National Park are also Paleozoic.
12. The geologic structure here is similar to the Tetons as well. Great Basin National Park lies in the southern Snake Range, which is asymmetrical. Note its steep western slopes…
13. … and less steep eastern slopes. Although the directions were reversed, we saw that the Tetons were also an asymmetrical range. Do you remember how that formed?
14. Here’s a scale model of the process done in layered sand. Once again displacement along curved normal faults contributes to the rotation. When the inclination (dip) of a normal fault lessens with depth, such faults are known as “listric”, which means shovel-shaped.
15. Listric faults tend occur in the relatively cool and brittle, upper crust. At depth, where higher temperatures and pressures make the crust ductile, extension results in horizontal shearing. The brittle crust tends to separate from the ductile crust along great near-horizontal surfaces formed where the listric faults merge at depth.
16. The surface of separation here is known as a detachment fault. The term décollement can also be used, but it is more general, referring to all low-angle faults, including compression-produced thrust faults as well as extension-produced detachment faults.
17. Your book recognizes the normal faulting and décollement in the Snake Range, but they do not show the normal faults as listric. Furthermore, they have placed arrows along the décollement in such a way as to suggest thrust faulting, not detachment faulting. In detachment faulting, rock above the décollement should uniformly slide down, away from the highest portion of the décollement, because detachment faulting is gravity-driven.
18. The discrepancies are once again due to the less-than-cutting-edge references used by your text.
19. Although the detachment fault is poorly exposed in the southern Snake Range where Great Basin National Park lies, it is beautifully exposed in the northern Snake Range. The exhumed rocks below the detachment are known as core complexes. We will look at core complexes in greater detail we get to Saguaro National Park.
20. Core complex rocks near the detachment are highly deformed…
21. … and often exhibit disharmonic folding due to non-uniform stress patterns.