

Geol 104 Geology of National Parks
Exam II Study Guide

Below is a list of topics you should understand after preparation for your second exam. These topics will be covered on the exam and you should use this list to evaluate your level of preparation for the exam. After studying ask yourself this question: Do I understand these topics? – Can you say something meaningful and in depth about each? If so, you should perform well on the exam.

I. History, and Geography of the Grand Canyon

Located on the Colorado Plateau
Powell's expedition

II. Tectonics of the Colorado Plateau

Laramide Orogeny = Early Cenozoic (Tertiary ~60 Ma) uplift due to shallow subduction of Kula oceanic plate

III. Formation of the Grand Canyon - 7-10 Ma by river down-cutting

River down-cutting and the shape of the Grand Canyon walls

IV. Geologic History of the Grand Canyon (and North America):

Recall this history spans ~1.5 Ga and is recorded by the rocks exposed in the Canyon. What produced the Vishnu Schist and Zoroaster Granite, how does this relate the Grand Canyon Supergroup.

Deposition of the Cambrian Tonto Group and Coconino sandstone
The Great Unconformity – what type(s) is it?

V. Zion

What is recorded by the Permian rocks at Zion? (same thing recorded by Permian rocks at Grand Canyon)

Canyon and Arch formation at Zion: steep vs. sloped valley walls.

VI. Bryce Canyon: Rocks here are ~100 Ma younger than at Zion.

How and why are the features at Bryce different from those at Zion?

Differential Weathering

Deposition of the Claron Formation and how it relates to the Laramide Orogeny

VII. Canyonlands & Arches – reflect same history as Zion and upper Grand Canyon

What is the Paradox formation and how was it deposited

Incised meanders at Canyonlands – recall how they form

VIII. Mesa Verde

Rocks at Mesa Verde record the transgression of the Cretaceous Sea: Dakota sandstone
-> Mancos Shale -> Mesa Verde Group

Groundwater flow at Mesa Verde: Aquicludes, Aquifers, springs, etc.

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IX. Continental Interior: Badlands, and Devils Tower

What is badlands topography and what weathering process forms them at Badlands NP
Pierre Shale – and the Mancos Shale at Badlands, = advance of Cretaceous sea.

Many fossils preserved here – especially mammals.

Devil's Tower: towering mass of intrusive igneous rock displaying text-book columnar jointing. How did it form?

X. Continental Interior: Mammoth Cave

Geologic history of Illinois Basin – What is recorded by the rocks of the Illinois Basin

Development of Karst Terrain by carbonic acid

How does river down-cutting effect Karst development?

Formation of Carlsbad Caverns, NM

XII. Appalachian Mountains

The Valley & Ridge and Blue Ridge Provinces and the events that form them

Modern Appalachian Mountains – what uplifts them

Smokey Mt: Blue Ridge and Valley and Ridge

Acadia and glacial topography

XIII. Glaciers and Ice Ages

Cause of Ice Ages - Current Ice Age began ~2 m.y. ago (Pleistocene)

Plate Tectonics and 'Orbital Variations'

Types of Glaciers and where you find them

How Glaciers Move: Plastic Flow vs. Basal Slip