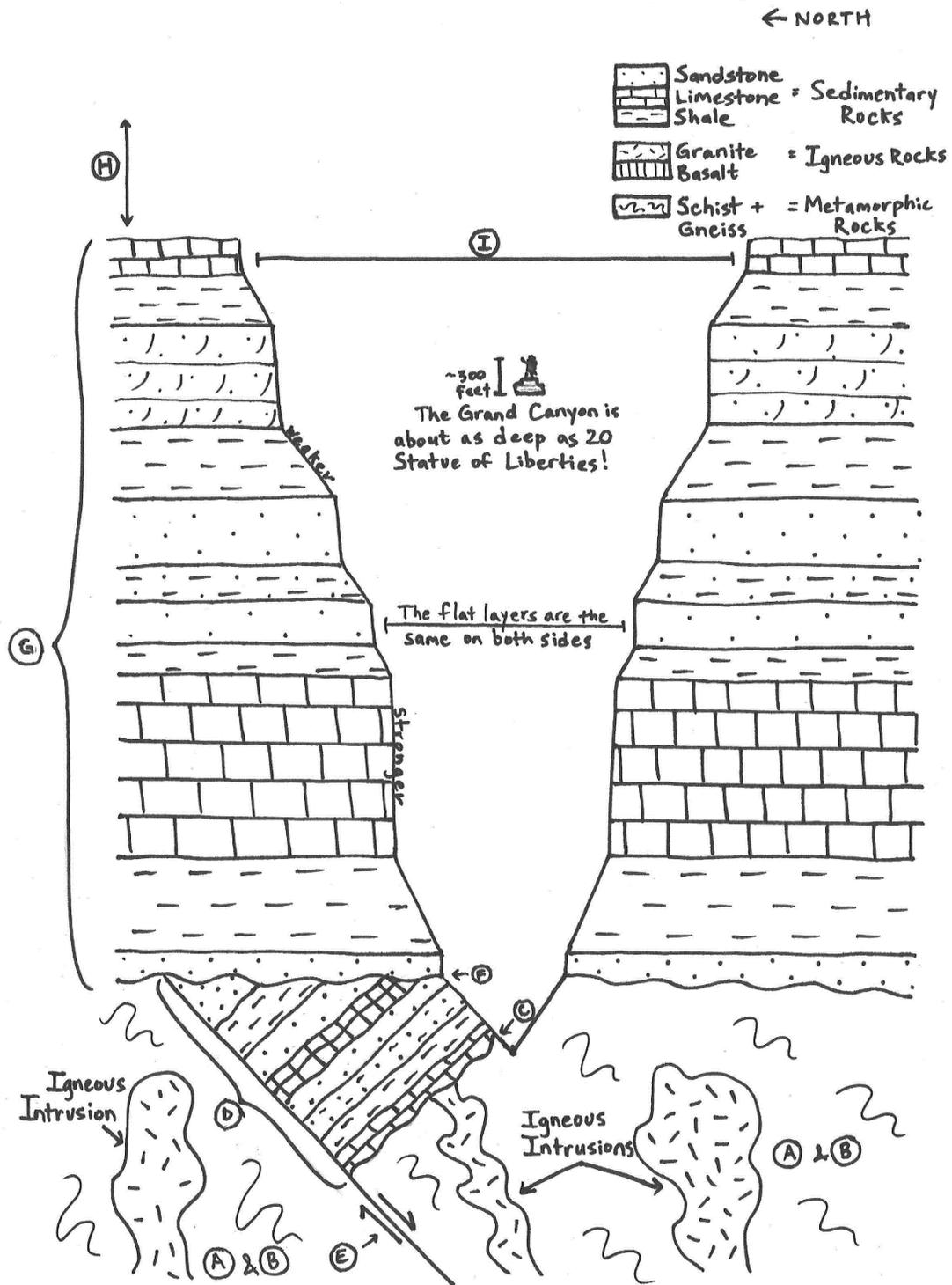


The Geology of the Grand Canyon – Reading the Story from the River to the Rim





This photo, taken from the South Rim of Grand Canyon (looking north), shows rocks that formed during a tiny fraction of geologic time. The north rim is about 1000 feet higher than the south rim where most people visit. Do you notice how some rock layers form steep ledges while other layers form gradual slopes? How rocks erode is mostly based on how strong the rocks are. Sandstone and limestone tend to form steeper cliffs than shale because they are stronger – and more resistant to erosion.

A brief geologic history of Grand Canyon

The first chapter of the story starts at the bottom of Grand Canyon where the Colorado River now flows. As you read the geologic book, time moves forward as you move closer to the rim. Pages have been torn from the book where the wavy lines, known as unconformities, represent gaps in geologic time where rocks have been eroded. The layers are older on the bottom and younger on the top. So, try thinking like a geologist by reading this story from the bottom up. Start with step “A” at the bottom of this page!

J) Only about half a million years ago, lava from small volcanoes known as cinder cones (not included on the sketch) located in western Grand Canyon cascaded down the canyon walls damming the river more than once, even as recently as about 100,000 years ago.

I) About 6 million years ago the Colorado River arrived to the Grand Canyon region. As the Colorado Plateau continued to be uplifted, the Colorado River slowly cut its way through thousands of feet of rock, linking older canyons and carving new canyons. The rocks are old, but Grand Canyon is young!

H) Next, the entire Colorado Plateau was uplifted starting about 70 million years ago and many of the rocks eroded away.

G) Sediments piled up and lithified over hundreds of millions of years (from ~540 to 70 million years ago) as seaways came and went.

F) The tops of those rocks eroded away and shallow seas filled up the low areas.

E) The new rocks were faulted causing all of them to tilt at an angle! The arrows show the way the fault moved.

D) New sediments were deposited and later lithified into sedimentary rocks between ~1.2 and 0.7 billion years ago.

C) The mountains were eroded away by about 1.2 billion years ago.

B) After that, (~1.7 billion years ago) the rocks were buried, folded, and uplifted into mountains. The heat and pressure from mountain building created new metamorphic rocks (mostly schist and gneiss). Then, magma squeezed into the rocks to form new igneous rocks (granite).

A) A long time ago (~1.75 billion years ago) in what is now northern Arizona, thick layers of sediment (sand and mud) were deposited along with lava flows from nearby volcanoes. The lava flows cooled and turned into igneous rocks and over millions of years the sediments were buried and hardened (lithified) into sedimentary rocks.

To learn more, visit: <https://www.usgs.gov/science-support/osqi/yes/national-parks/grand-canyon-national-park>