Geology of the Mt. Washington area, Presidential Range, New Hampshire

The geology of the Mt. Washington area has been complicated by millions of years of plate tectonic forces—ductile folding, brittle faulting—and metamorphism due to intense pressure and heat. In the most recent past, the Presidential Range was scoured by local mountain glaciers and large continental ice sheets, molding some of the spectacular landscapes that we will see on our trip. Untangling this complex story using present-day exposure of rocks and landforms has been the subject of over a century of geologic study and debate. Briefly, our ideas today go something like this:

Most of the rocks you see in the alpine zone around the summit of Mt. Washington were once sediments at the margin of North America, laid down in relatively shallow water in the late Silurian and early Devonian periods, around 400 million years ago. These sediments were then caught up in a collision between North America and a micro-continent called Avalonia, an event known as the Taconic Orogeny. The sediments, subjected to immense compressive forces, were folded, faulted, then re-folded and re-faulted during the Devonian while being subjected to intense pressure and heat that changed the original minerals of the sediments into new (more interesting) ones. Later intrusions of granite further altered the mineralogy of these rocks with their intense heat.

We leave the geologic story here, as later events—like the assembly of Pangea and the opening of the Atlantic Ocean—have left more obvious marks in other places. We pick it back up in the Pleistocene era (about 80,000 to 10,000 years ago), during the world’s most recent glaciation. Called the Wisconsin glaciation, its cool temperatures created rivers of ice that carved cirques, or
amphitheater-like valleys into the Presidential Range. These cirque glaciers were later overwhelmed by the late Wisconsin ice sheet that covered the valleys with kilometers of ice and topped over Mt. Washington. Carbon dates from sediments at the bottom of local lakes indicate that the permanent ice had retreated locally around 13,000 years ago at low elevations, and 11,500 years ago higher up.

Observations:

At each stop on Route 16 and along the auto road up Mt. Washington, record your geologic observations in the provided notebook. Make sure to include:

- Location—where are you?
- Bedrock description—find a rock attached to the mountain and describe it
  - Signs of deformation—folding, faulting, aligned minerals
  - Signs of metamorphism—mineralogy, textures
- Glacial features—visible cirques, roches moutonnees, erratics, till, striae and grooves
- Other observations—dominant weathering mechanisms (erosion), variations in topography, landslides, variations in treeline elevation, etc.