

Identification of Landslide Features using Remote Sensing Data

Landslide Mapping

- Landslide Mapping is a tedious, subjective process.
- Significant judgment involved, deserves field validation.
- Big challenge is determining activity of a landslide.
 - When did it fail?
 - Is it still active?
 - Will it become active?
- Field recon worthwhile as recent signs of distress may be encountered.

Landslide Mapping - Data

- There are a variety of datasets that may aid in mapping landslides.
- Geology Maps:
<https://www.oregongeology.org/geologicmap/index.htm>
- Satellite Imagery (Google Earth, Digital Globe, etc.)
- Lidar (Oregon Lidar Consortium, Puget Sound Lidar Consortium)
- Topo Maps
- Susceptibility Maps, Hazard Maps, InSAR, etc.

Available Maps

- Oregon Lidar Viewer
 - <http://www.oregongeology.org/lidar/>
- Oregon Geologic Data Compilation (OGDC)
 - <http://www.oregongeology.org/sub/ogdc/index.htm>
- SLIDO (Landslide Inventory)
 - <http://www.oregongeology.org/sub/slido/>
- HazVu (Statewide Hazard Viewer)
 - <http://www.oregongeology.org/sub/hazvu/>
- O-HELP
 - <http://ohelp.oregonstate.edu/>

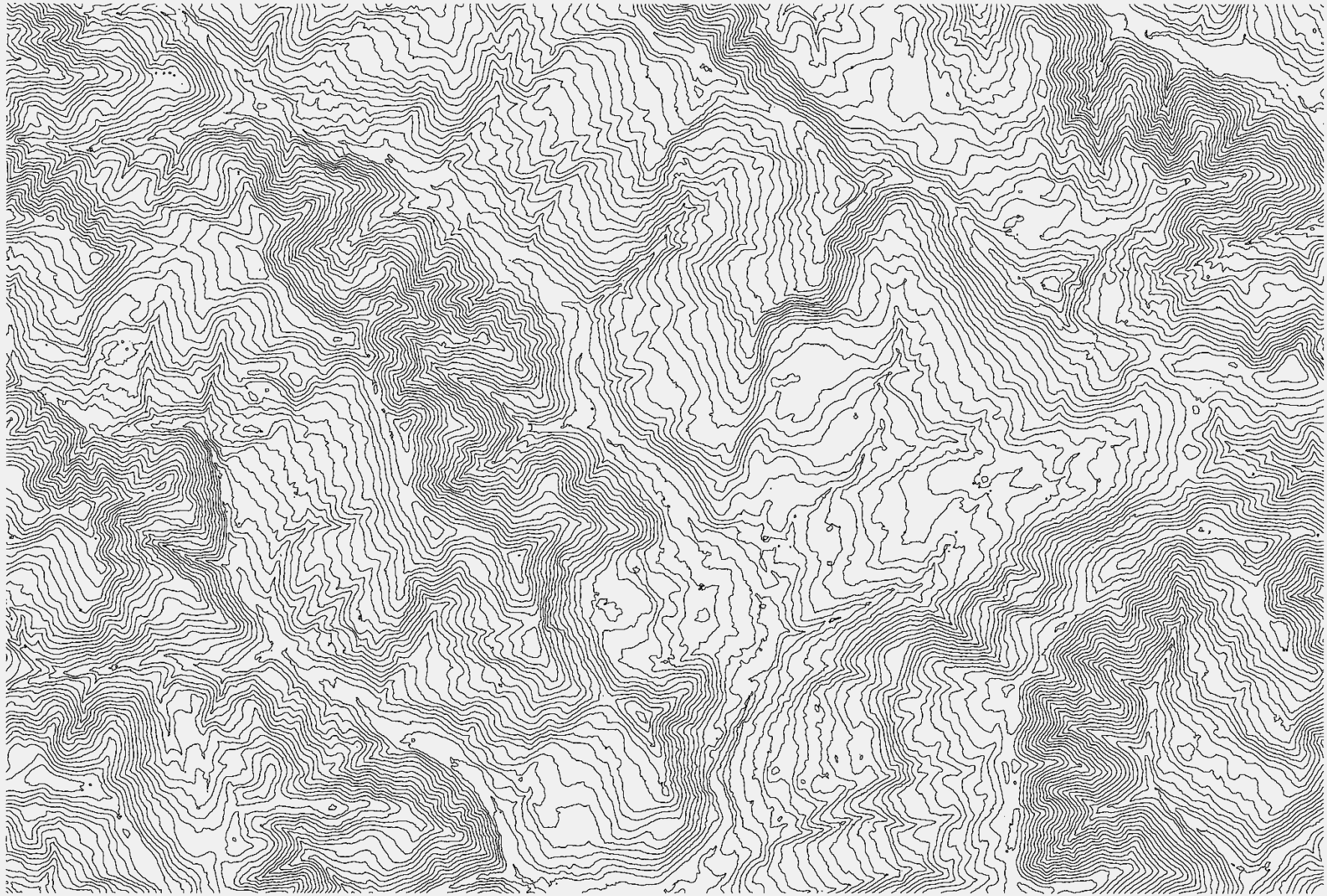
Satellite Imagery to Identify Landslide Terrain

- Landslides may be difficult to identify from satellite imagery if they are old, covered by vegetation.
- Sometimes, different vegetation will regrow in landslide terrain.
- Recent landslide terrain will have a markedly different color (mineral soil, rock) in comparison to vegetation and other terrain.



Topo Maps to Identify Landslide Terrain

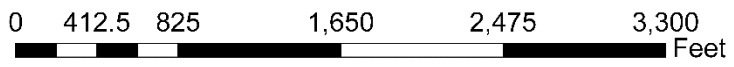
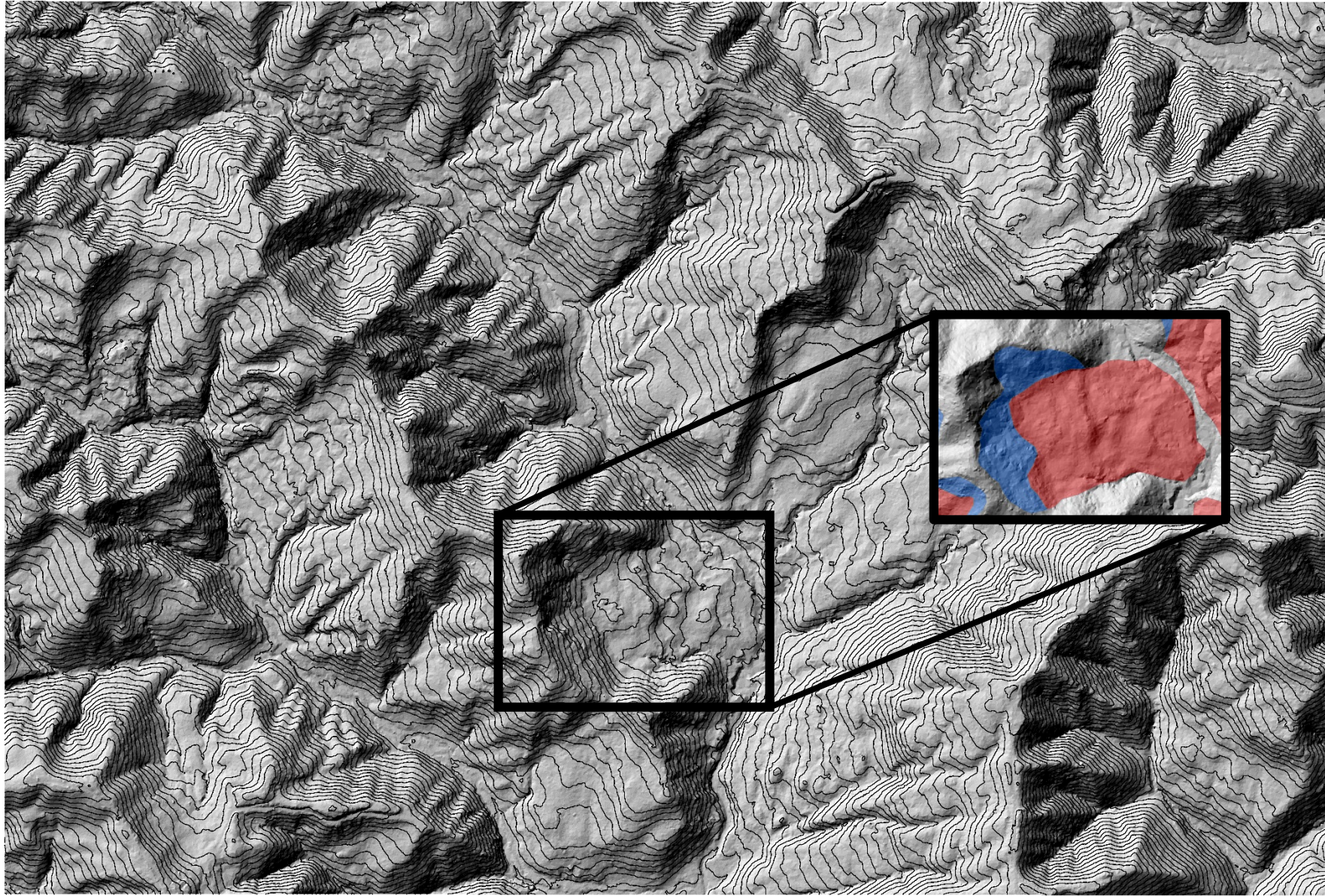
- Look for steep, concave topography – corresponds with headscarps.
- Look for hummocks, undulations, corresponds with deposits.
- Closed basins (areas that do not seem to drain), often associated with the head of rotational slides, landslide deposits.
- Drastic changes in topography that seem uncharacteristic.
- Reversal of concave contours to convex contours going downslope.



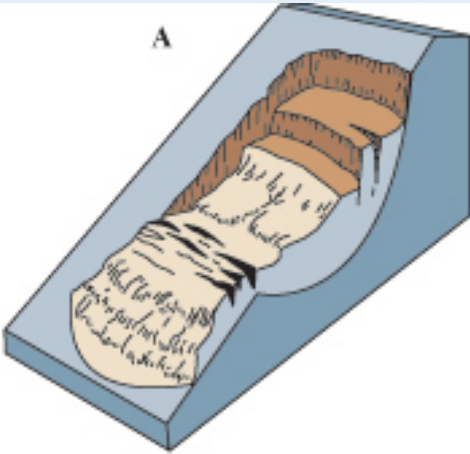
0 412.5 825 1,650 2,475 3,300 Feet

Lidar to Identify Landslide Terrain

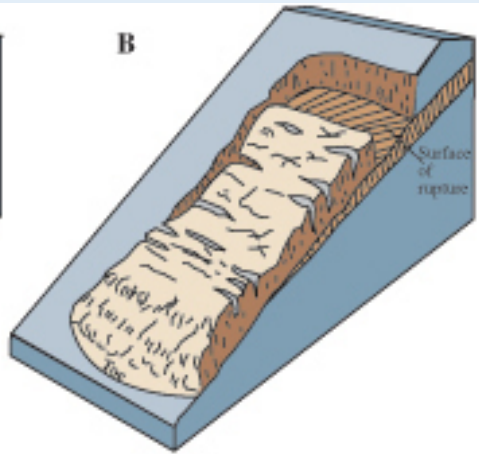
- Look for steep, concave topography – corresponds with headscarps.
- Look for hummocks, undulations, corresponds with deposits.
- “Scars” or “scoops” out of the landscape.
- Drastic changes in topography that seem uncharacteristic.
- Older landslides will have less defined landslide topography (hummocks, headscarp, etc.) in lieu of more defined streams, creeks, etc.



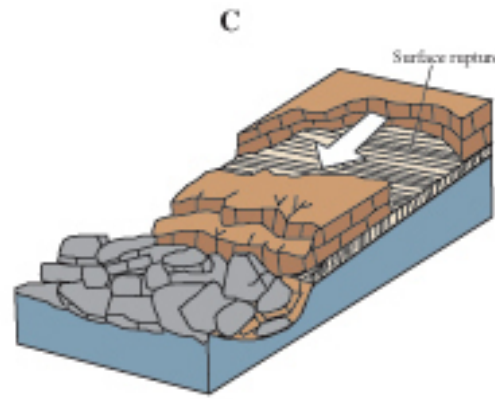
Types of Landslides



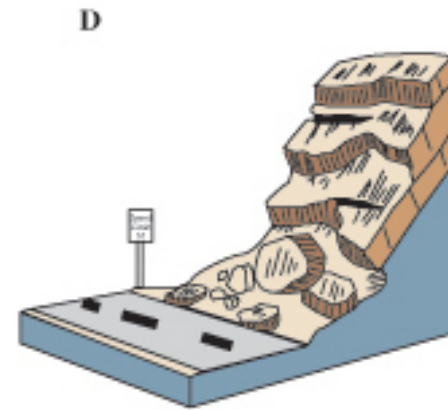
Rotational landslide



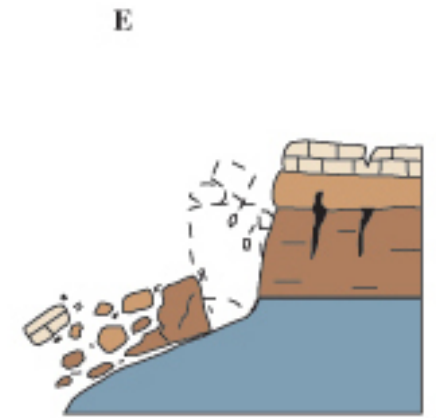
Translational landslide



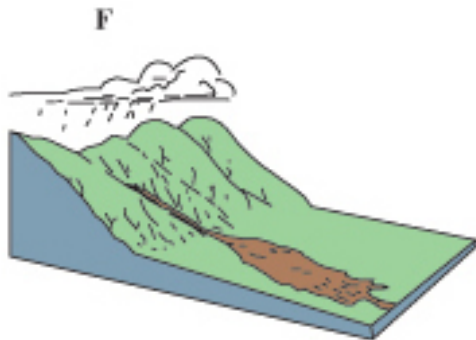
Block slide



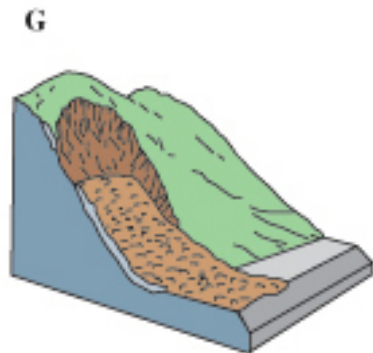
Rockfall



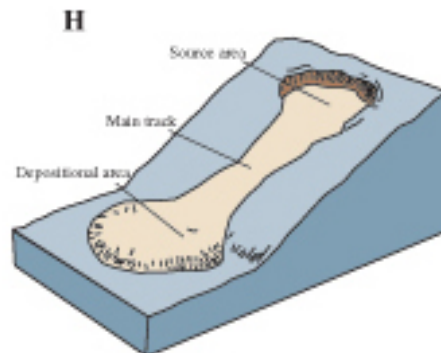
Topple



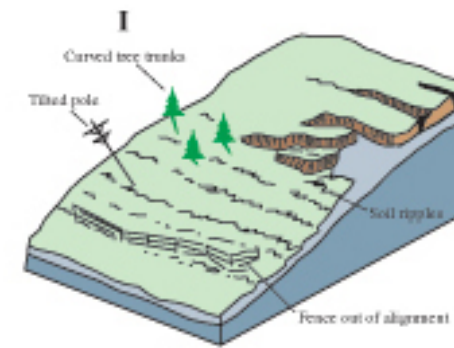
Debris flow



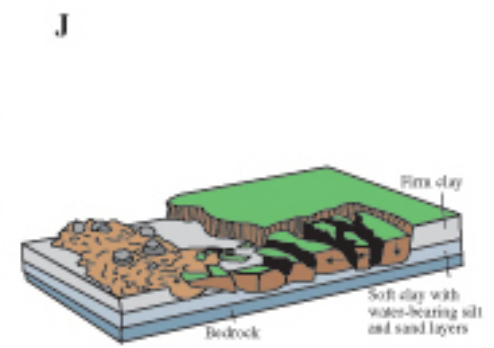
Debris avalanche



Earthflow

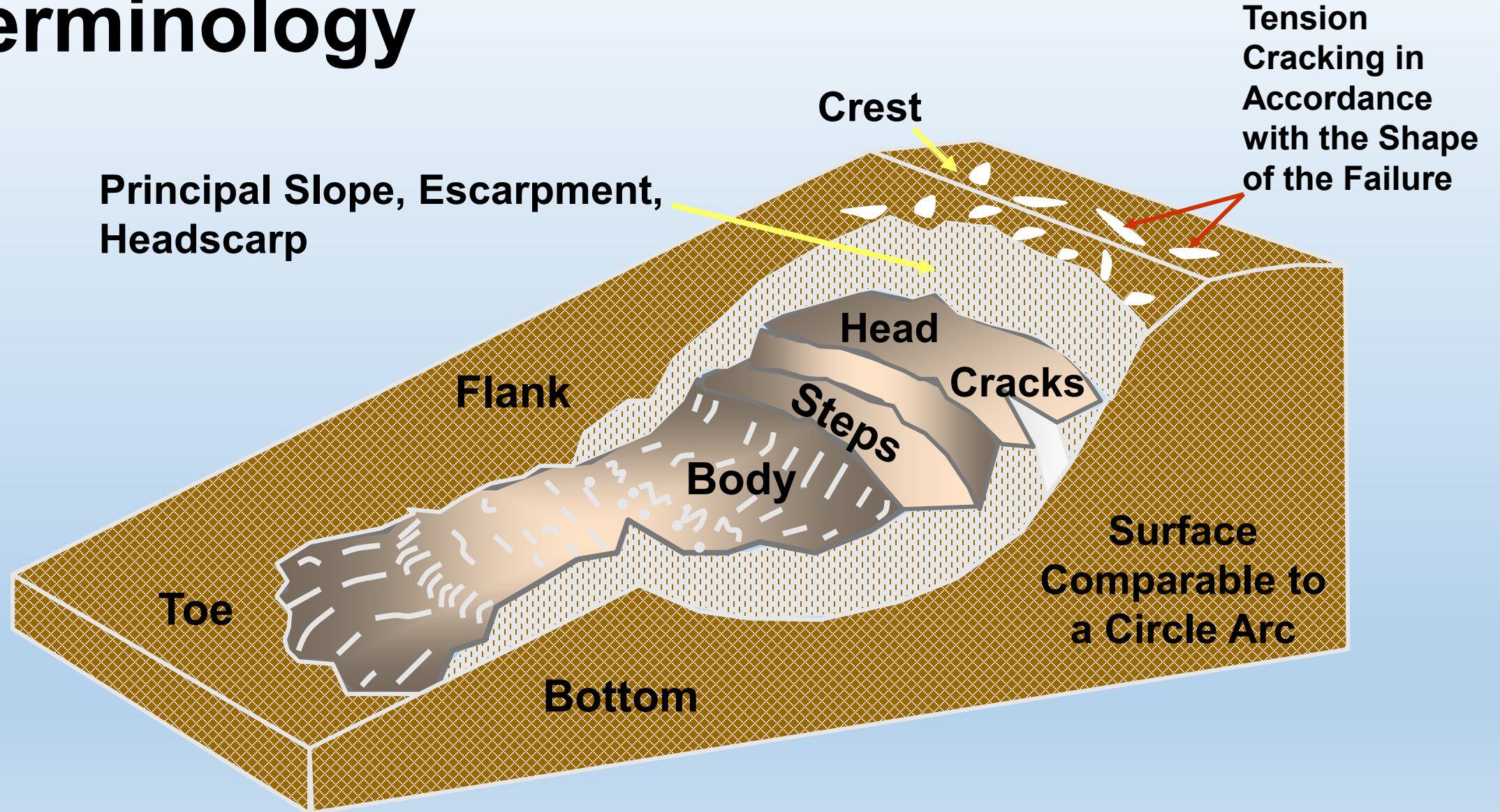


Creep



Lateral spread

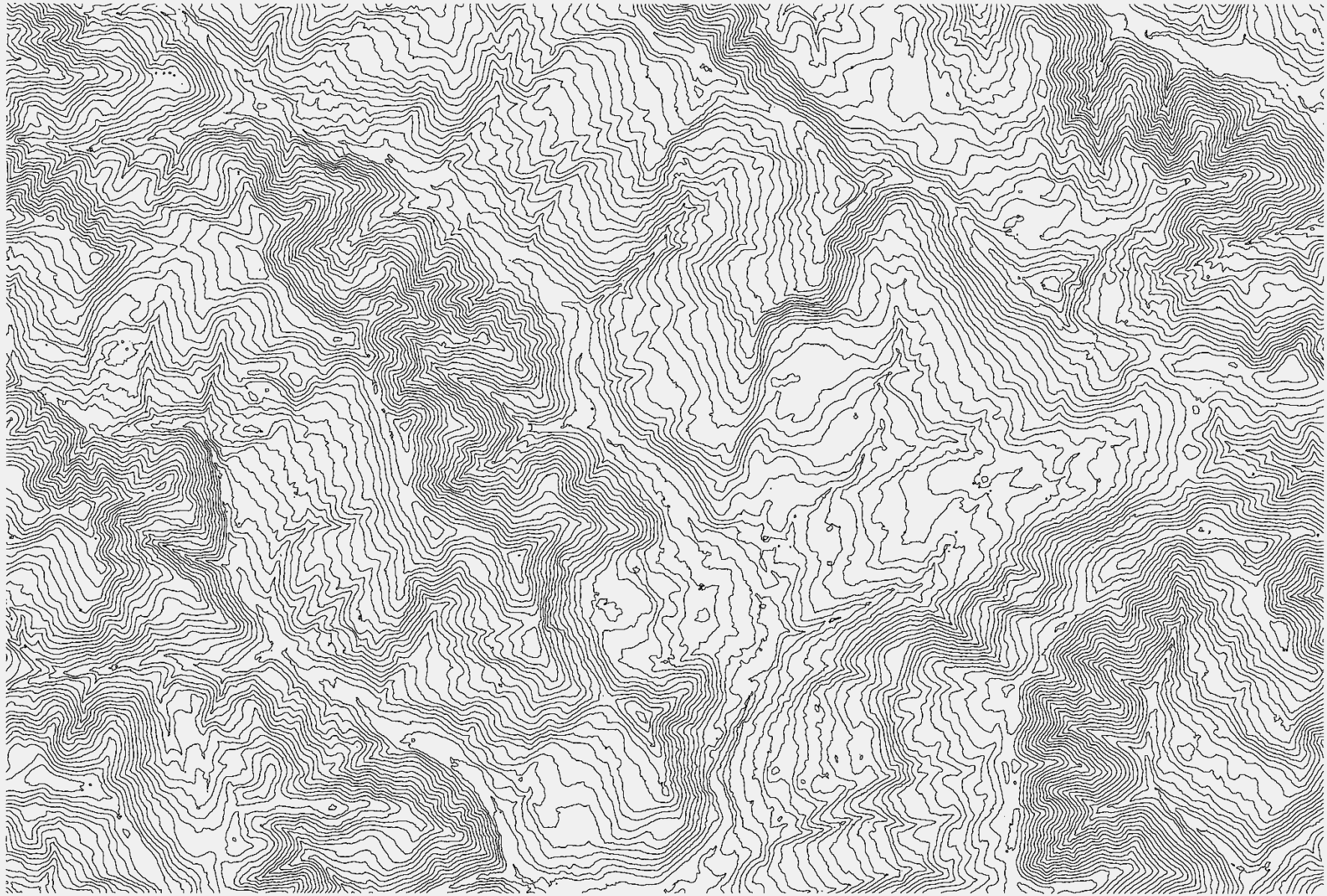
Terminology



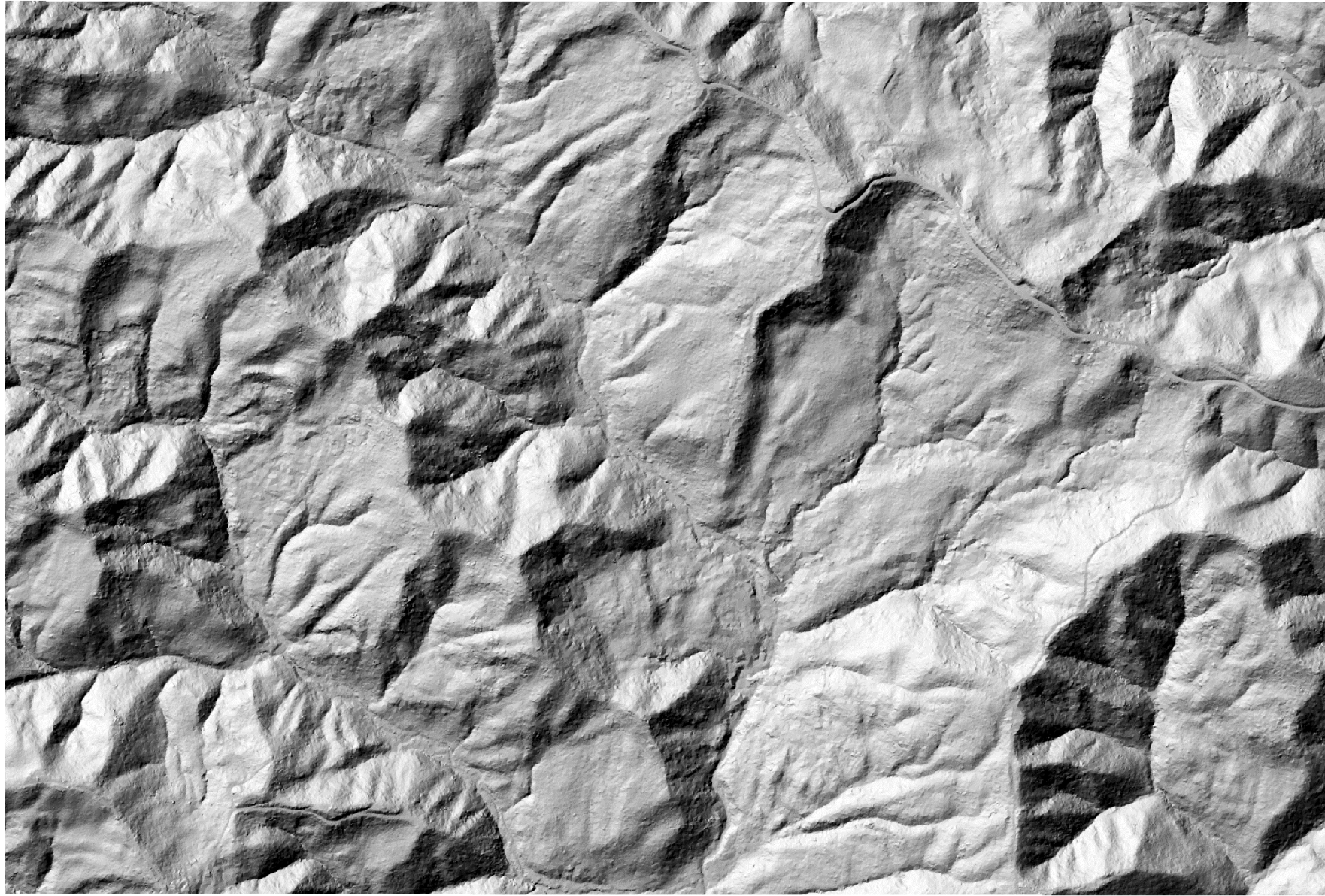
Our Exercise Site

- Oregon Coast Range, 10 miles from Pacific Ocean
- Actively-managed forestland
- Tye formation.
- Let's review the data provided.

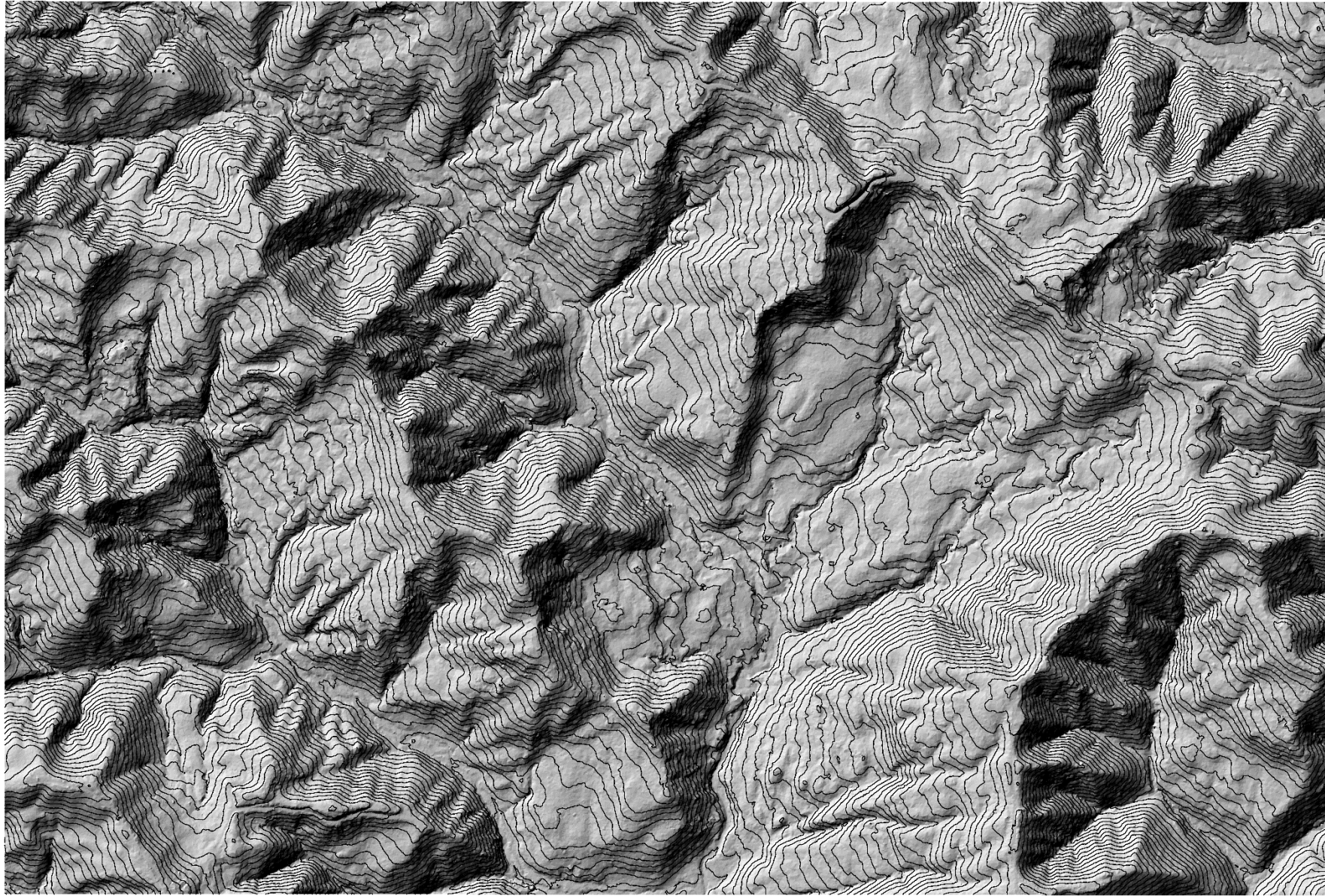




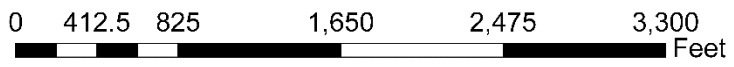
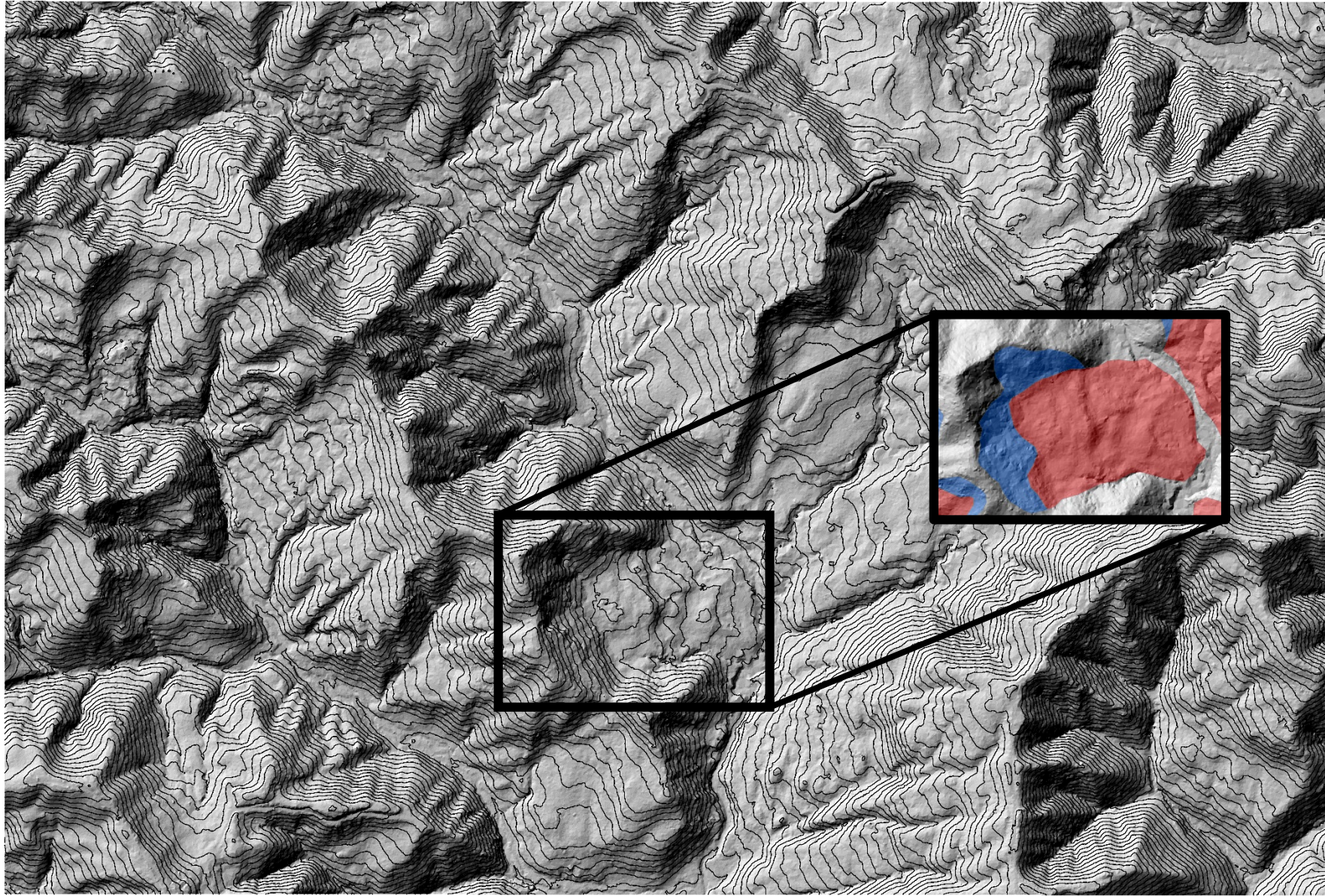
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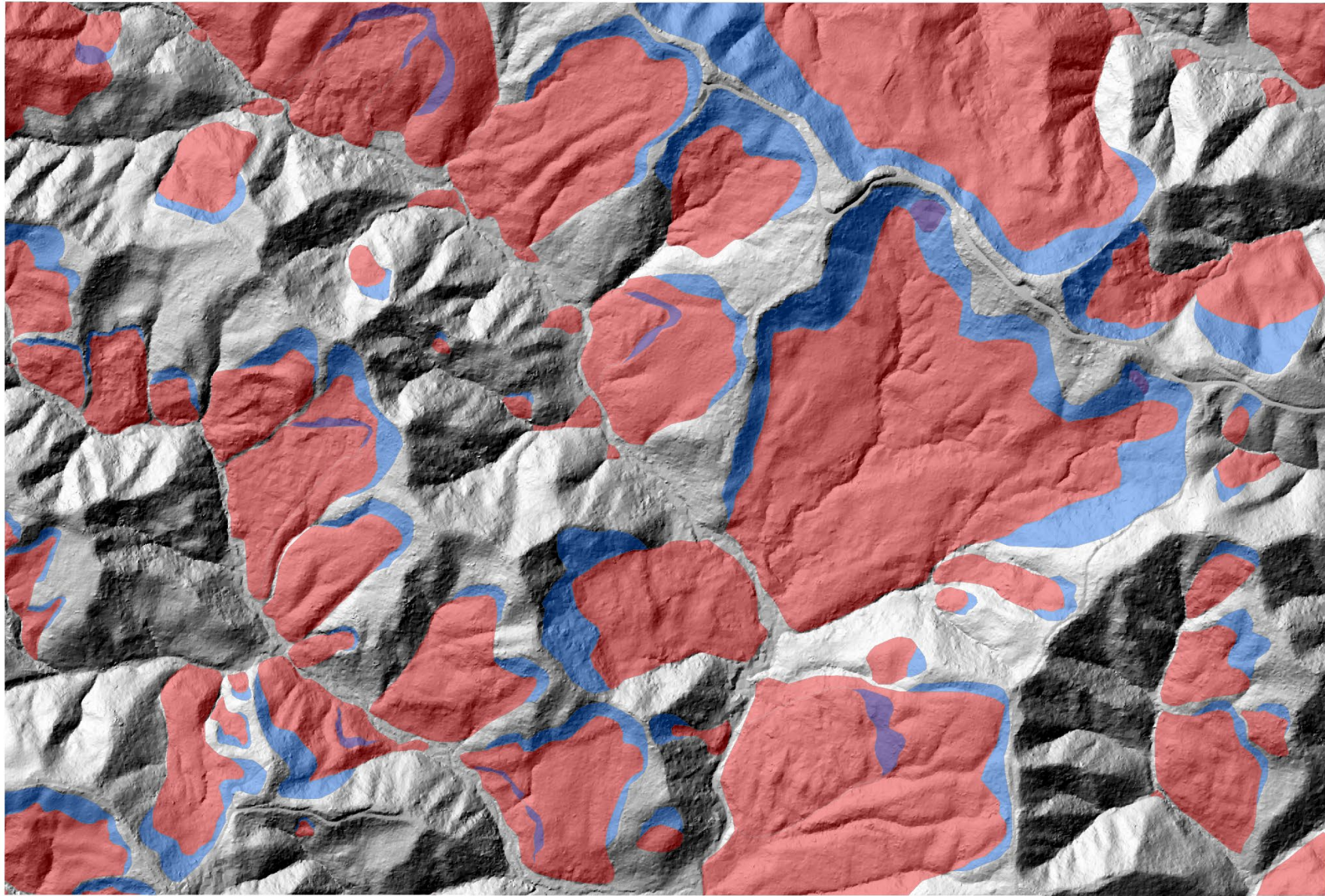
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Let's give it a try!



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Questions?