Saddle Creek “Road” and Dodge Street Bridge – June 27, 2008

Saddle Creek, Omaha – June 27, 2008

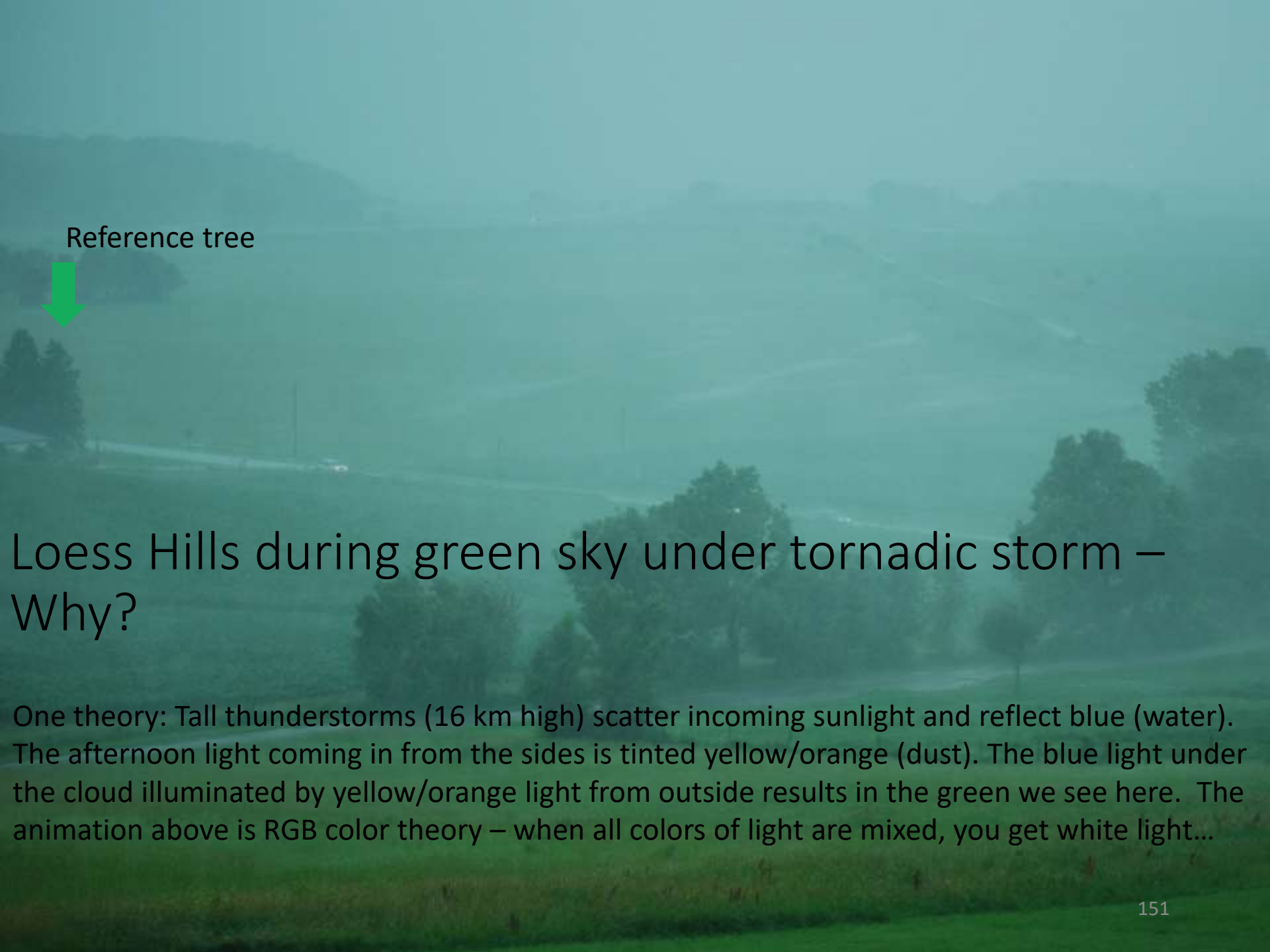
Saddle Creek, Omaha – June 27, 2008

Saddle Creek, Omaha – June 27, 2008

Storm: June 27, 2008

Loess Hills, Iowa – Clear day


Reference tree



Loess Hills during green sky under tornadic storm – Why?

One theory: Tall thunderstorms (16 km high) scatter incoming sunlight and reflect blue (water). The afternoon light coming in from the sides is tinted yellow/orange (dust). The blue light under the cloud illuminated by yellow/orange light from outside results in the green we see here. The animation above is RGB color theory – when all colors of light are mixed, you get white light…

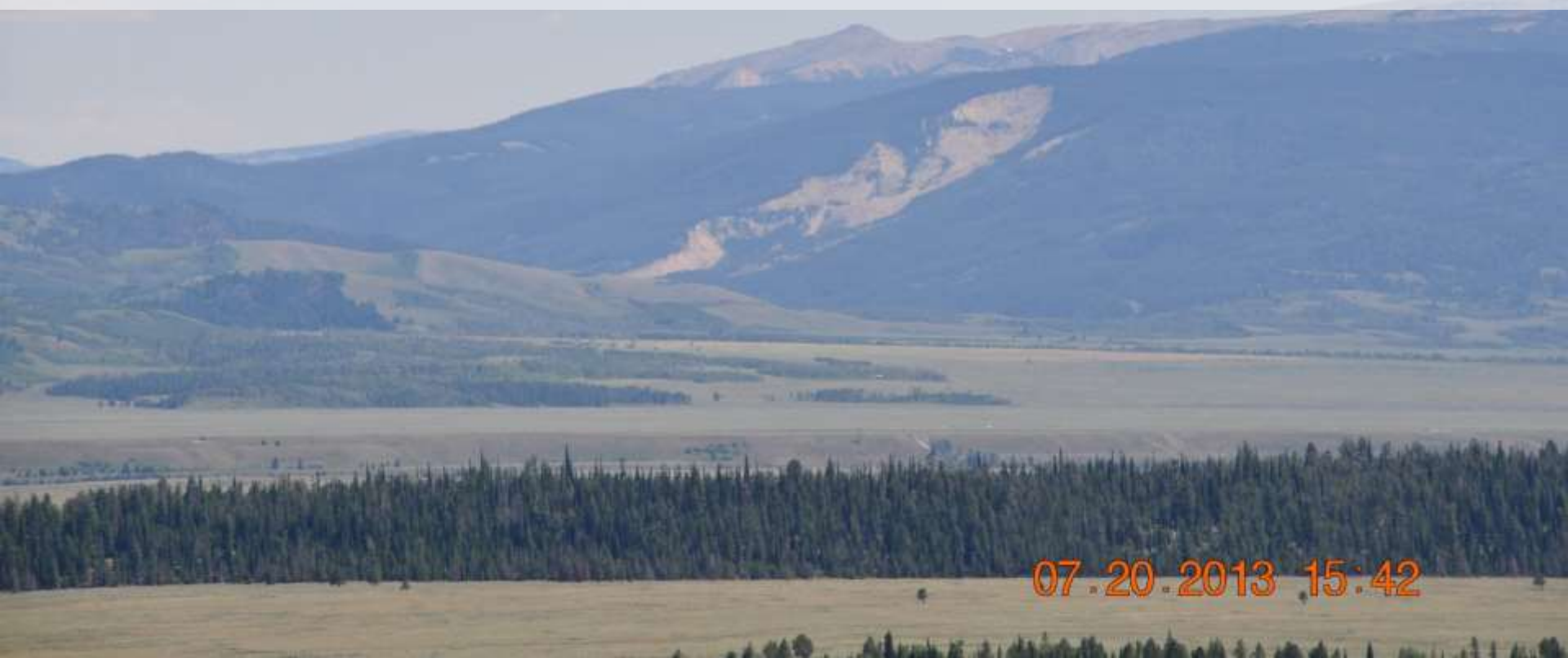
Saddle Creek “Road” Flooding in Summer 8-8-2021 !!!

Storm (front shown here) that caused Omaha flooding on 8-8-2021

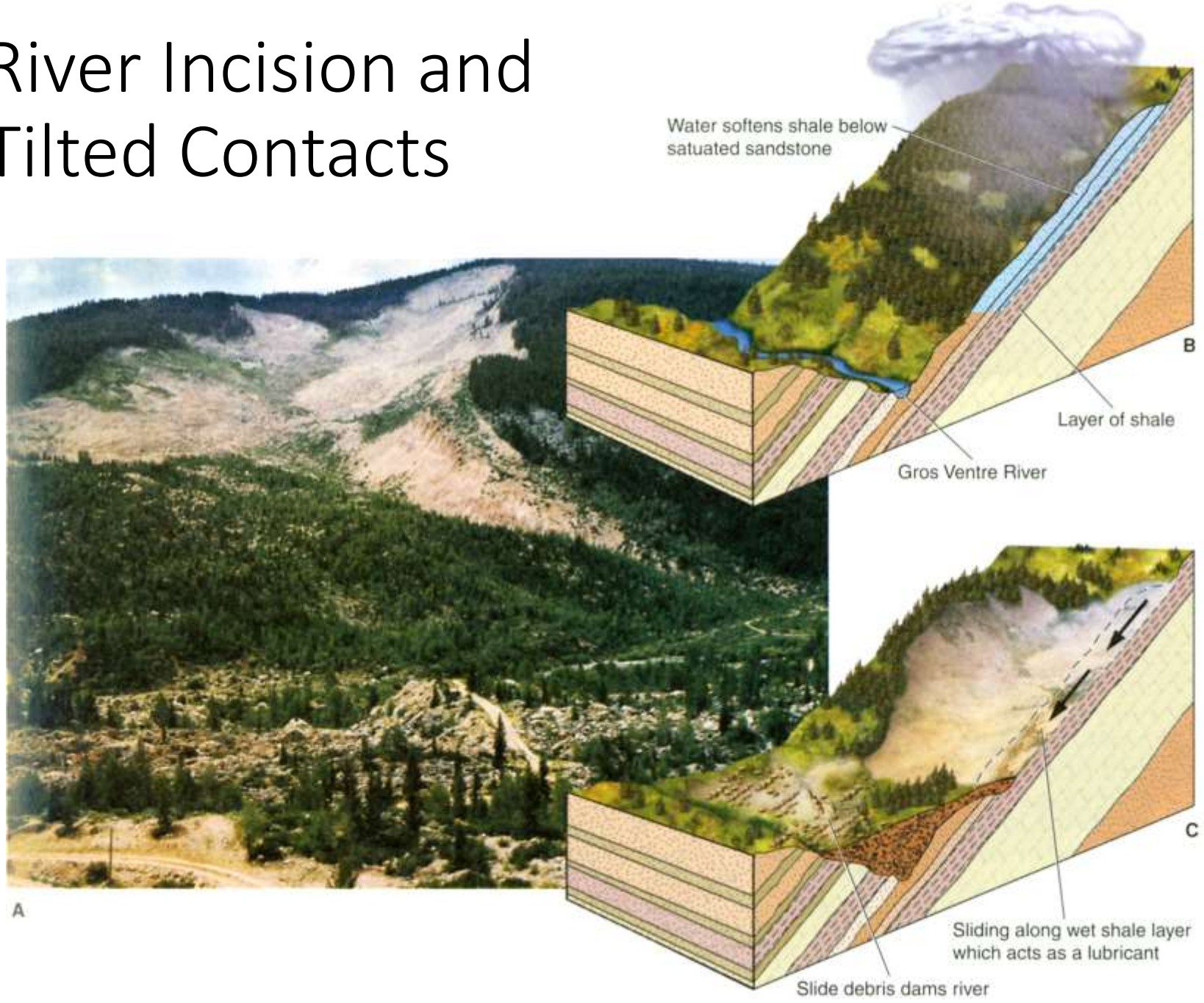
6 News viewer Michelle Allen-Mollner sent a photo, taken at 202nd and Harrison streets, of the storm approaching the Omaha-metro Saturday, Aug. 7, 2021. The storm brought hail, flash-flooding, and power outages to the area. (Michelle Allen-Mollner / Courtesy photo)

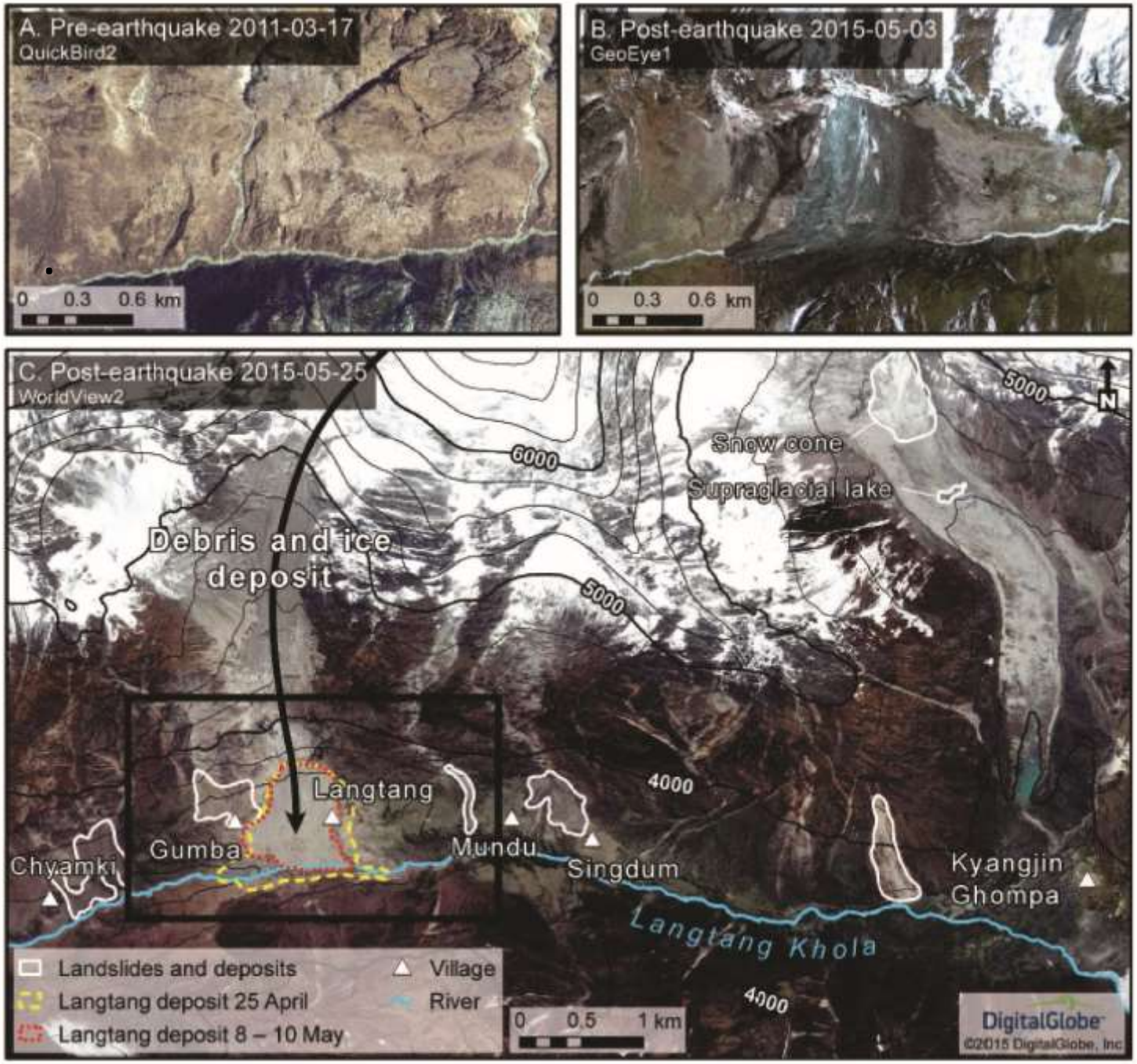
Gros Ventre Slide, Wyoming, June 23rd, 1925

- Translational slide caused by saturated, tilted contacts (Tensleep sandstone overlying Amsden shale) and possibly coseismic (tremors reported)
- ~38 million m^3 landslide volume
- Observed by ranch owner (he outran it by 20 feet)
- Slide Lake was formed (landslide dammed lake)
  - Accessed to be "stable" and "permanent" by engineers, geologists, and scientists
- Slide Lake catastrophic outburst flood on May 17th, 1927
- Completely destroyed Kelley, WY
- Killed 6 people
- Cost of losses estimated to be $500,000 in 1927 ($7.5 million in 2021)



River Incision and Tilted Contacts

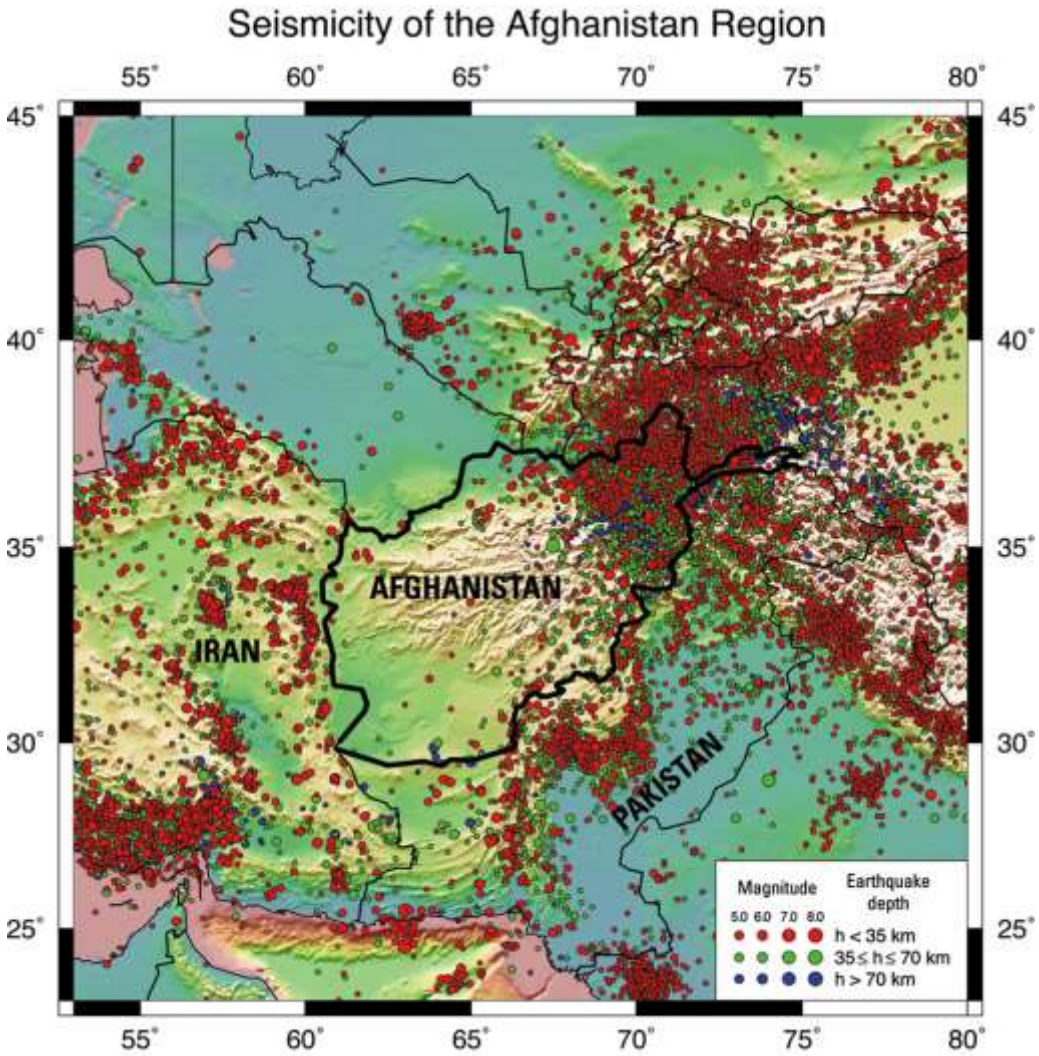




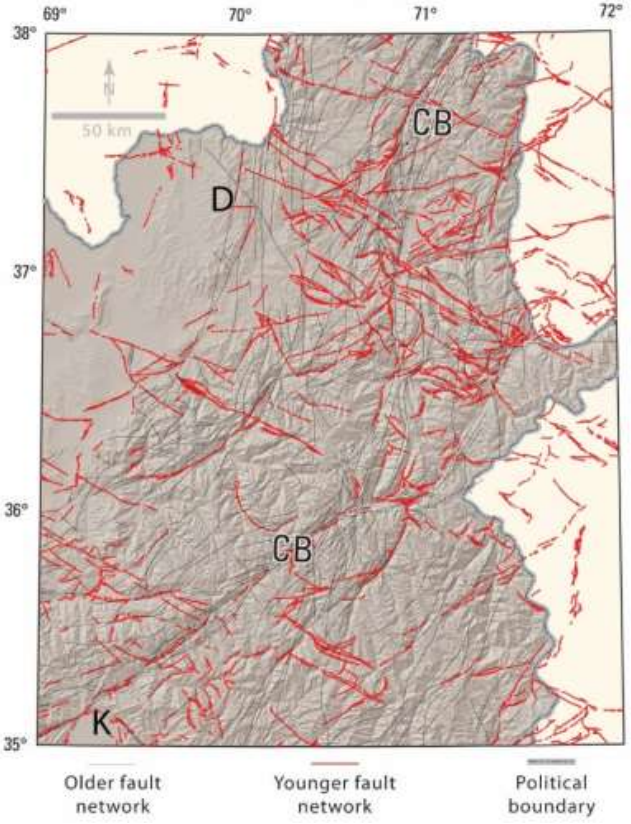
Geomorphic and geologic controls of geohazards induced by Nepal's 2015 Gorkha Earthquake from (Kargel et al., 2016) in *Science Magazine*

2015 Gorkha Earthquake

- This 7.8 magnitude earthquake killed 9,000 people and injured 22,000.
- The group of remote sensing scientists that I worked with helped to identify mass movements, blocked roads, and buried villages using donated satellite imagery.
- The village of Langtang in the previous map was completely buried and over 360 people were killed.
- Science helped save lives by identifying impacted areas so they could get the help they needed. Satellite image analyses helped because many communities were completely cut-off. Except the satellites continued to fly over…so we searched the images for people in need.
- There's a documentary (*Aftershock*) on Netflix about this earthquake and it features a story about Langtang. It's a good show, but there's some drama in it…

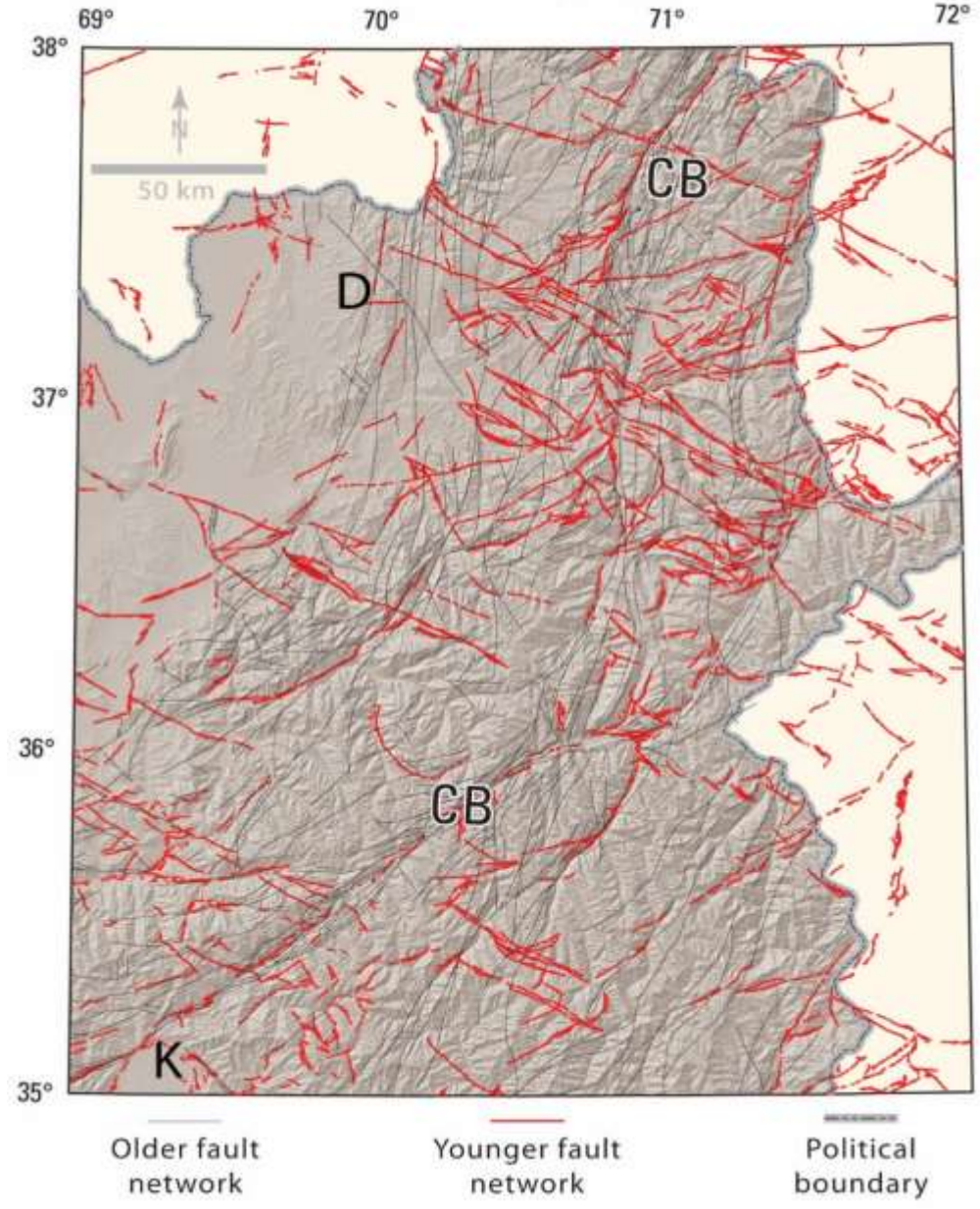


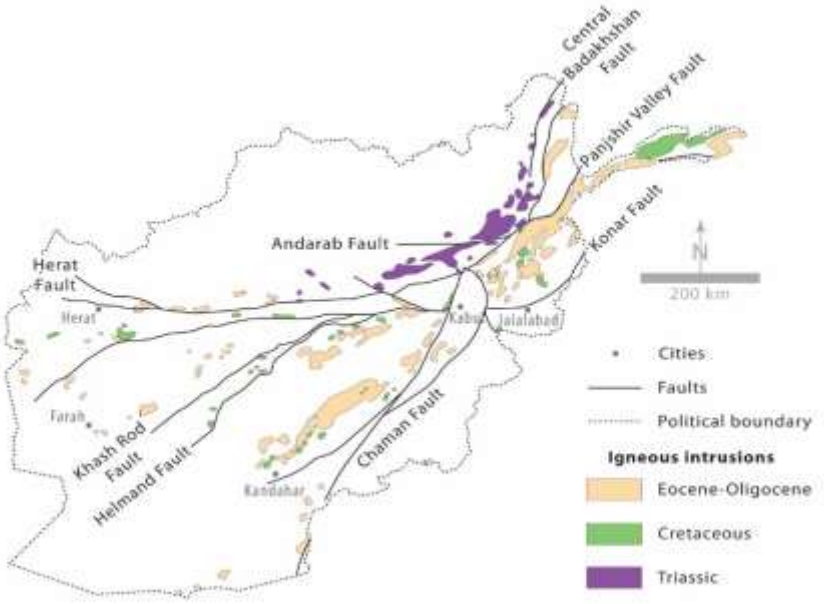
Highest magnitude & frequency of earthquakes in world



From Shroder et al., 2021

Afghanistan is full of active faults, and they have lots of earthquakes because of it!

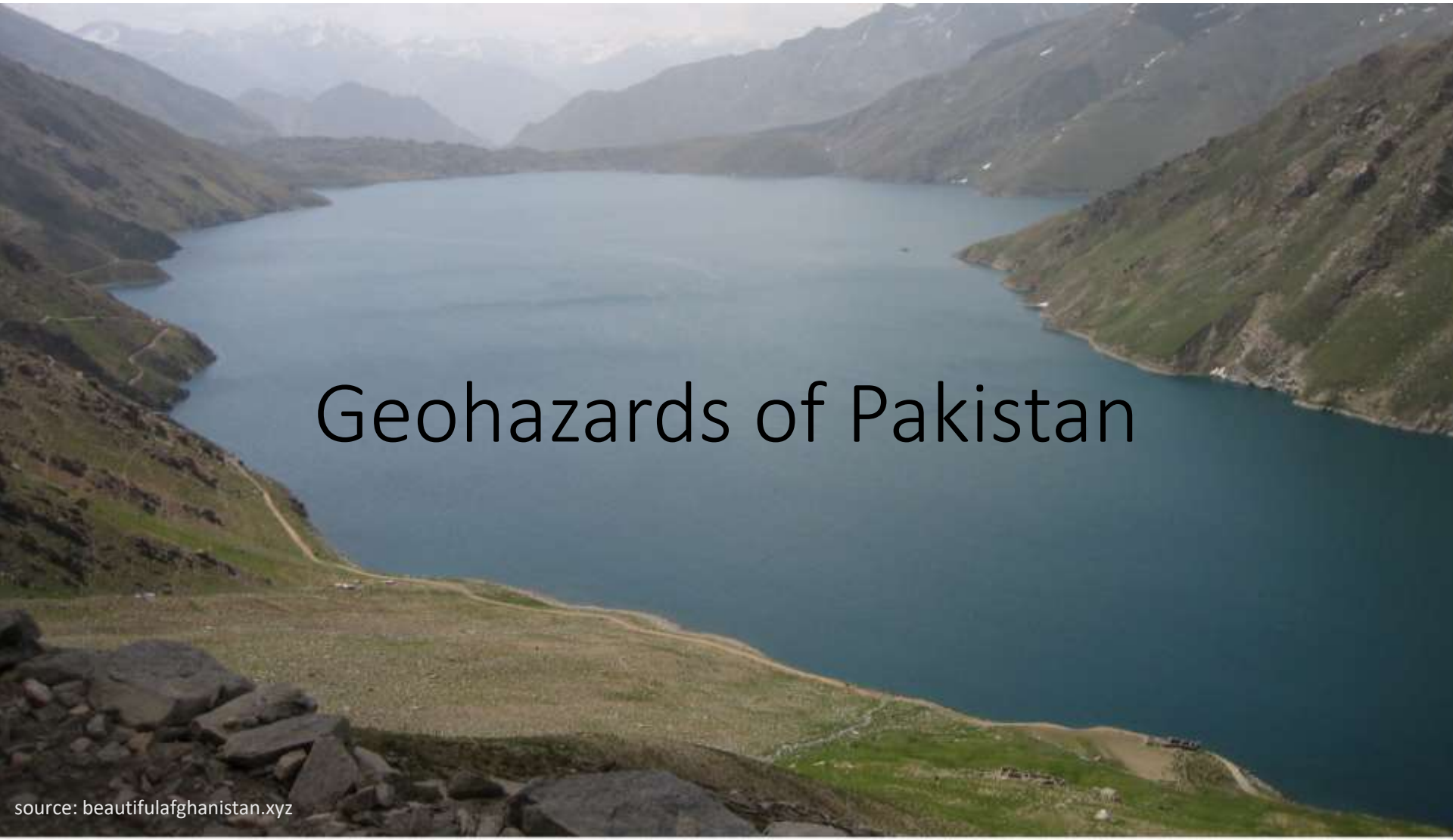




Hydrologic (Water) Basins

84 km^3
(cubic kilometers)
annual water amount

And everyone wants it!


Geohazards of Pakistan
source: beautifulafghanistan.xyz

Geohazards, and water/mineral resources originating from Afghanistan

- All humans require water and depend on their sources to keep providing
  - The rate of water delivery is important
    - A blessing of steady, predictable, amounts of water…
    - Or the hazard of floods, or low flows driven by drought
  - Climate change and melting glaciers threaten the current rates of water delivery

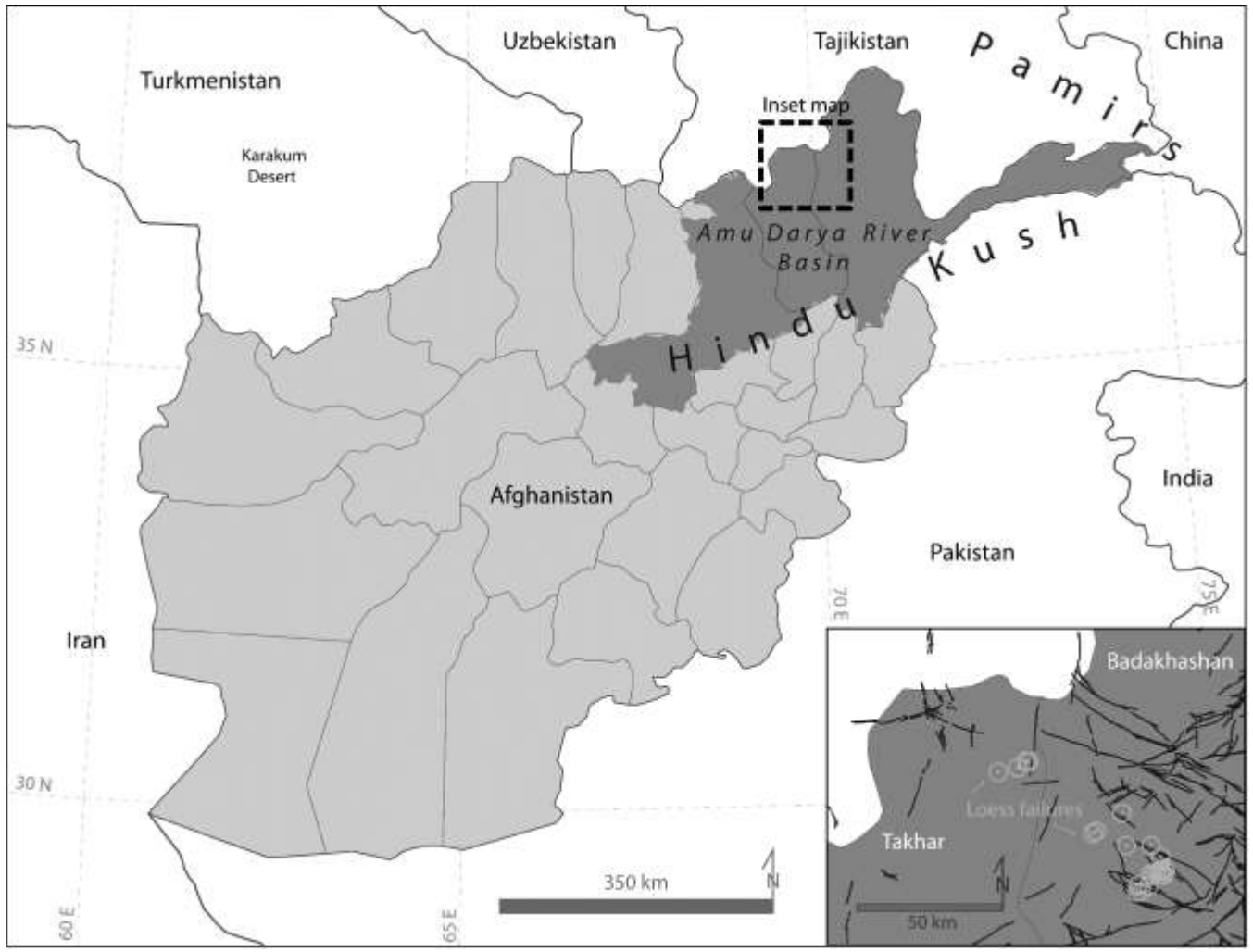
- Water delivery is needed and expected from Afghanistan to its neighbors

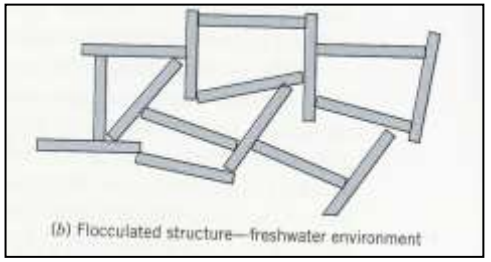
- Geohazards cause disruptions in water delivery, and mineral extraction/delivery
  - Mass Movements (Landslides)
    - Block access
    - Damage infrastructure
    - Create unstable water impoundments
  - Flooding from:
    - Concentrated Precipitation
    - Glacial/Landslide lake outbursts
    - Landslides and debris flow dams

Geohazards of Pakistan – Emphasis on Glacial

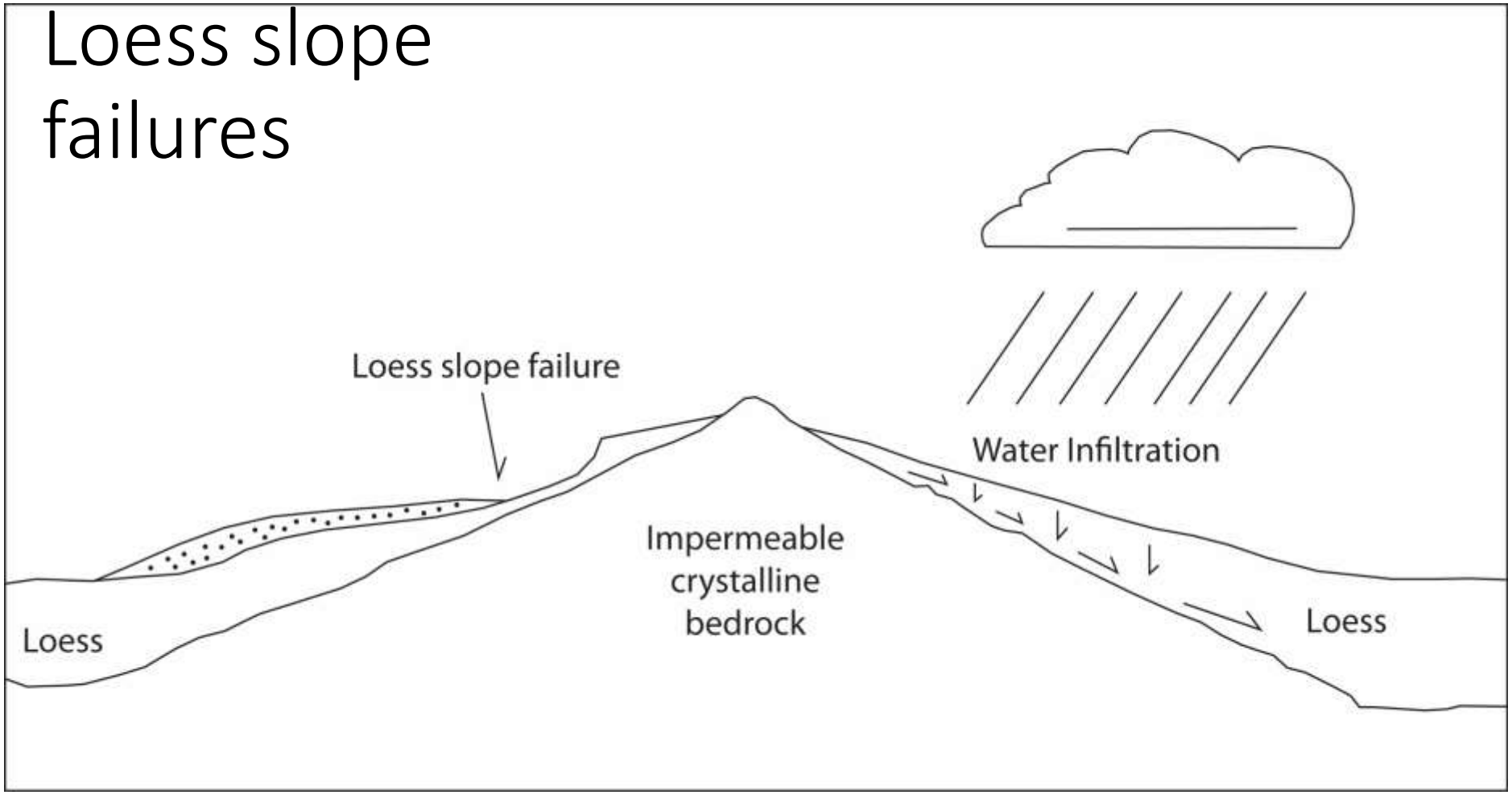
- Earthquakes
  - Coseismic ice/debris flows
  - Possibly a cause of glacial surges (Shimshal Valley)
- Mass Movement
  - Flows
    - Debris and Ice
    - Loess
  - Falls and Slides
    - Sturstroms
- Flooding
  - Precipitation/Climate change driven
  - Glacial Lake Outbreak floods
  - Landslide Lake Outbreak floods
  - Coastal Flooding from sea level rise
    - Salt water intrusion
- Drought
  - Climate change driven loss of glacier meltwater

Loess failures





Loess slope failures



From Shroder,Jensen-Schettler, & Weihs 2011

Wet debris flow in loess: dammed the stream and created a lake

From Shroder,Jensen-Schettler, & Weihs 2011

Loess karst-like topography:

sinkholes and solution valleys

From Shroder,Jensen-Schettler, & Weihs 2011