

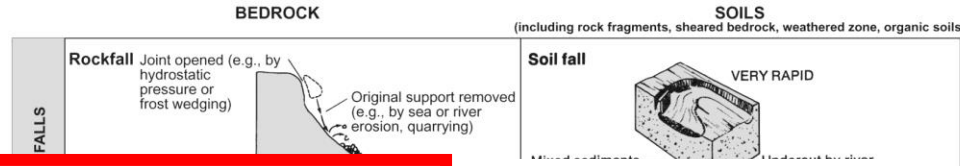
Geology and Landslides



Darrell Sapp/Post Gazette

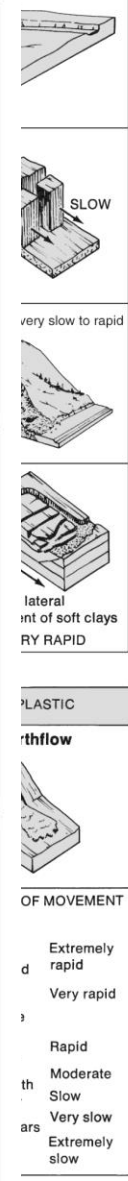
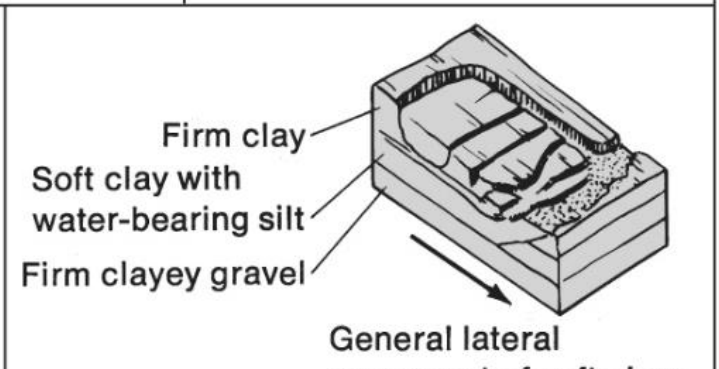
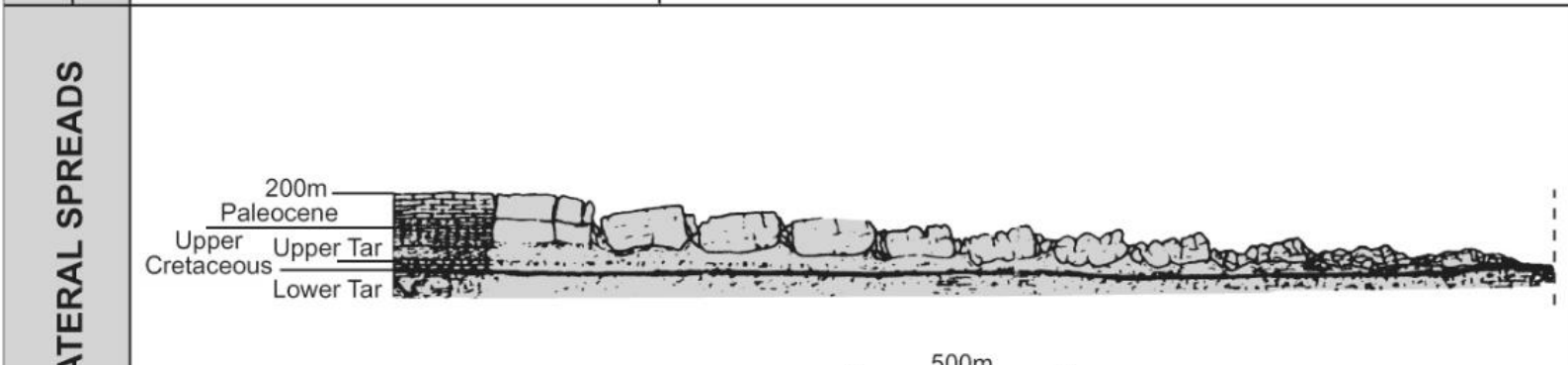
A Brief Introduction/Review
IRISE Landslide Capacity Building Seminar Series
Daniel J. Bain
University of Pittsburgh
Department of Geology and Environmental Science
August 28, 2020

Baseline conceptualization

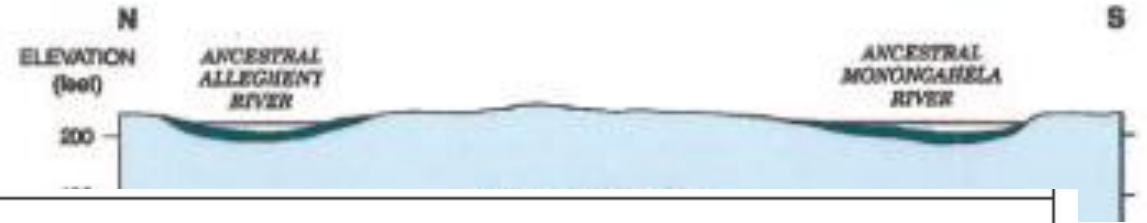


BEDROCK **SOILS**
 (including rock fragments, sheared bedrock, weathered zone, organic soils)

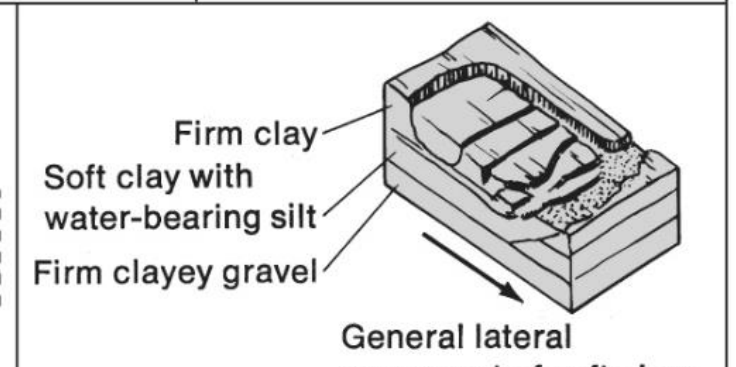
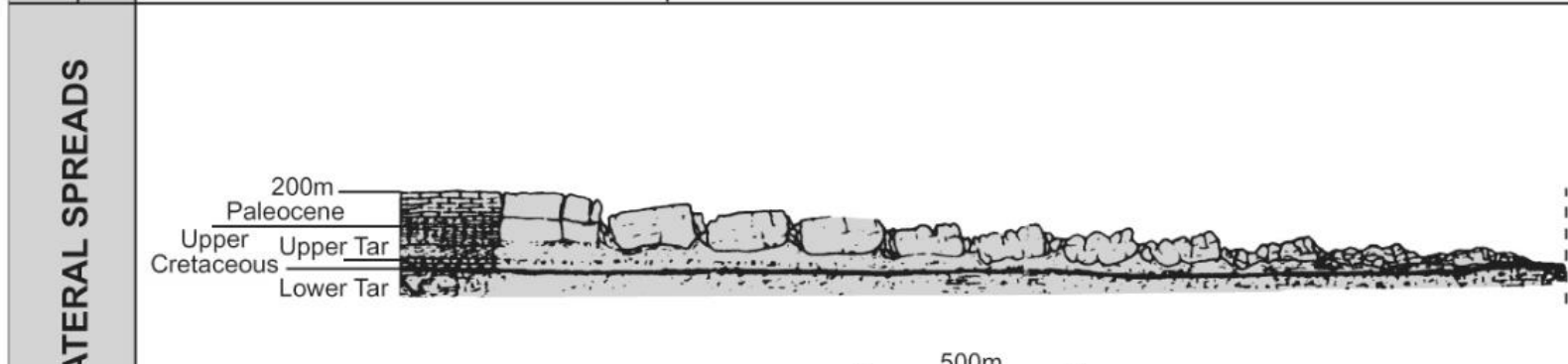
SLIDES	Rotational	<p>Rotational slump</p> <p>Rupture surface</p> <p>EXTREMELY SLOW TO MODERATE</p>		<p>Slides</p> <p>Slump Earth flow</p> <p>Rotational Planar</p> <p>Loess Glacial clay</p> <p>SLOW</p>	
	Translational	<p>Planar rock block slide</p> <p>Failure along faults</p> <p>MODERATE</p>	<p>Rockslide</p> <p>Scarp face—control by joints Dip slope—control by bedding planes</p> <p>VERY SLOW TO EXTREMELY RAPID</p>		<p>Debris Slide, very slow to rapid</p> <p>Bedrock</p> <p>lateral movement of soft clays VERY RAPID</p>



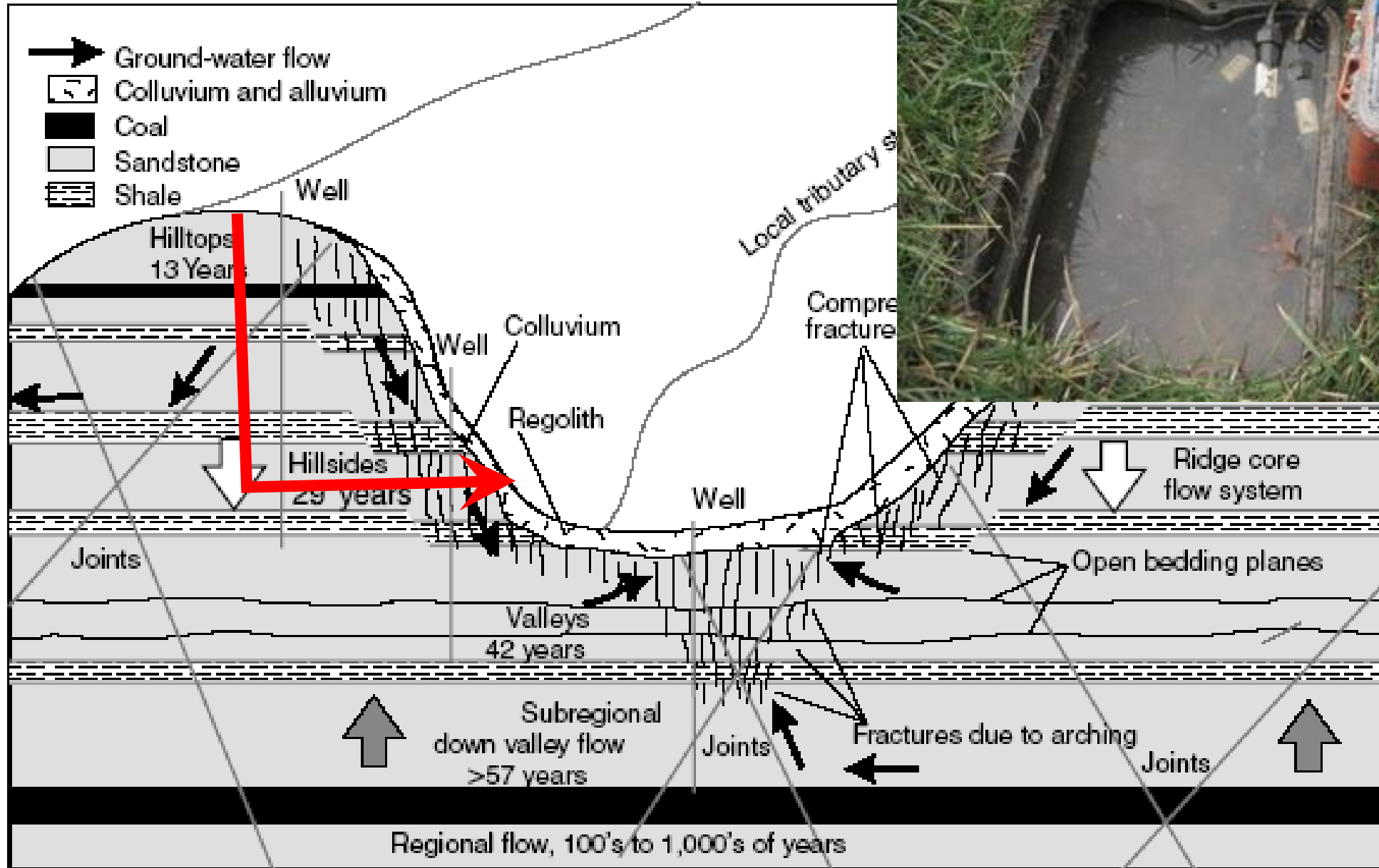
Regional Terrain



SLIDES	Rotational	<p>Rotational slump</p>		<p>Slides</p>		<p>Rotational Planar</p>	
	Translational	<p>Planar rock block slide</p>	<p>Rockslide</p>		<p>Debris Slide, very slow to rapid</p>		



Allegheny Plateau Stratigraphy



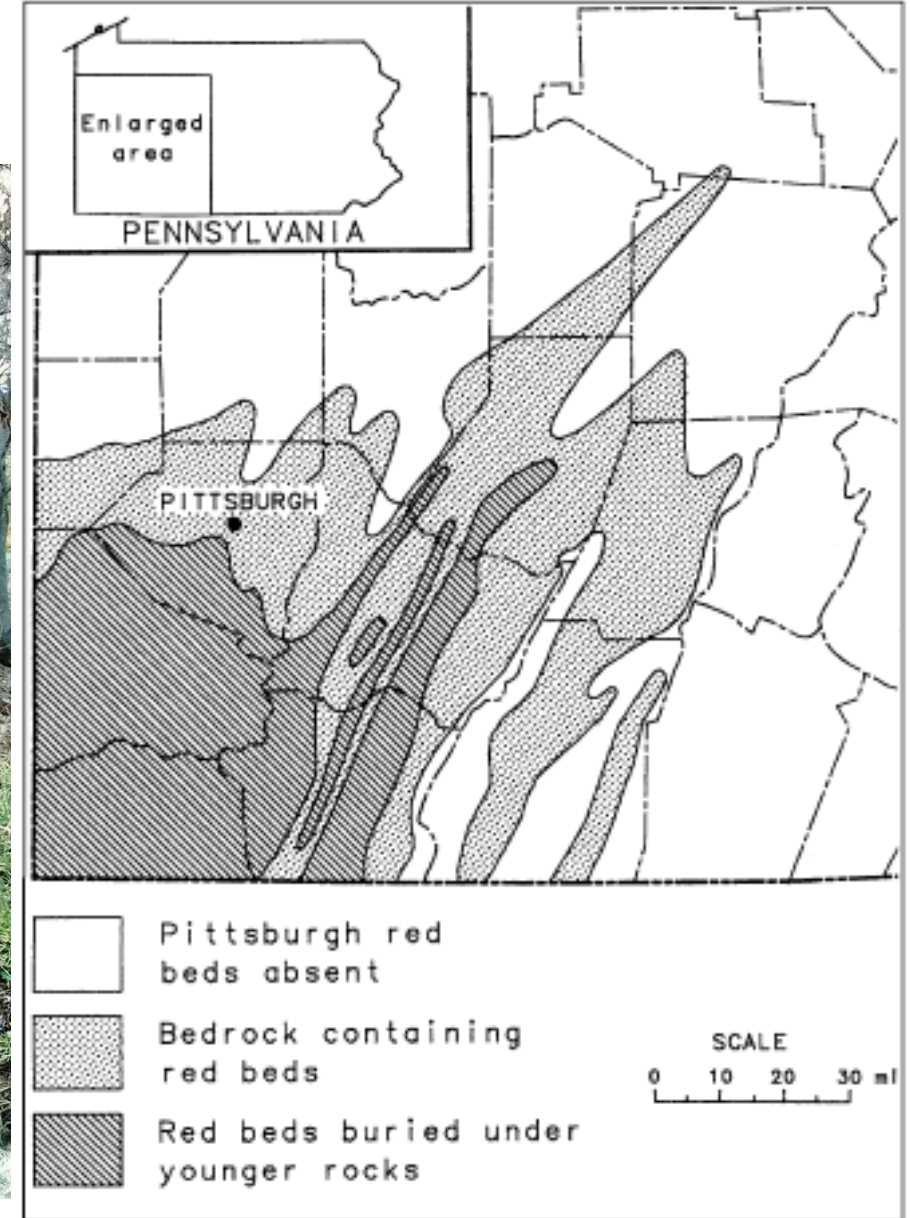
(Sheets and Kozar, 2000)

Allegheny Plateau Stratigraphy -- Red Beds



Peter Licastro

PGS landslide fact sheet



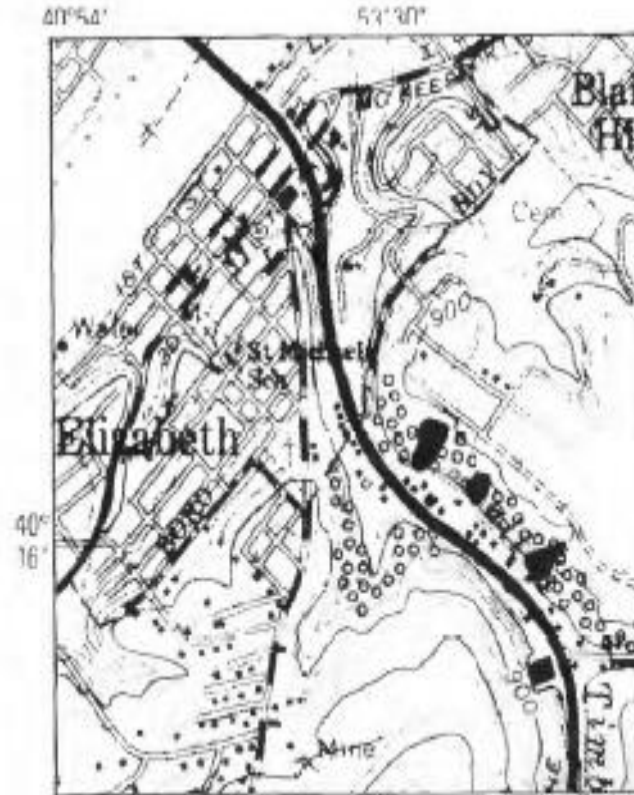
Conceptualization of landslide failure → Factor of Safety

At what angle ~

EXPLANATION
● Recent Landslide
○ Older Landslide

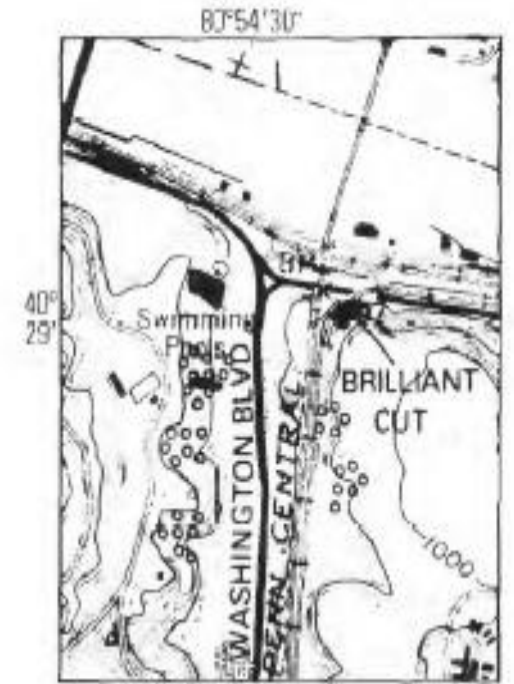


3. US 30-PA 48 AREA



4. FALLEN TIMBER RUN AREA

Pomeroy 1982



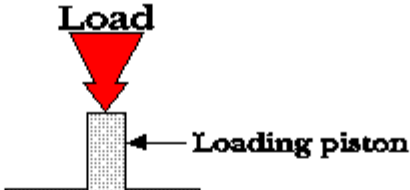
5. BRILLIANT CUT



~4

(Simon Eugster)

Cohesion and slope failure



THE FOREST IN THE CITY

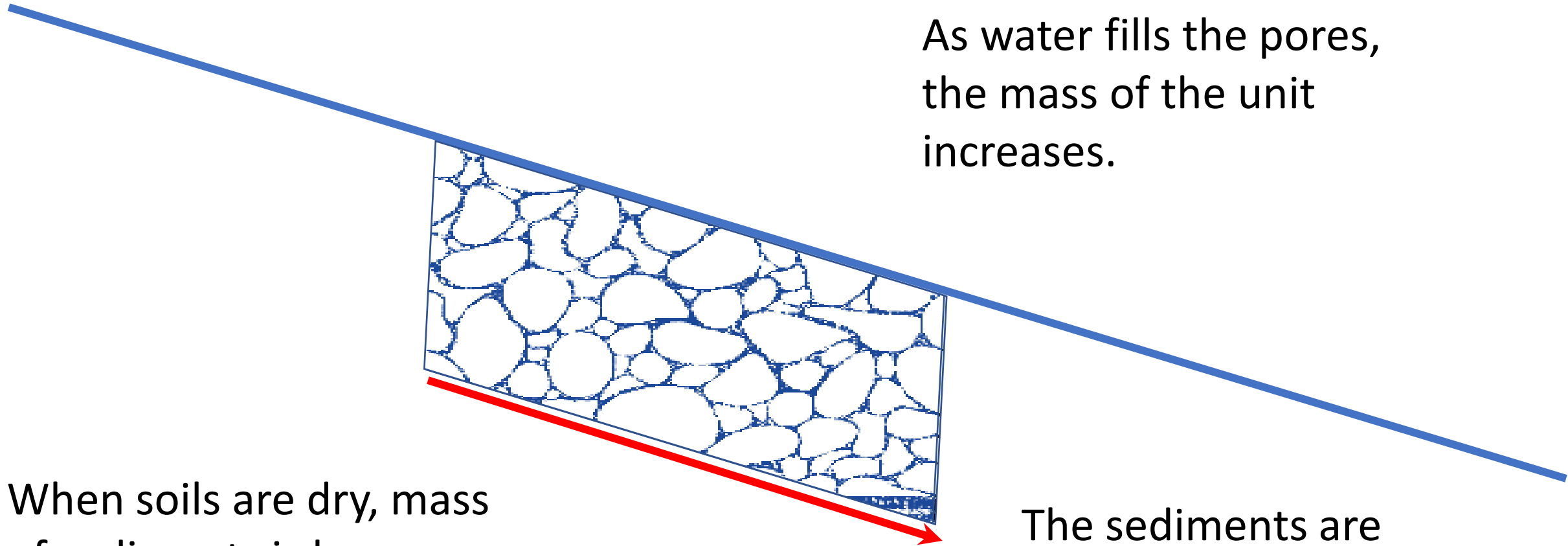


ap
cylinder
men
membra
Cell-pr
measur

(Friends of Hays Woods)

and friction

The role of water in slope failure



As water fills the pores, the mass of the unit increases.

When soils are dry, mass of sediments is less, lowering both forces.

The sediments are buoyant in water, reducing friction.

Safety factor

Mass Sediments
(less buoyancy)

Mass Water

Regional
Failure
Angle



When $FS = 1$, d
Sediments can

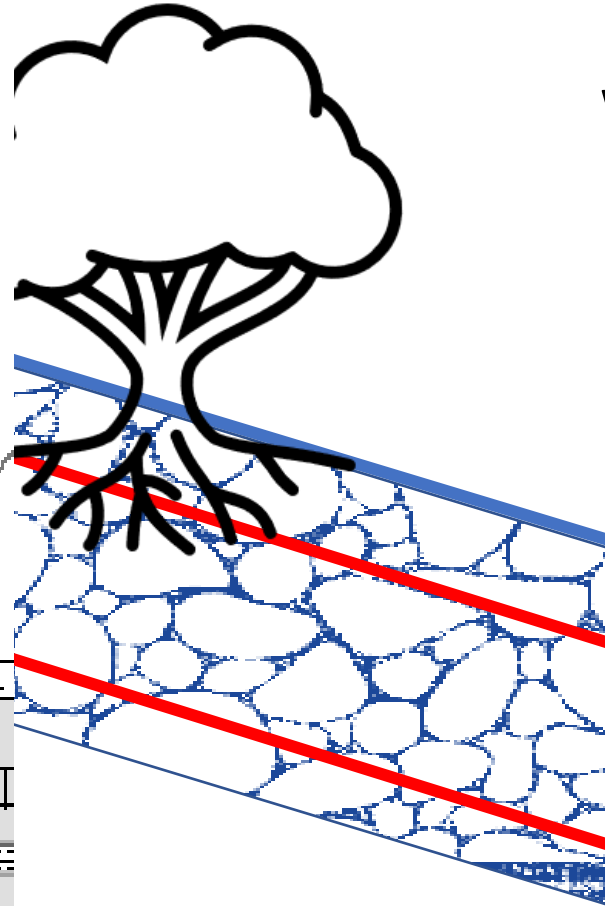
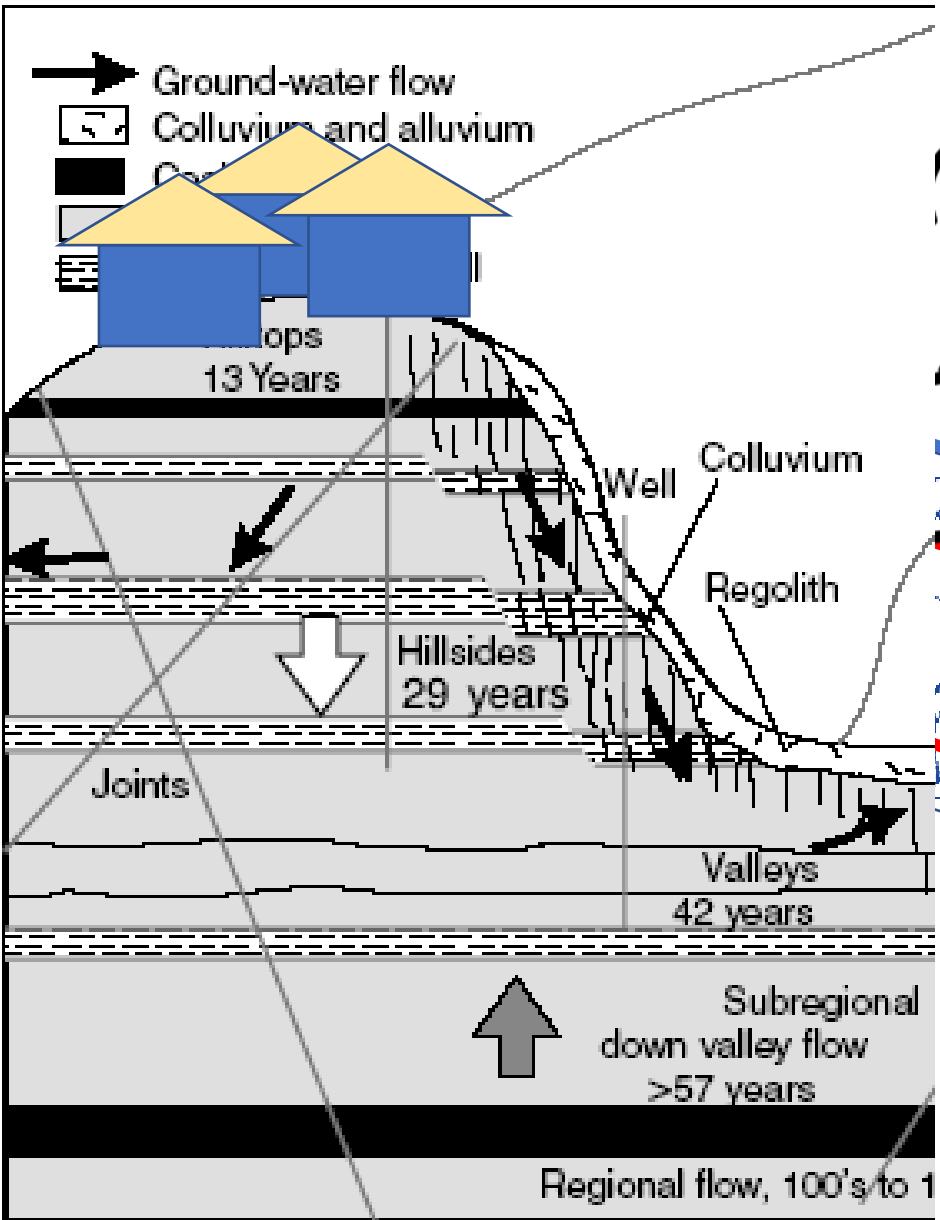
Summary and review

Prediction is hard

Which plane will fail?

What is the cohesion?

Fine root cohesion most important



How much water?

Acknowledgements

IRISE working group

University of Pittsburgh

Questions?