# What’s so epic about Epic?

Justin Kwapong (EC ‘24) and Charlie Peck (EC '84)
Earlham College
(with a lot of help from our friends, one of whom is here…)

# Legal Notice (cp)

We have little to no formal training in biology, geology, glaciology, ecology, ornithology, or archaeology.

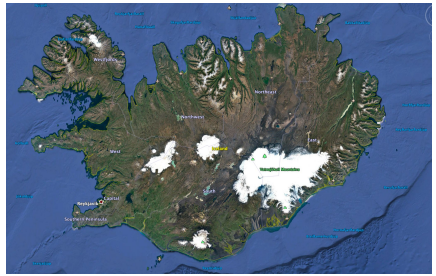
We are:

A computer scientist/engineer that works with people trained in those disciplines on multidisciplinary science problems situated in and around Iceland.

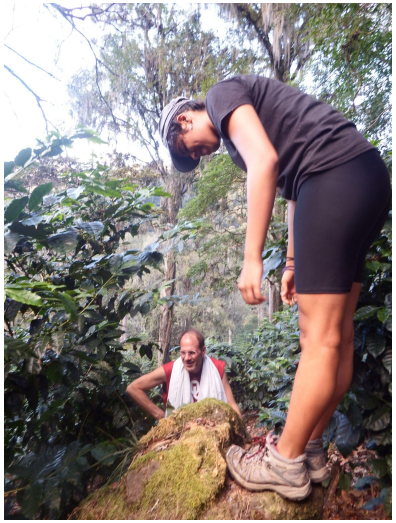
A senior biochemistry major.

# What we will cover (cp)

Backstory
Surveying
Environmental DNA
The other bits




# Backstory (cp)



Serendipity
Students, faculty
Inexpensive, open
Sólheimajökull, Stöð, Skalanes; Nicaragua
Archaeology, biology, ecology, glaciology, ornithology
Microbial and ancient environmental DNA, quadcopters
Earlham College, National Geographic Society
Epic program since 2017

# What can you do with quadcopters? (jk)

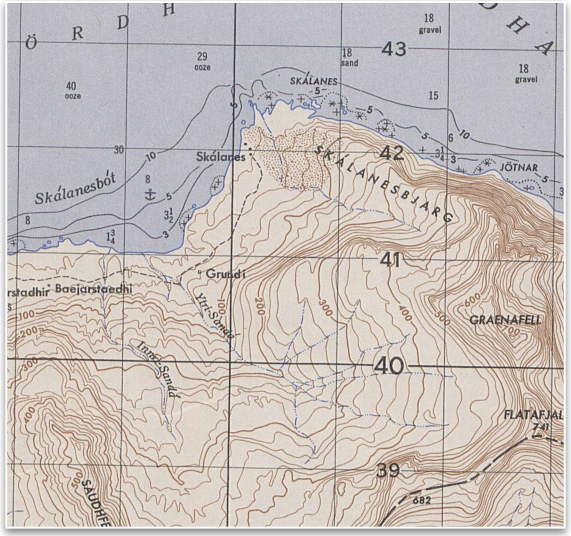
- ❏ Payloads, with many caveats (e.g. LiDAR, NIR camera/lens)
- ❏ It is a flying camera, many more capabilities to come thanks to Moore's Law
- ❏ Single images, e.g. sample spot and context photographs
- ❏ Image sets for surveying larger areas, 2D and 3D assemblies
- ❏ Inexpensive, open tools (e.g. the Portalyzer)
- ❏ Ground cover identification
- ❏ Invasive species measurement
- ❏ Avian nest identification
- ❏ Subterranean points-of-interest identification (archaeology)
- ❏ Movies, training and storytelling

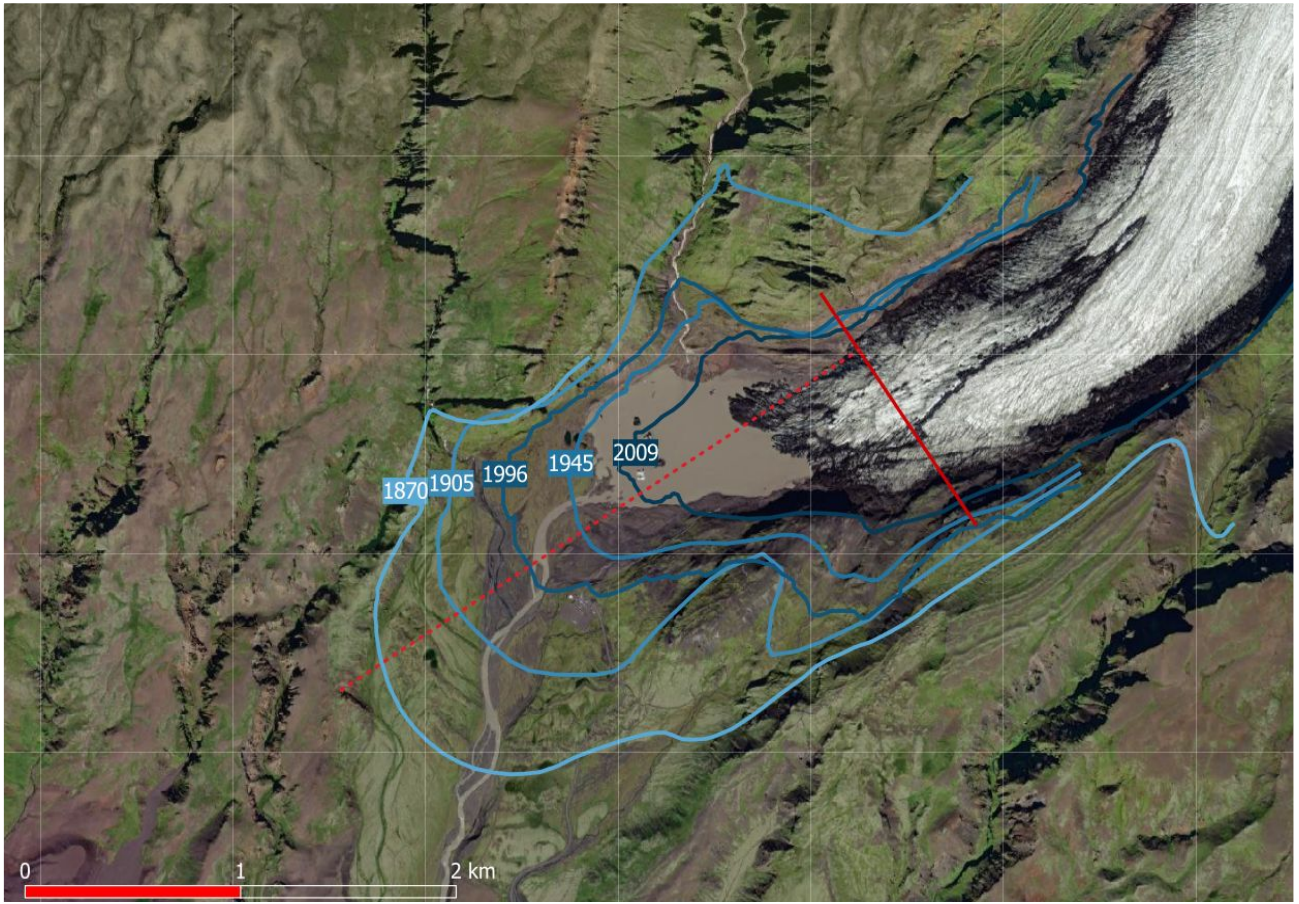
# Payloads (jk)

NIR rig for Autel Evo II

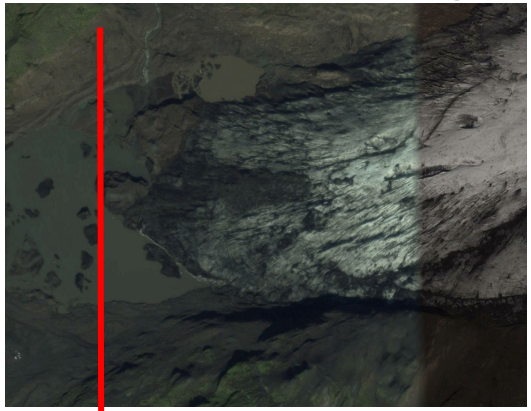
DJI PIII w/ DIY LiDAR rig

# Surveying (jk)

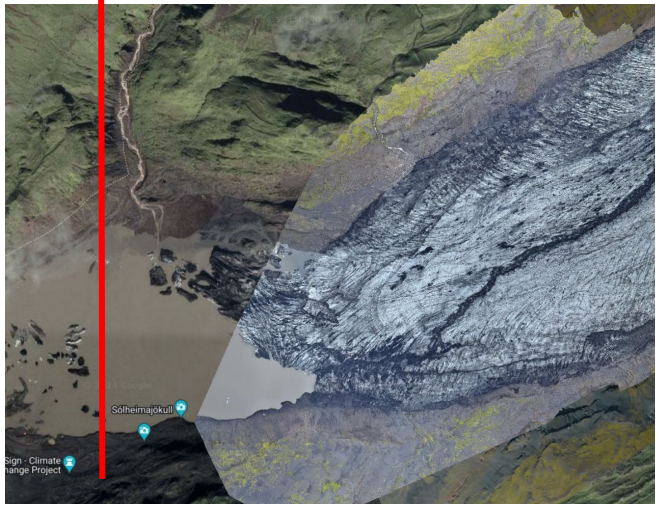


# Sólheimajökull (jk)



2013

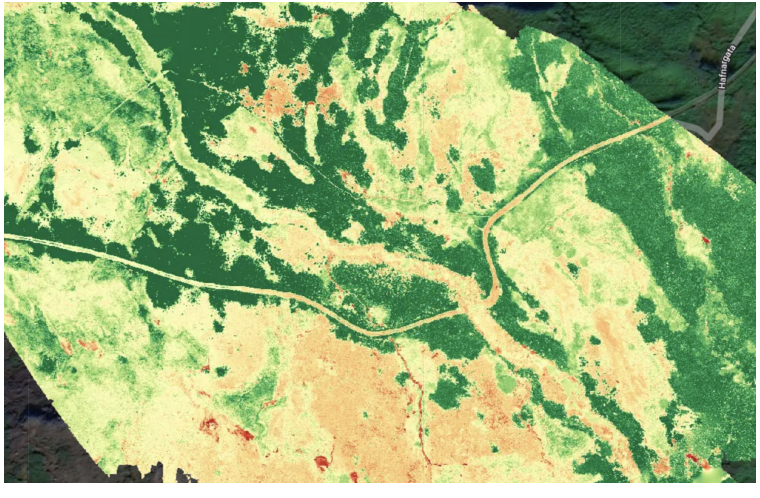



2023

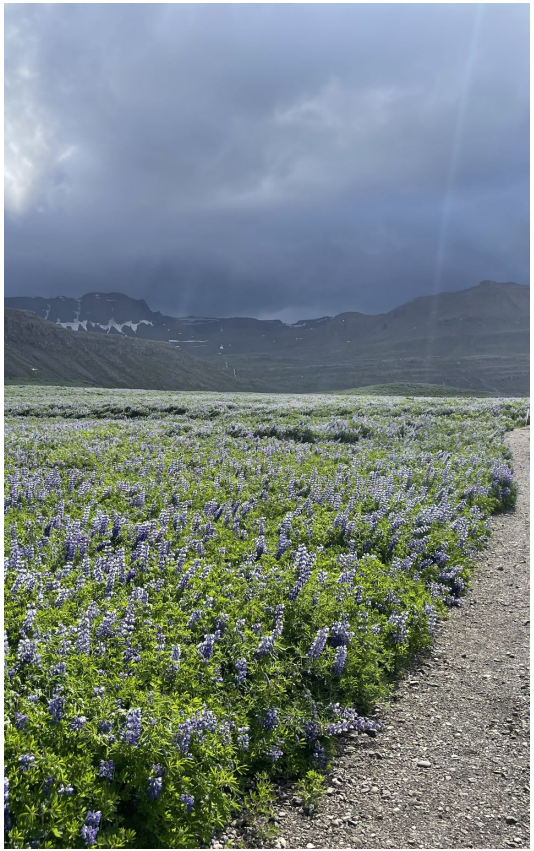
Assembly from ~300 images taken at 200m
Approximately 1.5km x 4km ground area
(Ash is from E15 in 2010)

# Ground cover identification (cp)

- Lupine introduced in the late 1800s to control erosion caused by anthropogenic activity
- Now an invasive species, interferes with ground nesting birds, e.g. the Arctic Tern



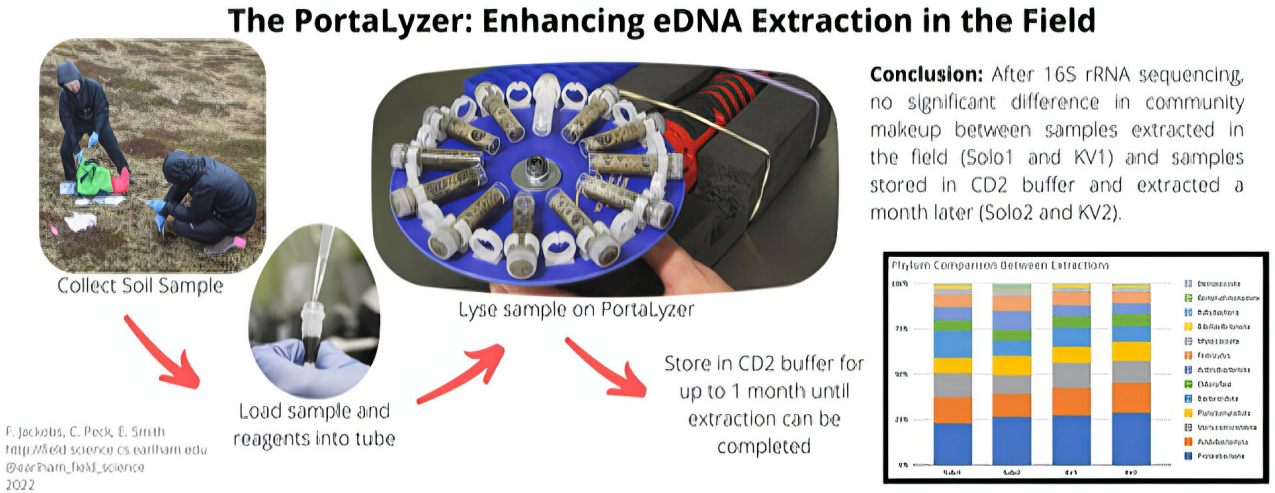
# Nest identification (cp)



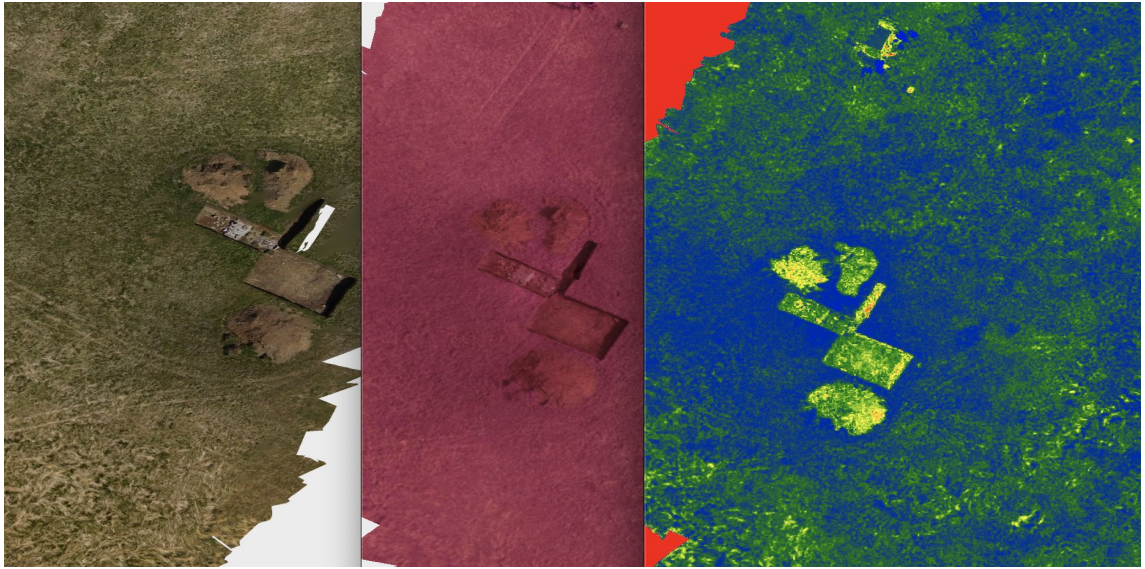
# The Portalyzer (jk)

- Problem: It is difficult to transport soil across International borders.

- Solution: A battery powered device that supports DNA extraction in hostel kitchens…



# Stöð ( cp)



# Storytelling ( jk)

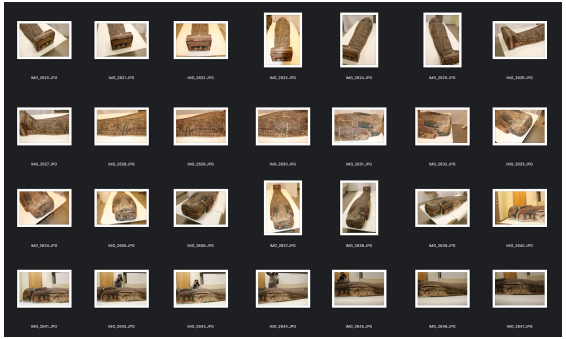
# Environmental DNA (young and old) (cp)

Icelandic soils

Microbial DNA from soil and water
- 16/18S rRNA sequencing
- Glacial forefield
- Avian nesting grounds
- Invasive species
- Fjord

Orgismal DNA from soil
- Whole genome sequencing
- Archaeology sites
- What they grew and ate
- Who they were

# And now for something completely different… (cp)

180 images, 1.3GB total
(less than Frozen, and more interesting)

# The other bits (jk (3), cp (3))

Cultural and community connections, Oli and Rannveig

How we learned to stop worrying and love the storytelling (Kate)

Long-term view, longitudinal science

Working with data, lots of it

Edge computing (CS!)

Skalanes (alumni trip)

Questions?