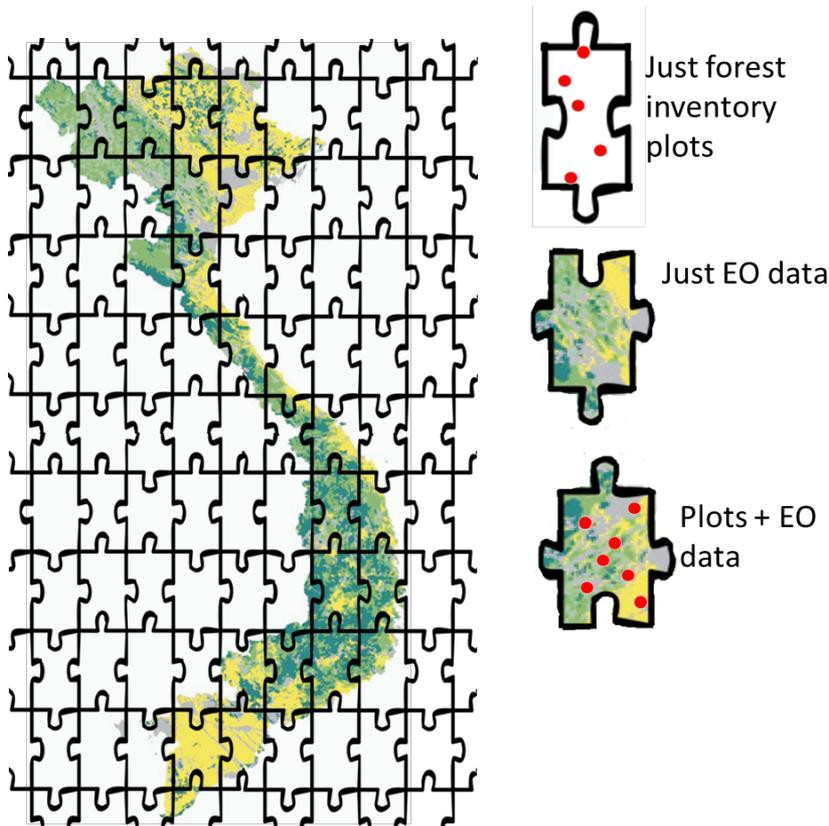


# NFI problems where new EO data can help:

**Nonresponse:** Can we fill in areas where there are “holes” in the inventory with EO data?

**Efficiency improvement:** Stratum weights for stratified estimation, predictors in model-assisted regression or model-based estimation?

**Inventory design:** Does the “inexpensive” data help us optimize the inventory design (pre-stratification, double sampling for stratification)?



How can we combine ground and EO data to improve forest monitoring?

I'm just a regular guy, trying to find a new dataset.

### Data Dating Profile:



**Lister, Andrew** -FS

Research Forester • FS-NRS- Forest Invntry & Analysis

 Start chat  Send email 

- **Height:** 1.88 m, **Weight:** 86.2kg
- **Physical description:** green-ish eyes, bald-ish pate
- **GIS Skills:** high intermediate
- **Remote sensing skills:** intermediate
- **Programming:** high intermediate R, SQL, low intermediate Python, rudimentary javascript, other languages.

Seeking an EO dataset with shared interests.

Contact me if you want to spend time staring into my eyes, working on fun projects together, and can be easily operationalized. **I don't want to spend a lot of time trying to understand you, as I am very busy and can be impatient.**

I've been courting ICESat2 for awhile..

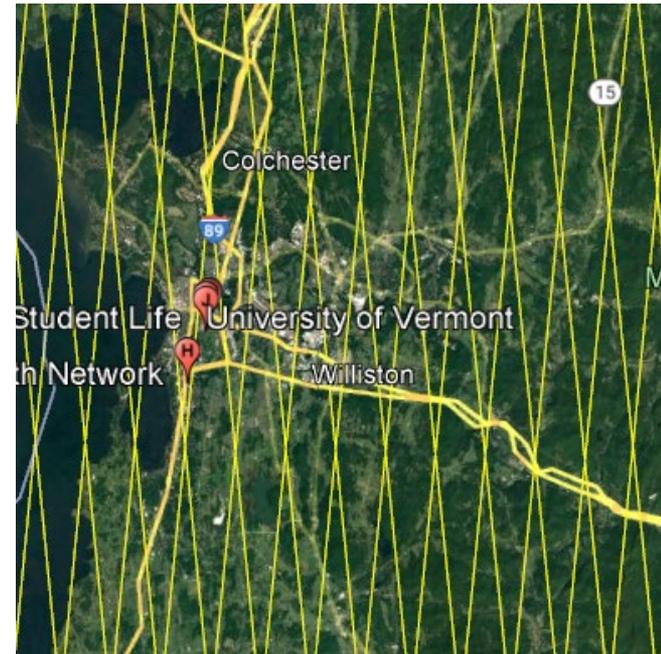
### Data Dating Profile:



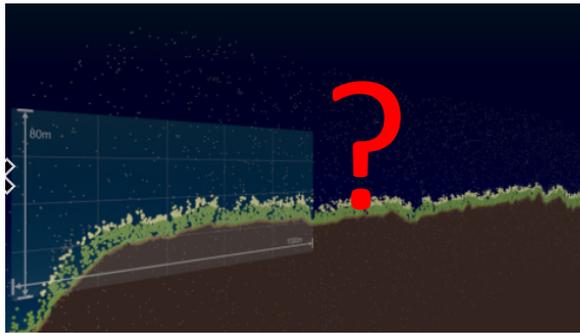
- **Height:** 481 km, **Weight:** 1,514 kg
- **Physical description:** boxy, with long arms and piercing, yet sensitive eyes
- **GIS Skills:** You can't just load me into ArcMap!
- **Remote Sensing Skills:** You need to get beyond my complicated jargon to really know me.
- **Programming Skills:** I'm open to anything, but the way to my heart is through Python.

Seeking someone who can understand me. I just want to be helpful.

Here's an Insta of me visiting my friends at UVM!



# The obvious first date question: How do your height data align with reality?



## Studying vegetation canopy with ICESAT-2

2021.09.17

Although the primary mission goal of ICESat-2 is to monitor changes in the cryosphere, ICESat-2 also collects elevation data over the Earth's land surfaces providing geodetic measurements to support a wide range of terrestrial applications. In the temperate and tropical regions, ranging measurements from ICESat-2 are used to produce estimates of

1. Download some sample data
2. Overlay them on aerial imagery and see if they make sense

### Our first date:

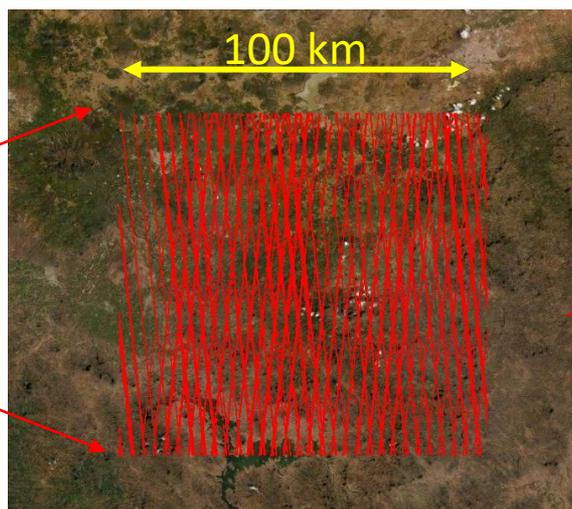
1. ICESat is pretty easy to download. You define a box, choose dates, and it writes a Python script for you, which you run and it downloads .h5 files.

File Name	Elevation (m)	Start Date	End Date
ATL08_20211208015412_1170130_6_005_01.h5	111.7	2021-12-08 01:54:11	2021-12-08 02:02:42
ATL08_20211118144541_0873130_2_005_01.h5	36.8	2021-11-18 14:45:42	2021-11-18 14:52:45
ATL08_20211114145401_0812130_2_005_01.h5	36.5	2021-11-14 14:54:00	2021-11-14 15:00:26
ATL08_2021113030953_0789130_6_005_01.h5	87.9	2021-11-13 03:18:20	2021-11-13 03:18:20
ATL08_202111090318... .h5		2021-11-09 03:18:20	2021-11-09 03:18:20

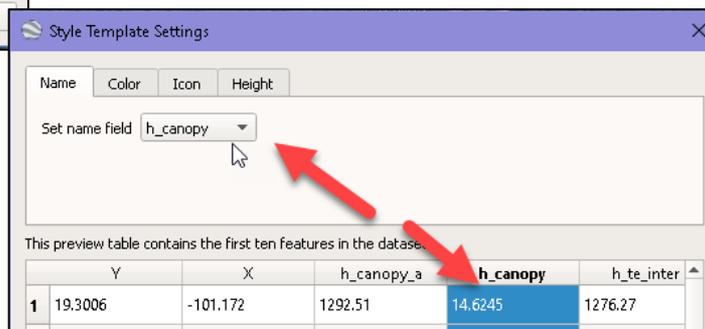
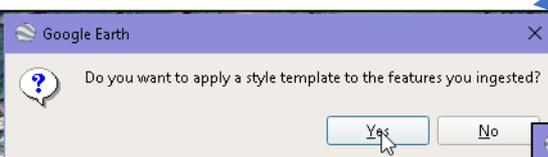
2. But wait.. .h5 files won't load in ArcMap! Needed to awkwardly figure out how to read contents of .h5 file and extract individual layers from this multidimensional file format, for many files at once.

## Our second date:

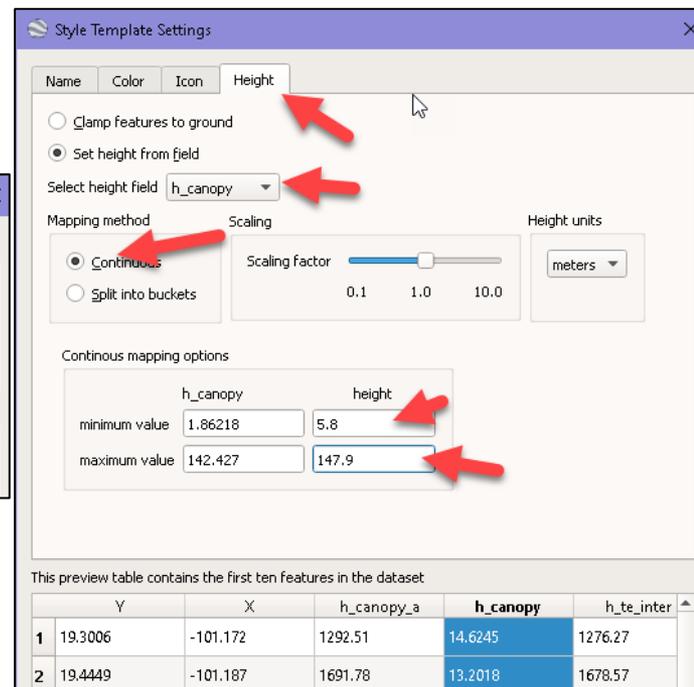
1. Wrote some R code that would extract x, y, canopy\_height for all .h5 files in study area.  
>206,000 points across multiple years (2018-2020)



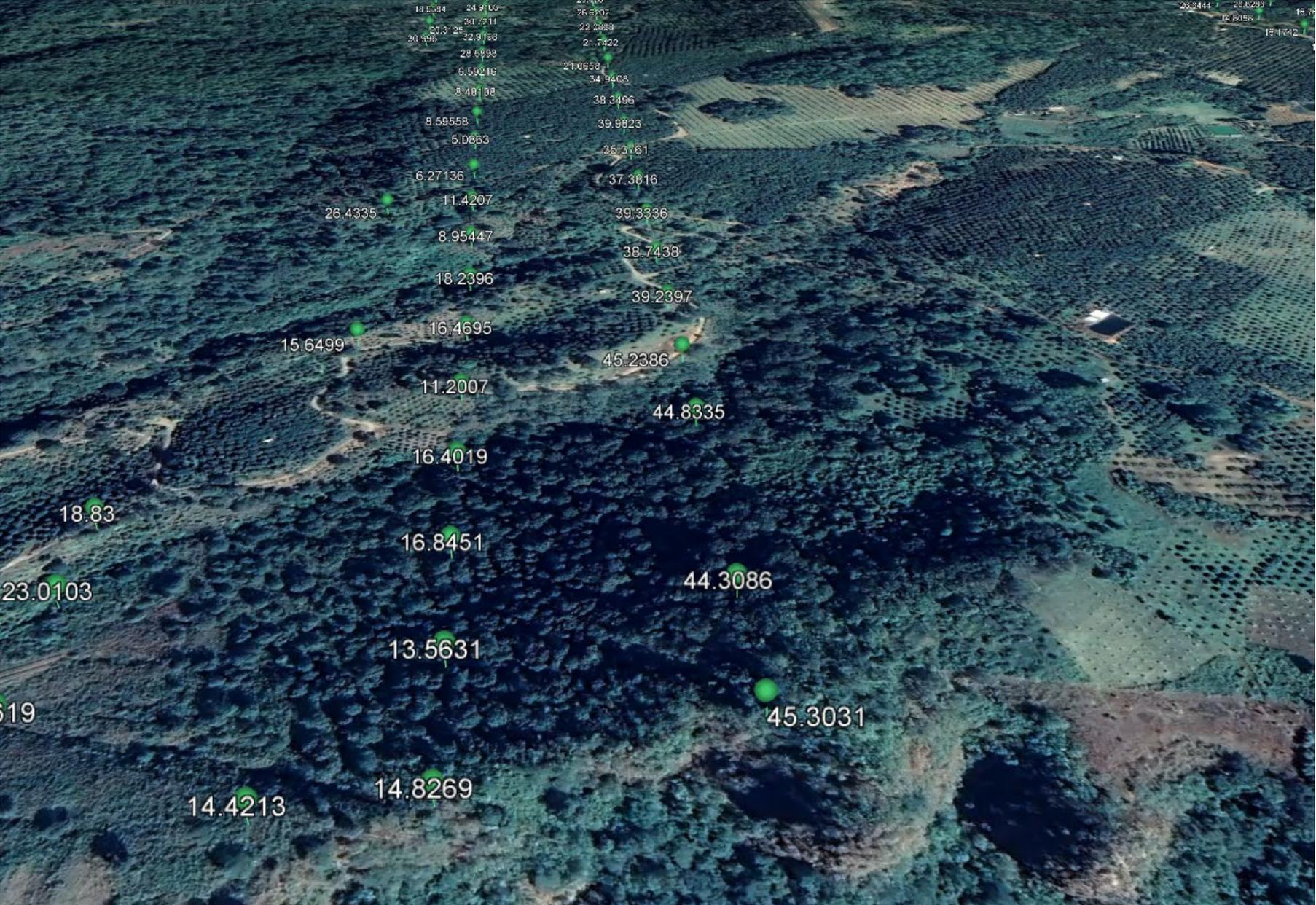
Get a 1% subset of the 200,000 points, and load in Google Earth.

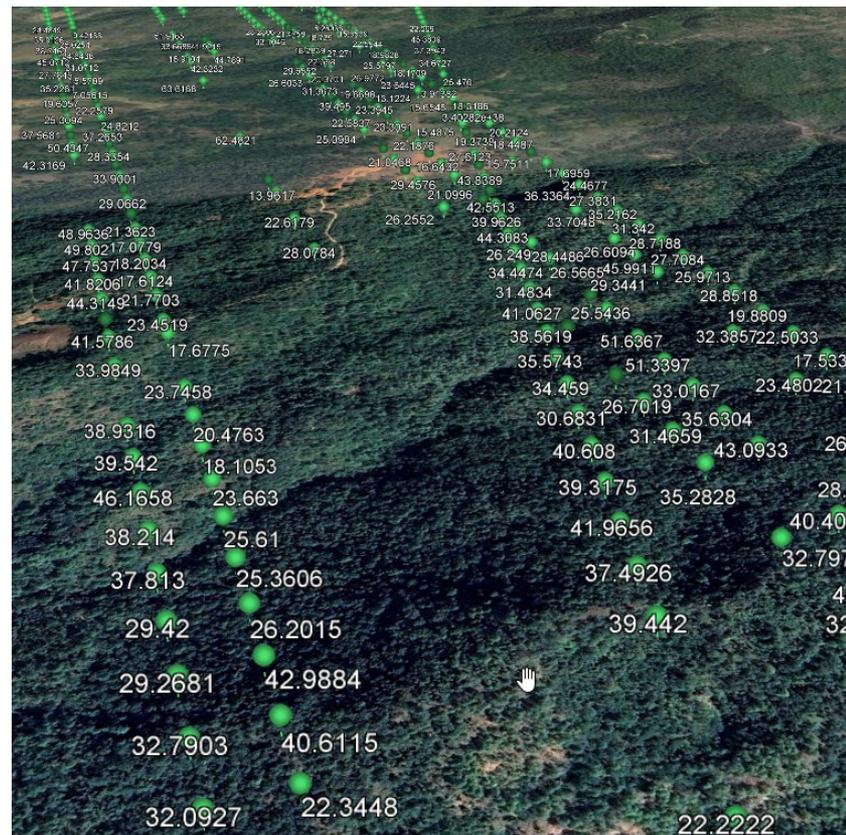
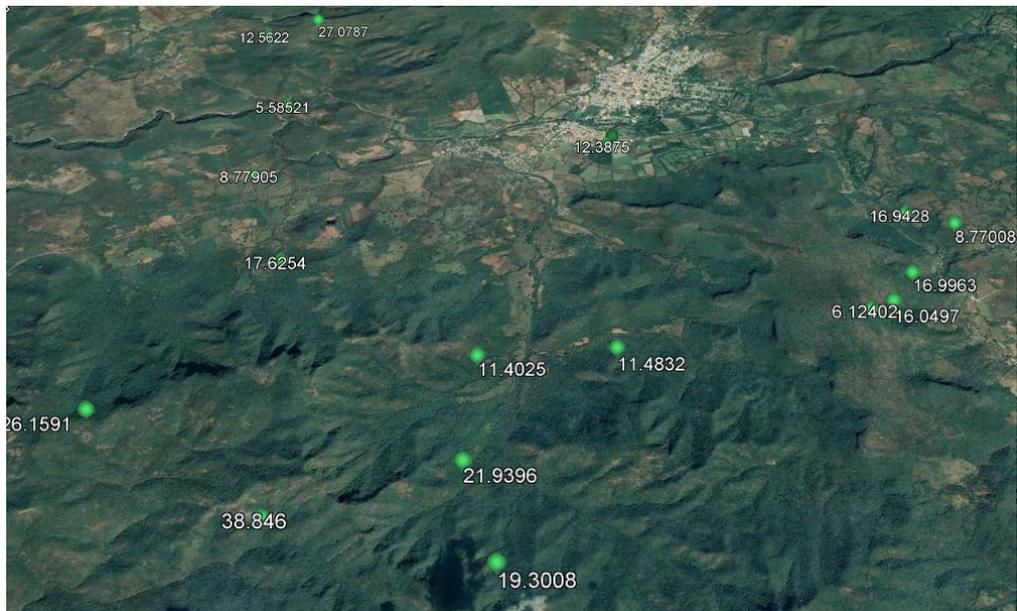


I impressed ICESAT with my Google Earth Skills!



Our third date: I think I am in love!





Things I didn't like about our dates.

1. ICESAT was hard to read – I had to guess and use trial and error to break through its barriers.
2. Strange behaviors at times (canopy heights of  $10^{34}$  )
3. Very demanding (took a long time to load 200,000 points, 100x100km area)
4. It was evasive (canopy height is actually some sort of an aggregate of a 100-m long strip of five 20m ATL03 geosegments).

All in all, I want to keep seeing ICESAT, and I need to learn more and about its relationship with ATL03 before I commit to more dates.



Andy Lister  
andrew.lister@usda.gov