**Drones ESIP Summer Meeting Notes**

Introduction

* Pairing procedure – push up and push down. You know it is on when it stops flashing.
* the barometer model allows you to hover much more effectively.
* 4 Things to Accomplish by Today:
  + Hovering – getting up and then landing
  + Backwards and forwards
  + Left and right
  + Moving yourself in a circle
* You will crash. Just be mindful.
* Red is always forward-facing.
* Once you’re hovering, the rest can be done with the right joystick
* All kits have additional spare parts
* Align yourself into the wind. – use the high mode when you are outside
* The camera should be in the bottom – can pair your phone to it

Randy Russel – FAA App B4UFLY

* Lacks a little bit of accuracy
* Shows a map, and puts circles around a 5-mile radius of an airport, hospital, etc.
  + There is usually a phone number associated with an airport etc. – you can call to see if you can fly there
* Recreationally: how high can you go? 400 ft is considered recreational. 500 ft becomes commercial airspace.

Talks Part #1

**Sensors and Drones: Connecting for Science**

Lindsay Barbieri, UVM

*Exploration of connecting & using earth monitoring sensors with recreational drones (carbon dioxide sensor, wind, thermal and imagery: RGB and near infrared camera and multi-spectral cameras)*

* Good opportunity to bridge the in the field and satellite – identifying small & inexpensive platforms to get more information on the environment. Integration of computer and environmental science.
* Monitor emissions – make sensors lightweight and low-powered enough to be used on a drone.
  + Found cheap, lightweight C02 meter, only 23 g: K30 C02 meter: $100
* Drone flights – able to get repeated measurements and very portable
* ESIP Drone Cluster: has an open science framework
  + <https://osf.io/nubem>

**Placed Based Learning: Pairing Satellite and Drone Data**

Preston Lewis, NASA

*Using the MY NASA DATA Live Access Server, you can pair your Drone collected data with NASA Earth System Science data to better understand what’s going on in your backyard (Your schoolyard too)!*

* all of NASA’s data is free to you, but data can be hard to collect/confusing as a citizen. That is what MY NASA data exists
* My NASA server – portal for the data. Try to archive.
  + Most all we have now is atmosphere
  + We should be getting more than just atmosphere soon, and there will be a regional dataset
* Gives students real-world sense of this is what other people are using as well.
* Solar Cell dataset: Shows the solar potential. Plots the dates that don’t have capacity for solar.
* Every time you take a photo: data through numbers, data through pictures, data through both
* Ability to look at a line plot that you could produce. If you collect data, you could try to compare and contrast to the NASA data. Using a real-life plot can help them learn and retain what it is like to plot data.

**The Modern Blanket Toss: STEM Outreach in Rural Alaska with UAVs**

Kirk Hogenson, ASF, University of Alaska

*The Modern Blanket Toss is a program through which high school students perform experiments using unmanned aerial vehicles (Quad-rotor and Hexcopter UAVs), GPS tracking devices and Geographic Information Systems (GIS)  to perform experiments and activities that help their communities, such as search and rescue or charting sea ice.*

* Students from underserved areas of Alaska use the drones to help their communities. Try to find a way to apply their new skills.
  + DGIs are expensive (several hundred/several thousands)
* Agisoft Photoscan allows them to connect the photos to the GIS or Google Earth
* One student looked at Coastal Erosion – flew with her own drone and went across the coast to help them determine where erosion was happening in her community
* The river is a big highway, but it gets dangerous in the summer. One student used the drone to monitor the river and find where the river is going to break through. Help them identify where not to go with their snow machine.
* You can apply this to other communities and get students excited.

Talks Part #2

**Droning in New Zealand: flying a DJI Phantom and generating 3D models from imagery**

Sean Barberie, UAF

*Lessons learned from a proven methodology where “small aircrafts answer big questions” easily duplicated in STEM education.*

* Castle Hill formation – see how much you could do with the 20 minute battery flight
* Has a “backpackable” drone
* Structure from Motion: take a lot of pictures. Same things from all these different angles that then creates a large fully functional model. Off the shelf drone with drone
* Sketchfab.com/seanrgb
* How much was the camera? Can you get an infrared?
  + Camera came with the drone
  + There are some custom infrared

**Drone Resources Catalog: Examples of Drone Activity in the Earth Sciences**

Kush Bhakta, NASA (GSFC Intern)

*This presentation will showcase the ESIP Drone Resource Catalog which attempts to document drone-based earth science projects and software within the drone community -and- describe the experience of implementing drones into undergraduate research from the perspective of a first-year college student.*

* Data management for Drone - We want to understand what drone data is and create standards for metadata in order to ensure data is available in the future
* Catalog page in ESIP Drones – drone based surveys you can find – All drone collected data can fit into the “Drones in Science” data 9 categories
* Lots of activity going on with new types of interesting data – ex. Drones going into glacial crevasses.
* Biogeosciences – most of the drone activity will be done here.
* Software side: open source & commercial software. GPS enabled drones.L ooking at open source options. Flight software. Post processing (after collecting data and want to create a final product) – ongoing and growing open source
* <https://osf.io/ub84e> for more information

**Comparing drone cameras with instruments on polar-orbiting satellites**

Presenter: Margaret Mooney, CIMSS

*Recreational drones provide the perfect stepping stones for G6-12 students to consider undergraduate research projects or careers in remote sensing.* *This talk explores similarities and differences between aerial photography collected by drones and digital data acquired during satellite flyovers, including a very cool way to acquire satellite images via the SatCam app.*

* Cameras on Drones with Instruments on Polar-Orbiting Satellites
* SatCam – free! NOAA & NASA’s data for you to use. Good for drone
  + There is an app
    - Satellite overpass: when a satellite passes over you
    - The app will tell you when a satellite is going over you each day
  + You will start to create your own history of your observations
* Drones & SatCam – you can take images of greening up and down throughout the seasons