Converting Skydio Flight Logs to CapTopo Maps

This is a manual workaround until Skydio comes up with more streamlined and automated support for CalTopo. I wrote this script with the help of ChatGPT to make Skydio drone flight logs from our SAR organization's UAS team accessible to Search Management team and others during an active search. We run this after each Operational Period.

This script is deliberately minimal to reduce the risk of breaking something in our production CalTopo or Skydio accounts. Note that Google Earth and many other products can also use KML formatted files.

High-Level Use Case: You will take CSV-formatted flight logs from Skydio, convert them to KML format using a python script, then import them into CalTopo to be able to visualize them on a common map with other objects and/or share with others.

Requirements / Assumptions

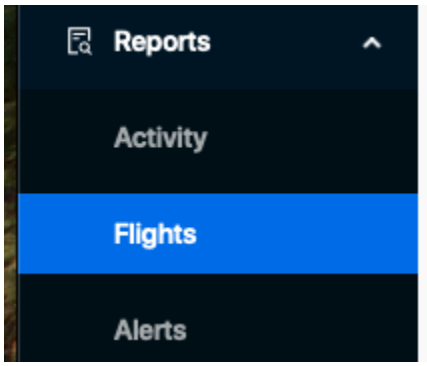
- CalTopo access to import and manipulate objects
- Access to Skydio Cloud and able to export flight logs, OR a copy of the pilot's skydio logs exported in CVS format
- A laptop with python3 installed, or an iOS device with Pythonista (paid app) installed. The laptop method is preferred over the iOS method.
- A copy of my script "csv_to_kml.py" (for laptops) or "csv-to-kml_iphone.py" (iOS). You can get it from Github (https://github.com/billburns250/csv_to_kml)
- Internet access, to be able to import the converted logs into CalTopo
- Read/Write access to a CalTopo map in your account. For SAR purposes, use your team's CalTopo account. Some CalTopo features described below may only be available in a "team account" or in SAR mode, but basic object import should work.
- It's *highly recommended* to run the file conversion and import the files from a laptop, not a mobile device. While the latter is possible, it's just more clumsy due to UI limitations.

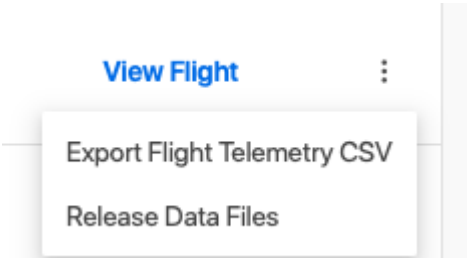
Instructions - Laptop

NOTE: These steps work, but must be followed exactly as written. This script is not a "commercial" product by any means, it handles one known error case from Skydio logs, but there may be more that haven't been discovered yet. It is highly recommended to use python on a laptop instead of the Pythonista + iPhone/iPad route.

Export Skydio Flight Telemetry Logs

1. From your Skydio account, select each drone flight and select “Reports → Flights”





2. For each flight, select “*Export Flight Telemetry CSV*”
3. For brevity, rename each flight something short like “pilotname_MonthDay-Flight number”
    a. Example “bburns_Aug10-1.csv”

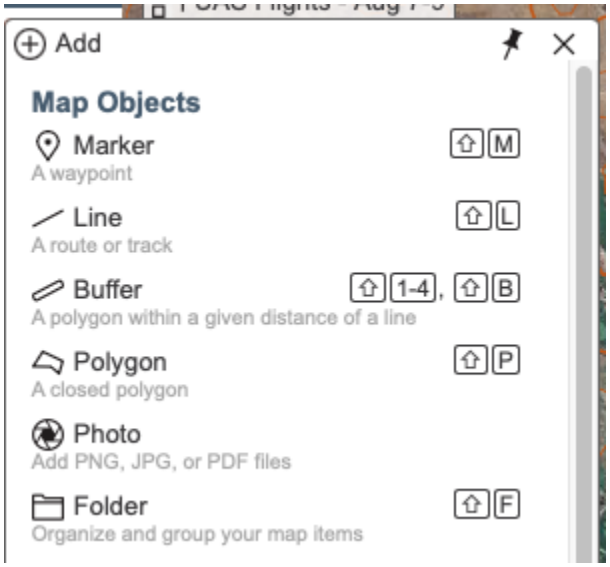
Convert CSV to KML format

4. Run the python script “`csv_to_kml.py`” against each CSV file to convert it into KML format, specifying the input and output file names.
    a. Example: `python3 ~/bin/csv_to_kml.py dhill-Aug7-2.csv dhill-Aug7-2.kml`
5. The python script will generate a summary report for each file it converts, like this:
    a.
```
Available CSV headers:
  'Datetime (UTC)', 'Latitude', 'Longitude', 'GPS Altitude (ft MSL)', 'Satellites', 'Horizontal Accuracy Estima
te (+/- ft)', 'Vertical Accuracy Estimate (+/- ft)', 'X Velocity (m/s)', 'Y Velocity (m/s)', 'Z Velocity (m/s)'
, 'Speed (m/s)', 'Velocity Accuracy Estimate (+/- m/s)'
Detected columns:
  timestamp -> 'Datetime (UTC)'
  latitude  -> 'Latitude'
  longitude -> 'Longitude'
  elevation -> 'GPS Altitude (ft MSL)'

Finished writing KML to: dhill-Aug7-1.kml
Rows processed: 7774
  Rows written: 7773
  Rows skipped (invalid/missing data): 0
  Rows skipped due to invalid coordinates (0.0): 1
```
    b. The script runs very quickly, and is flexible to automatically detect and handle common CSV headers in case they change or this is used for another device.
    c. Don’t worry about a small number of “rows skipped”. Occasionally Skydio flight logs include one or more rows with a lat/long of “0,0” at the end of the log – this script detects and ignores them. It doesn’t include them in the converted output.

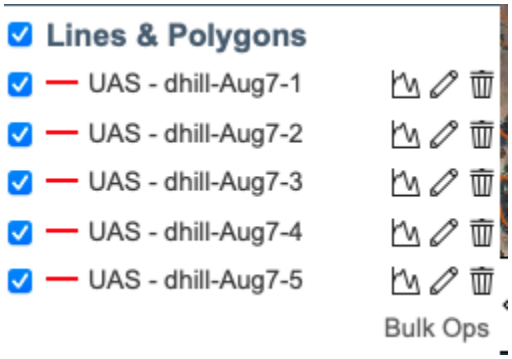
Import the KML files into CalTopo

6. Login to your CalTopo account
7. Click on “Your Data” to find the map you wish to import KML flight logs into
    a. Note: You should do a test import into a non-production map before modifying a “real” incident map.
8. Within “Map Objects”, click “Add” to create a new Folder, to contain your flight logs

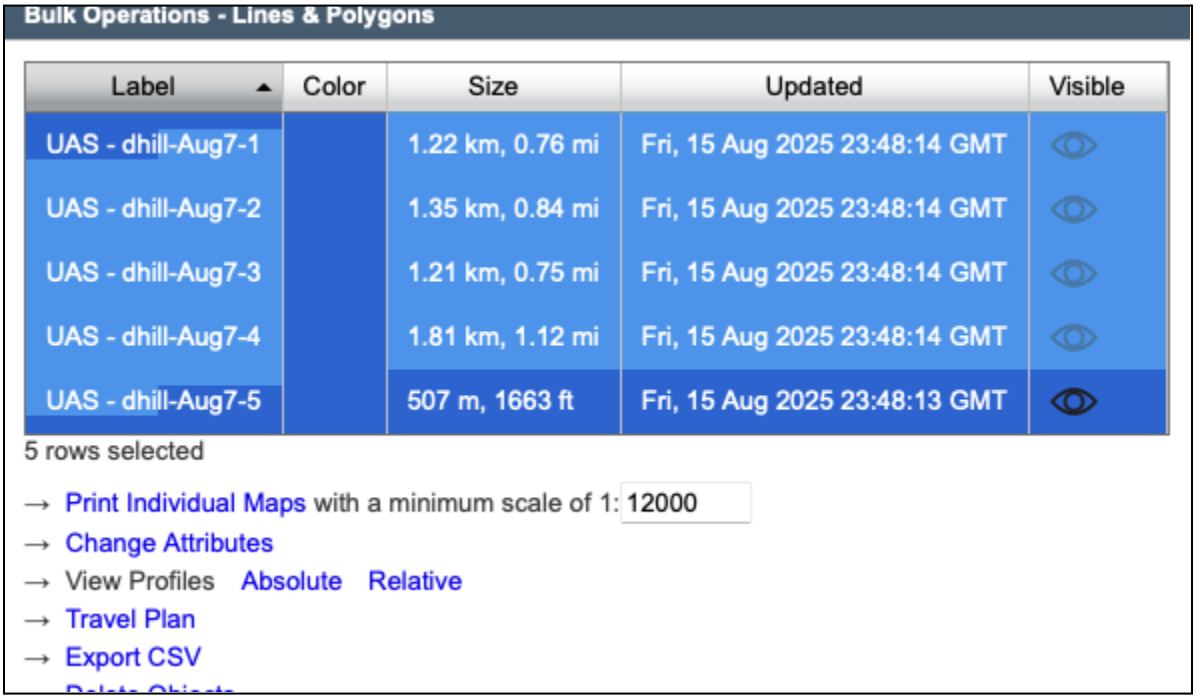


9. Under “Map Objects”, choose “Import”

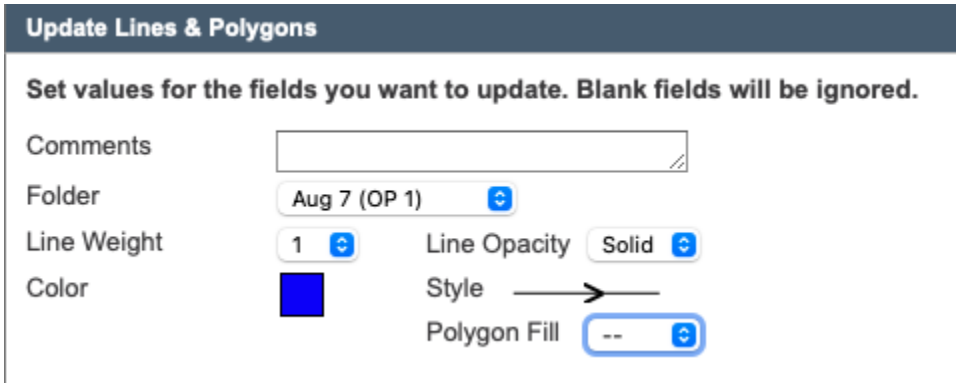
10. In the “Importer” window, choose all of the KML files you created
11. Wait for the input to finish and for CalTopo to process them. It might take a few minutes.
12. Select all the shapes to be imported, and click “Import”
13. If successful, your imported flights will appear within “Lines and Polygons”:



14. Choose the “Bulk Ops” option, then click and shift-click to select ALL of the objects. In the next step we will move and set several attributes all in one operation:

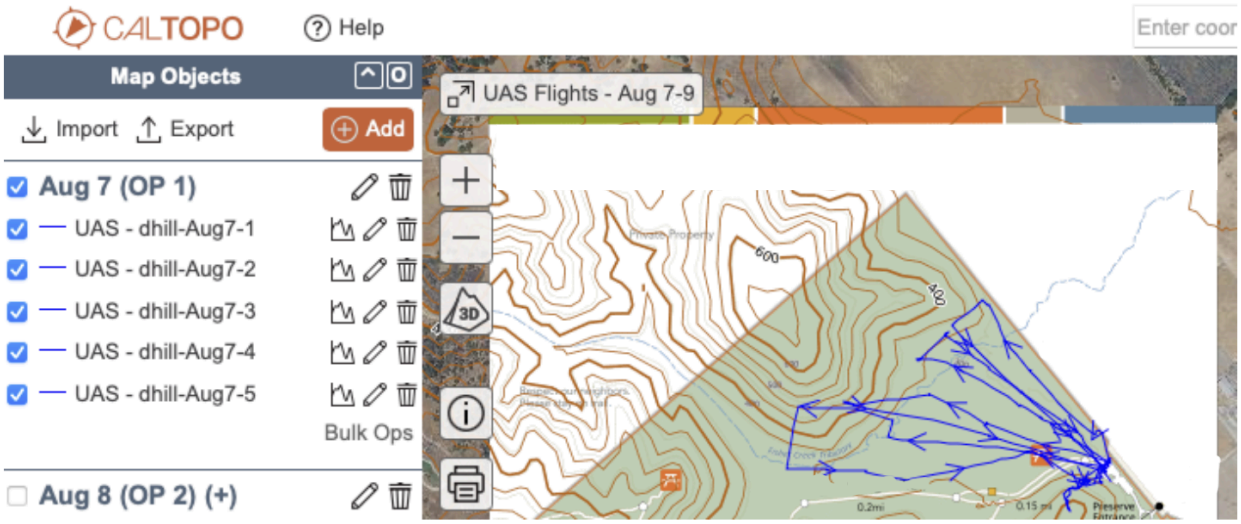


15. Click the “Change Attributes” option:



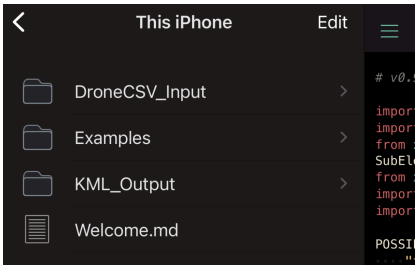
    a. Select the folder you just created
    b. Change the line weight, opacity, and color if desired (I like “Blue”)
    c. Change the line style to be an arrow. This will also show the drone’s flight direction.
    d. Click “Update”

16. Here’s the desired End Result:

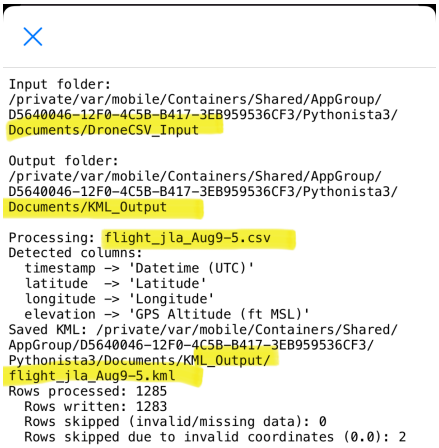


Instructions - iPhone/iPad (It Works, But Not Recommended)

NOTE: These steps work, but must be followed exactly as written. This is not a "commercial" product by any means, it handles one known error case from Skydio logs, but there may be more that haven't been discovered yet. Python on an iOS feels like a hack, but it does work.

1. *Follow instructions above #1-3 to get the CSV files onto your iphone/ipad*
2. *(First time only) Create a new folder on your iPhone within the Pythonista3 sandbox exactly named "DroneCSV_Input"*
3. *(First time only) Create a new folder on your iPhone within the Pythonista3 sandbox exactly named "KML_Output"*
   a. 

4. *MOVE your CSV files from your iPhone into the Pythonista3 sandbox folder "DroneCSV_Input" you just created*
5. *Click the "play" button on the script* 



6. *If everything worked, you should something like this:*
7. *Now go to your KML_Output folder and follow the rest of the instructions above, Steps 6-8.*
8. *You cannot do "Bulk Ops" with CalTopo on iPhone, so I recommend copying the KML files to your laptop or sending them to someone with a laptop to finish the import exercise.*

Known Issues

1. Skydio exported flight logs do not capture the aircraft's actual altitude, but the terrain height. This only appears to be an issue with *exported* logs, not the internal flight telemetry. I've filed this as a bug with Skydio.
2. Sometimes Skydio logs add a row with a lat/long of "0,0". This script detects and ignores those, so it doesn't affect the output.
3. Pythonista on iOS is difficult to get files into/out of, because of the iOS sandbox restrictions. If you get errors about "no CSV files found", this is because you've put the source files in the wrong folder.