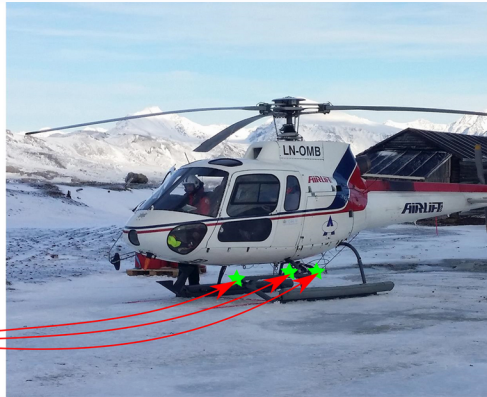


EGM702 – Photogrammetry and Advanced Image Analysis

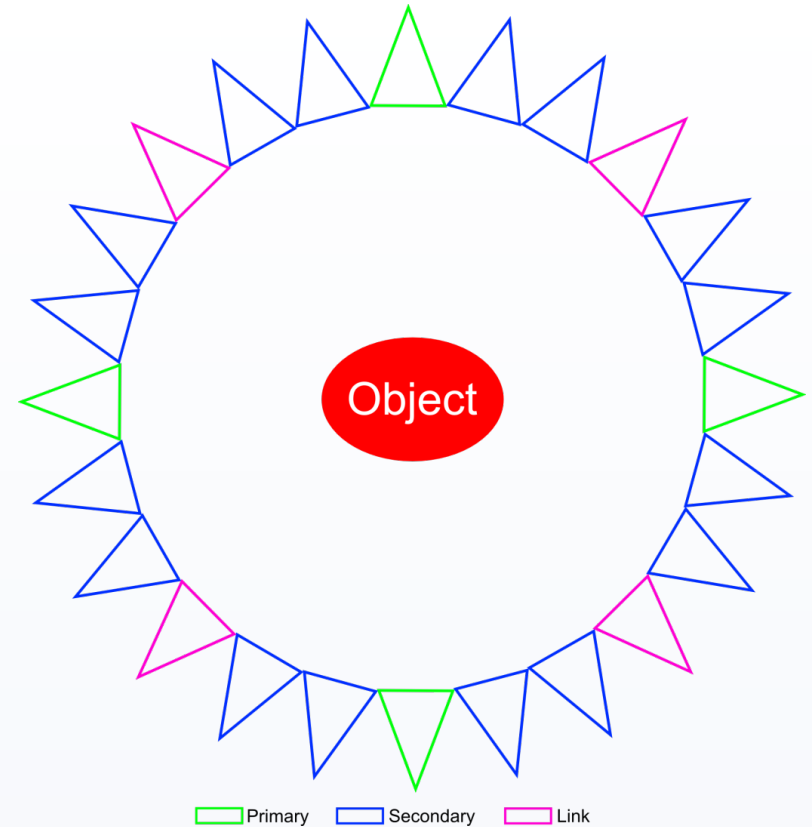
Week 1, Part 5: Acquisition Planning

What do we need?

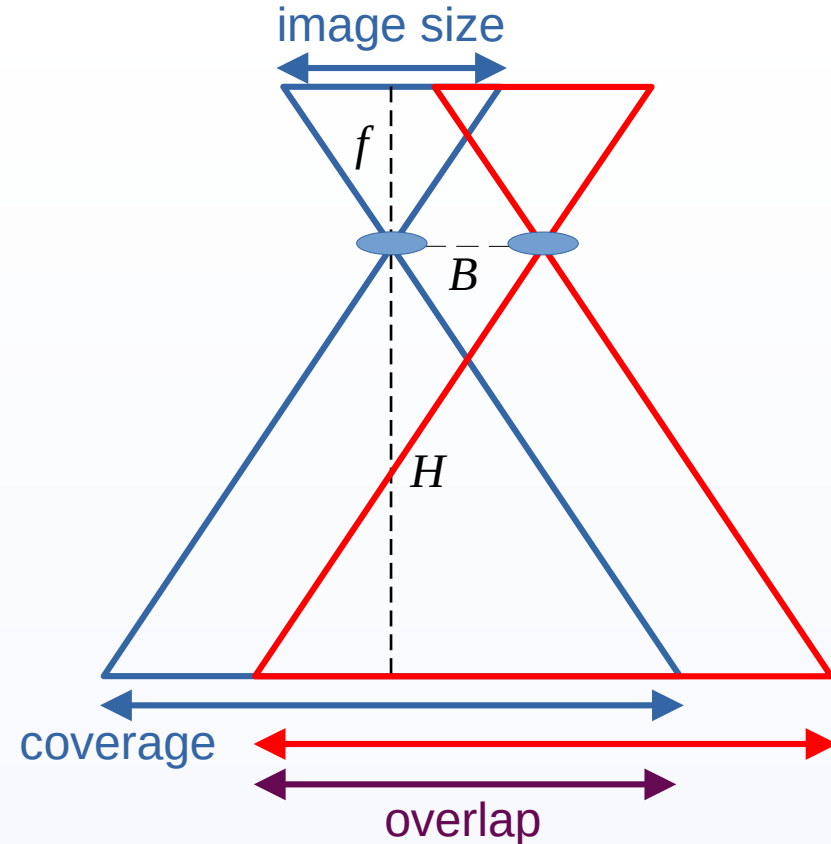
- A suitable camera
- A platform
- An acquisition (flight) plan

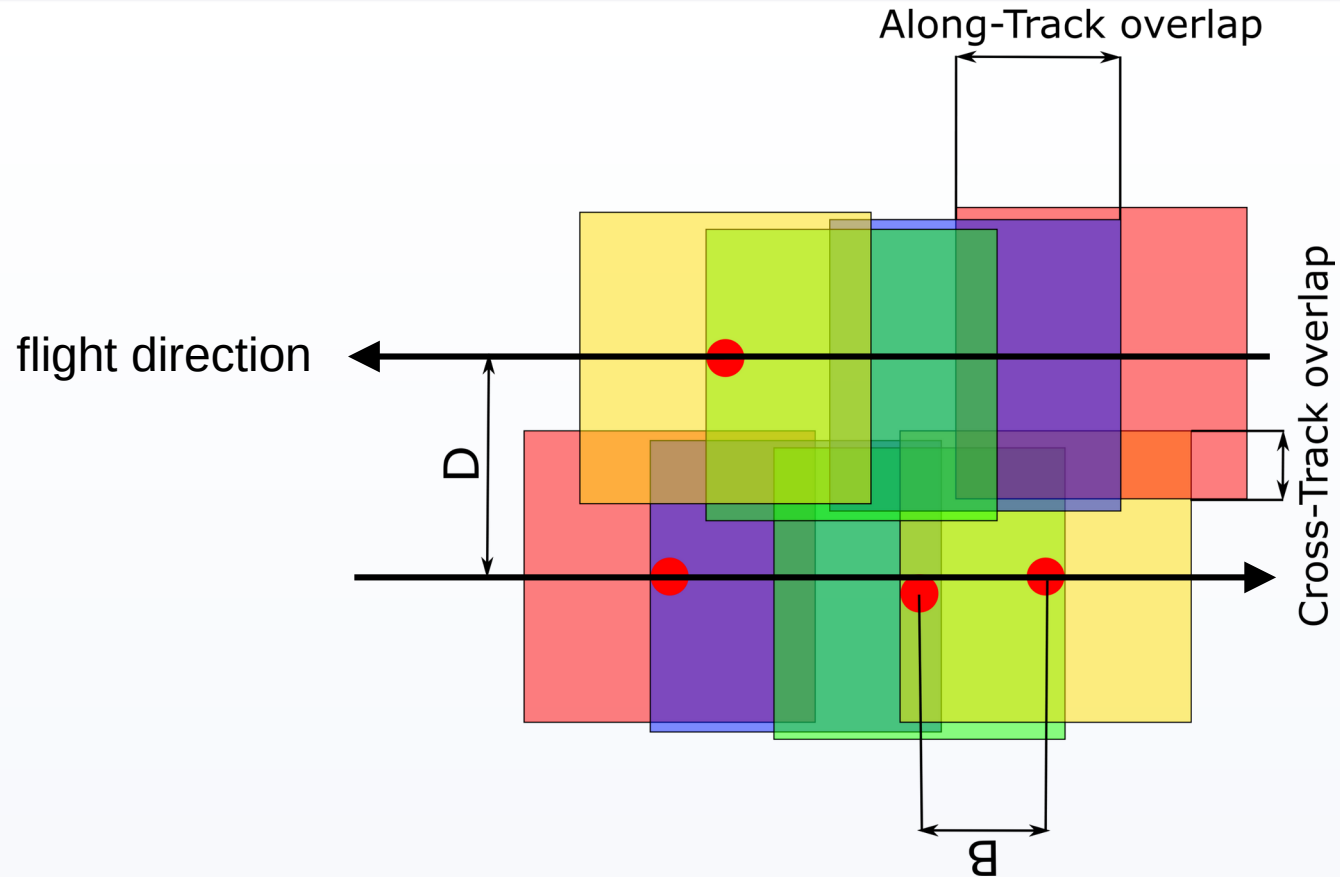


- Try to get a full 360° view of object
- Multiple views of each “side”: better results
- Remember: only get results for what camera “sees”



- Images have to **overlap**
- Ratio of B (distance between cameras) and H determines DEM accuracy
 - $0.6 \leq B/H \leq 0.9$ typically gives best results
 - Better results with larger B/H (i.e., 0.9 better than 0.6)





Necessary parameters

- Camera parameters: f , size (x , y)
- Desired scale (or ground sampling distance, GSD)
- Size, average elevation of survey area
- Desired overlap (along-track), sidelap (cross-track)
- Aircraft speed
- NB: many (free) software packages exist for flight planning

A worked example

- Study area: 10 km wide, 16 km long, 300 m elevation (average)
- Camera: $f = 152.4$ mm, 230 mm 'film' size
- Desired scale: 1:25k
- Overlap: 60%, sidelap: 30%

A worked example

- Plan on North/South flight lines (why?)

- Flying height (above sea level): $H = \frac{f}{scale} + \bar{h} = \frac{0.1524m}{1/25000} + 300m = 4110m$

- Ground coverage per image: $C = \frac{Sz}{scale} = \frac{0.23m}{1/25000} = 5750m$

- Distance between camera centers: $B = (1 - overlap) * C = (1 - 0.6) * 5750 = 2300m$

- Time between exposures: $t_{sep} = \frac{B}{V} = \frac{2300m}{160 km h^{-1}} = 51.75 s$ (round down)
 $B = 2267m$

- Number of photos/line: $N_{photo} = \frac{L_{line}}{B} + 2 = \frac{16000m/line}{2267m/photo} + 2 = 9.1 photos/line$ (round up)

- Distance between flight lines: $D = (1 - sidelap) * C = (1 - 0.3) * 5750 = 4025m$

- Number of flight lines: $N_{line} = \frac{width}{d_{line}} + 1 = \frac{10000m}{4025m/line} + 1 = 3.48 lines$ (round up)
 $D = 3333m$

- Total number of photos: $N_{tot} = N_{photo} * N_{line} = 10 * 4 = 40 photos$

Additional considerations

- Instead of scale, may use GSD (m/pix): $GSD = \frac{H * p_d}{f}$
 - Need to know physical pixel size, p_d
- Cloud/weather conditions
- Time of year
- Vegetation conditions
- Time of day (sunlight)

- In order to acquire images, we need a camera, a platform, and a plan
- Need to consider B/H ratio, camera + survey parameters
- Also consider purpose of survey
- Now, can use specialized software to help plan acquisitions

- Lillesand, Kiefer & Chipman – Chapter 3
- Hasegawa et al., 2000 [[ISPRS](#)]
- 15 drone apps to help you [[Heliguy.com](#)]
- Flight Planner Tutorial [[DJI Flight Planner Tutorial](#)]