ICE BRIDGE: Photogrammetric Camera

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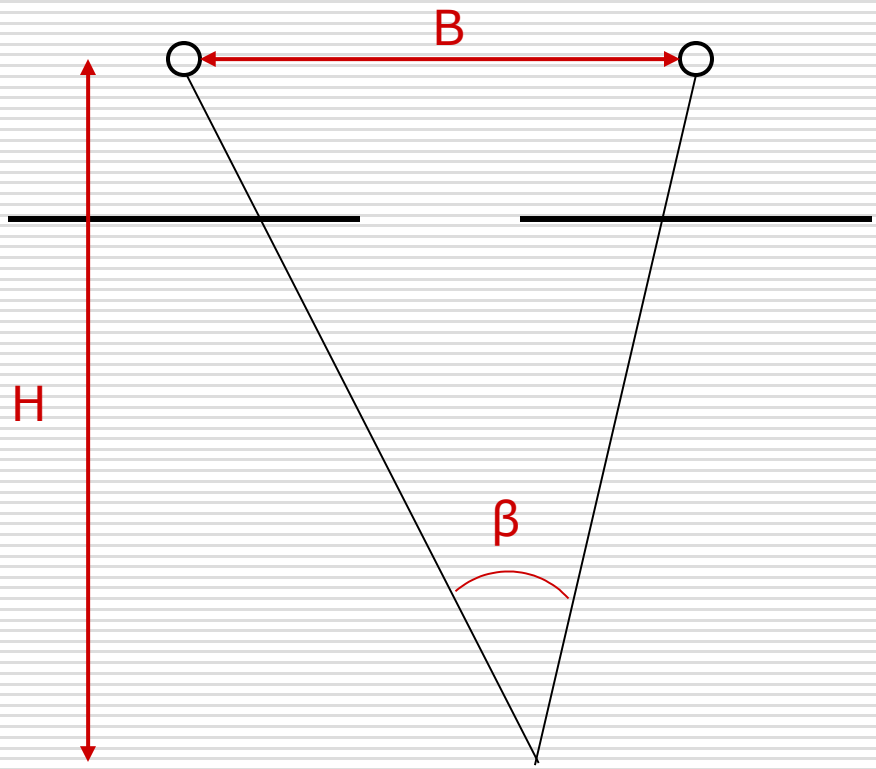
Science Objectives

1. Precise surface reconstruction and surface roughness analysis
2. Determine velocities and strain rates from repeat flights
3. Determine control information for registering various sensors

Specifications

- To meet science objectives we need:
  - Ground Sampling Distance GSD = 0.1 m for low altitude flights
  - Swath width SW = 300 m (comparable to ATM swath width) ➔ 3000 pixels across flight line
  - Stereo capability for determining surface elevations, precision of elevations 0.1 m ➔ B/H ratio = 0.6

Base/Height (B/H) Ratio



Camera Requirements

- Metric properties: after calibration interior orientation should remain constant
- FOV
  - To satisfy B/H ratio: ~60°
  - To satisfy SW (ATM scan angle): 40° k
- Dynamic range: 12 – 14 bits k
- Resolution: 3000 pixels cross flight

Camera Options

- Photogrammetric cameras (frame or multi-line)
  - Require stabilized platform and port at least 400 mm diameter
  - No ports available → not an option 2009
- High-resolution commercial cameras
  - Canon EOS 5D Mark II (~21.1 MPixels)
  - Nikon D3X (~24.5 MPixels)

Proposed Camera

- Canon EOS 5D Mark II
  - Available from Cirrus Digital Systems
  - Practical experience from NASA High Altitude Mapping Program (John Arvesen)
  - Issues:
    - Metric stability
    - Geocoding (synchronization with Applanix)

Possible Configuration

- Canon EOS 5D Mark II has resolution of 5616 x 3744 pixels, nominal pixel size = 6.2 micron, comes with different focal lengths
- Mount long side along flight direction ➔ 3744 pixels cross track
- B/H = 0.6 ➔ B = 300 m (H = 500 m)
- ➔ exposure rate ~2 sec/frame

Concluding remarks

- Canon best compromise under current circumstances
- Good chance to meet science objectives
- 2009 camera mission will provide most valuable data and experience
- Exact details about camera configuration still under discussion