SfM from ground-based photographs

Plets et al. (2012). Three-dimensional recording of archaeological remains in the Altai mountains, *Cambridge Univ. Press*
SfM from Unmanned Aerial Vehicles (UAV)

- DJI Phantom 2 quadcopter (~$1k)
- Custom built helicopter (~$15k)
- Autokite (~$1k, discontinued)
- Falcon Unmanned fixed wing (~$12k)
SfM from helicopters and multi-rotor UAVs

**Pros**  Robust in high wind and can take off and land anywhere. Larger helicopters can carry large SLR camera. Smaller multi-rotors cannot, but are easier to fly.

**Cons**  Helicopter needs trained pilot to take-off and land and regular refuelling. Initial costs are high and requires careful maintenance. Regulations may need to be followed (FAA in the U.S.)
SfM from fixed wing UAVs

**Pros**  Relatively easy to pilot. Can cope in moderate winds. Flight durations are normally longer than copters.

**Cons**  Susceptible to damage during landing. Regulations may need to be followed (FAA in the U.S.)
SfM from Unmanned Aerial Systems (UAS)

- Allsopp helikite (~$2k)
- Ramon's balloon (~$100s)
- Brooxes picavet (~$100)

Images of various unmanned aerial systems showing their use in SfM applications.
SfM from Unmanned Aerial Systems (UAS)

**Pros**
- Easy to drag across target area.
- Once in the air can remain there.
- Can carry large SLR cameras. No FAA regulations!

**Cons**
- Requires helium, which can be expensive (>$100 per canister), and fiddly picavet.
- Cannot be automated.
- Difficult to deploy in windy conditions.
SfM from Unmanned Aerial Systems (UAS)

**Pros**
- Easy to drag across target area.
- Once in the air can remain there.
- Robust in high wind.
- No FAA regulations!

**Cons**
- Requires helium, which can be expensive (>\$100 per canister).
- Cannot be automated.
- Carries small cameras.
SfM from airplane photos

• “Historical topography” and “diachronic geomorphology” possible using legacy air-photos. Requires sufficient photo overlap and georeferencing is a challenge.

(Left) A short section of the ~85 km-long USGS aerial survey of the 1992 Landers rupture, California.

(Right) Resulting 30 cm-resolution DEM, hillshaded to highlight fine geomorphic features.

Georeferencing was undertaken using modern satellite imagery.