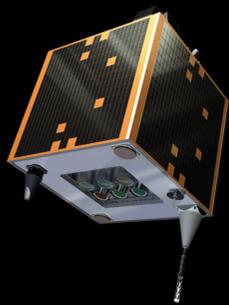


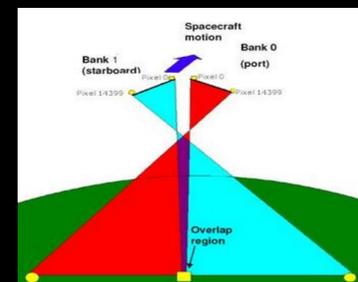
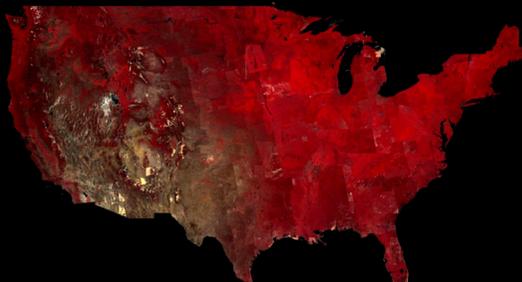
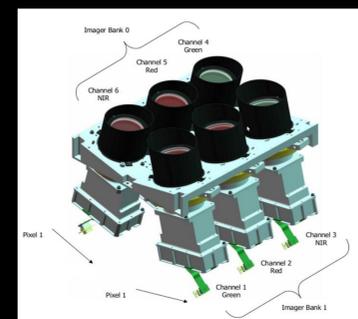
The Deimos-1 Earth Observation System

- Fully owned and operated by ElecnoR Deimos Imaging
- Member of the Disaster Monitoring Constellation (DMC)
- Launched in July 2009, operational since March 2010
- Sun-Synchronous orbit at 650 km
- Satellite built by SSTL (UK), 100 kg mass
- Expected lifetime: 10 years



The Payload

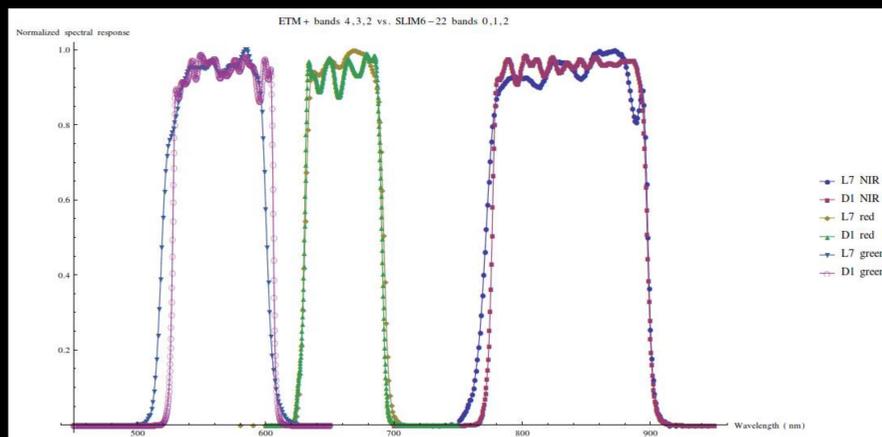
- Dual-bank pushbroom CCD, 3 cameras per bank
- 3 bands matching Landsat 7 NIR, R, G channels
- Swath: >620 km
- Spatial resolution: 22 m GSD at 10 bits
- Capacity: >5 million km² par day



Deimos-1 & Landsat-7

- Deimos-1 designed to match Landsat-7 ETM+ 4,3,2 bands (NIR, red, green)
- Both are Sun-synchronous, with similar GSD
- Deimos-1 lacks on-board calibration devices
- Cross-calibration with Landsat-7 in order to provide consistent data for similar applications

	Landsat-7	Deimos-1
Orbit type	Sun-synchronous (descending)	Sun-synchronous (ascending)
Equatorial crossing	~10:09	~10:39
Height	~702km	~661km
Inclination (deg)	98.23	97.98
Nominal GSD (m)	30 (bands 4,3,2)	22
Band number	8	3
Sampling type	Whiskbroom	Pushbroom
Swath width (km)	185	620
Quantization (bits)	8	10
On-board calibration	Yes	No



Cross-cal with Landsat-7

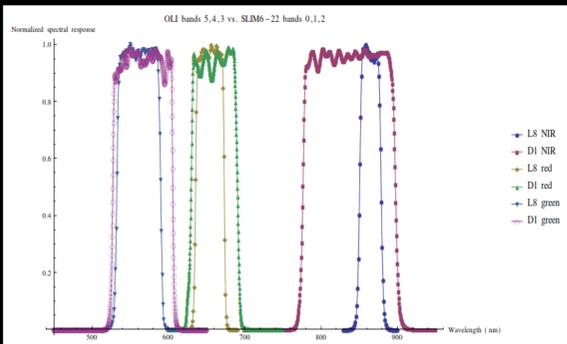
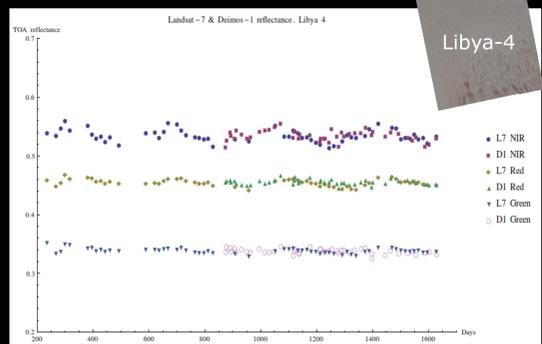
- Primary site: Libya-4. Using modeled periodic effect correction
- Other CEOS PICS & ocean eclipse images as auxiliary data
- Validation through vicarious campaigns

Deimos-1 & Landsat-8 OLI

- Changes from ETM+ to OLI
 - 8 to 9 reflective bands
 - 8 to 12 bits quantization
 - Whiskbroom to pushbroom
 - Meaningful changes in spectral response, specially in the NIR band

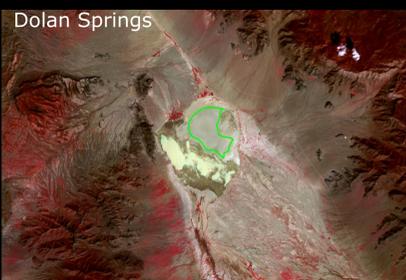
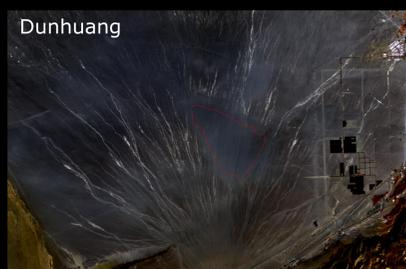
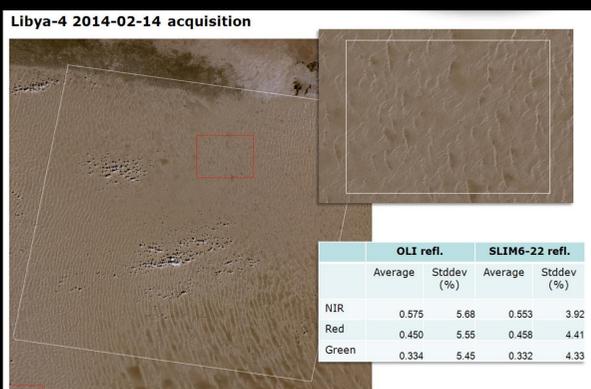
Cross-cal with Landsat-8

- Not enough Landsat-8 data yet to validate Libya-4 periodic effect correction model
- Cross-cal through "close approaches" between platforms constrained to:
 - ± 15 minutes of time gap
 - ± 5° of incidence angle difference

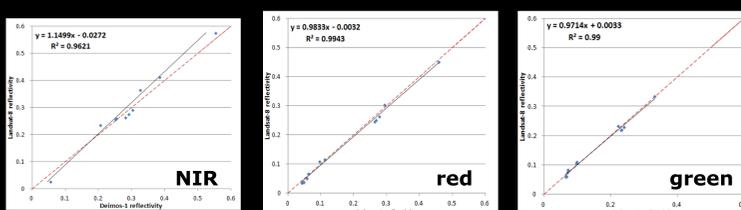


Targets chosen

- CEOS reference standard test sites
 - Libya-4
 - Dunhuang (China)
 - La Crau (France)
- Other test sites
 - Dolan Springs (USA)
 - Crop areas
 - Mid-latitude forest
 - Rainforest
 - Savannah



Results and ongoing work



- Red and green bands correlate
- Differences in NIR band are not negligible
- Further research:
 - Assess ground spectral response differences impact in measurements
 - Assess atmospheric water vapor absorption relationship with measurement dispersion

