

Atmospheric Correction for Reflective Hyperspectral Imagery

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21 June 2011

Environment Canada Visit



Reflective Hyperspectral Sensors Examples

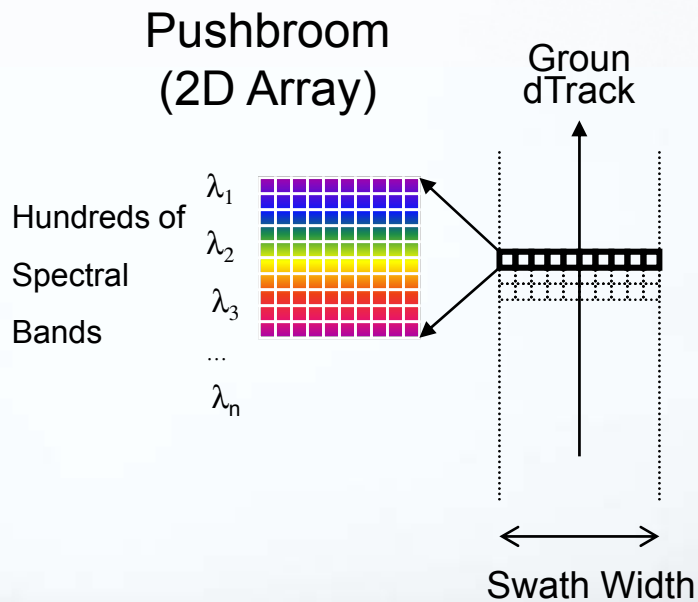
Hyperion
(NASA)
0.4-2.5 microns
Pushbroom
Swath width > 30Km
> 200 bands
GSD: 30m

Itres CASI 550
(Hyperspectral Data Intl.)
0.4-1.0 microns
550 pixels pushbroom
72 bands
IFOV: ~1.3 mrad

Itres SASI 600
(Hyperspectral Data Intl.)
0.8-2.5 microns
600 pixels pushbroom
160 bands
IFOV: ~1.3 mrad

Probe-1
(A.U.G. Signals)
0.4-2.5 microns
512 pixels whiskbroom
128 bands
IFOV: ~2.2 mrad

AISA DUAL
(University of Victoria)
0.4-2.5 microns
300 pixels pushbroom
492 bands
IFOV: ~1.3 mrad



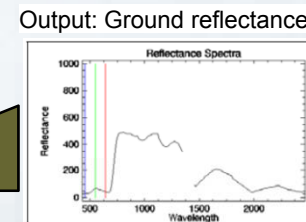
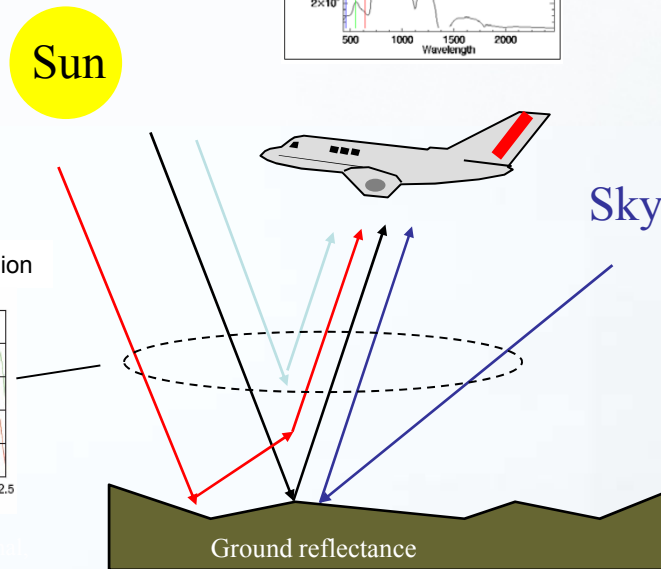
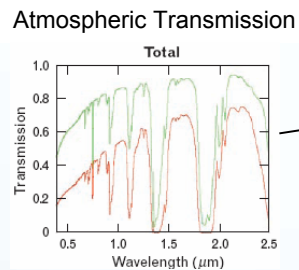
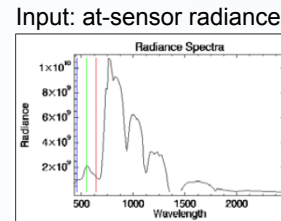
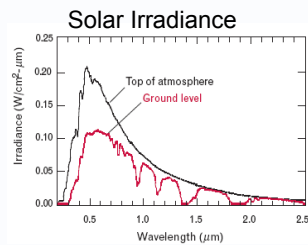
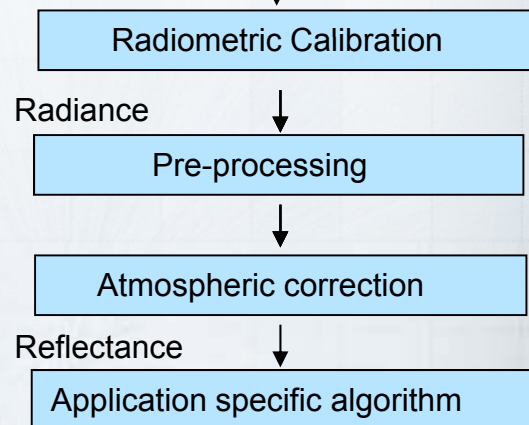
Reflective Hyperspectral Image Processing Chain

Total Radiation at sensor:

- Direct solar reflected
- Skylight reflected
- Path scattered
- Adjacent scattered

Image Processing Chain

- Raw Sensor data
- GPS/INS data



Atmospheric Correction Methods

Radiative Transfer Methods

- Known techniques:
 - ATREM
 - ATCOR
 - FLAASH
- Many are based on MODTRAN 4 or 5
- Require radiance calibrated imagery

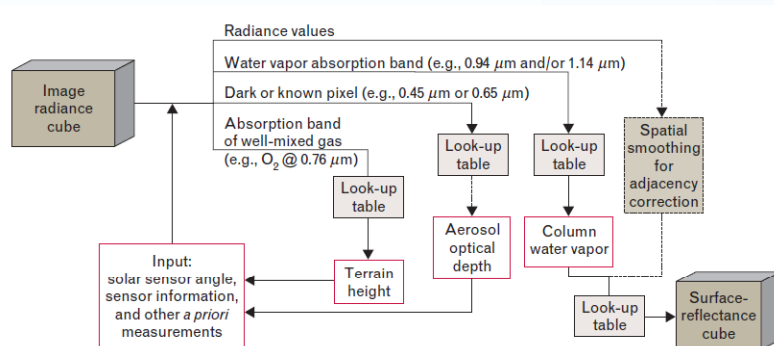
Empirical Methods

- ELM (Empirical Line Method):
 - requires 2 or more known targets in the scene)
- QUAC:
 - no user inputs required

Related Techniques

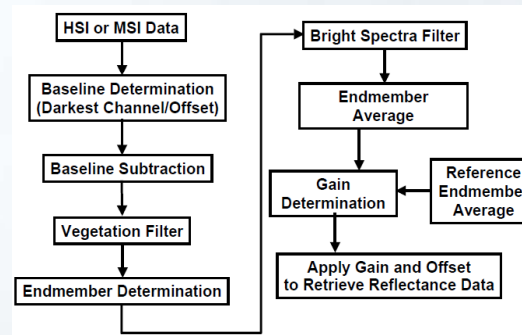
- Cloud detection and masking
- Shadow removal
- Adjacency effects removal
- Atmospheric correction for off-nadir views
- Atmospheric correction for polarimetric HSI

FLAASH



From: Griffin et al, *Compensation of Hyperspectral Data for Atmospheric Effects*, MIT L.L. J. Vol.14, No. 1, 2003, pp. 29-54

QUAC



From: Bernstein et al, *Improved Reflectance Retrieval from Hyper- and Multispectral Imagery without Prior Scene or Sensor Information*, Proc. SPIE, Vol. 6362, 2006

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