VENµS Super-Spectral Camera

Technical Description

General Concept of VENµS

- Joint ISA-CNES project for scientific mission to evaluate remote sensing applications
- 12 narrow spectral bands in the VNIR range
- Bands for vegetation and water monitoring
- GSD 5.3 m
- Binning on some bands to achieve high SNR at the expense of resolution
- Swath width 27 km

The VENµS Satellite

- The satellite is being developed by Israel Aircraft Industries
- The VENµS Super-Spectral Camera (VSSC) is being developed by El-Op Ltd at its Rehovot, Israel facility.
- The satellite will also carry an experimental ion propulsion system being developed by Rafael, Israel

Venμs Spectral Bands

Band #	Equivalent Central Wavelength [nm]	FWHM [nm]
1	420	40
2	443	40
3	490	20
4	555	20
5	638	24
6	638	24
7	672	16
8	702	16
9	742	16
10	782	16
11	865	20
12	910	20

Camera Principles

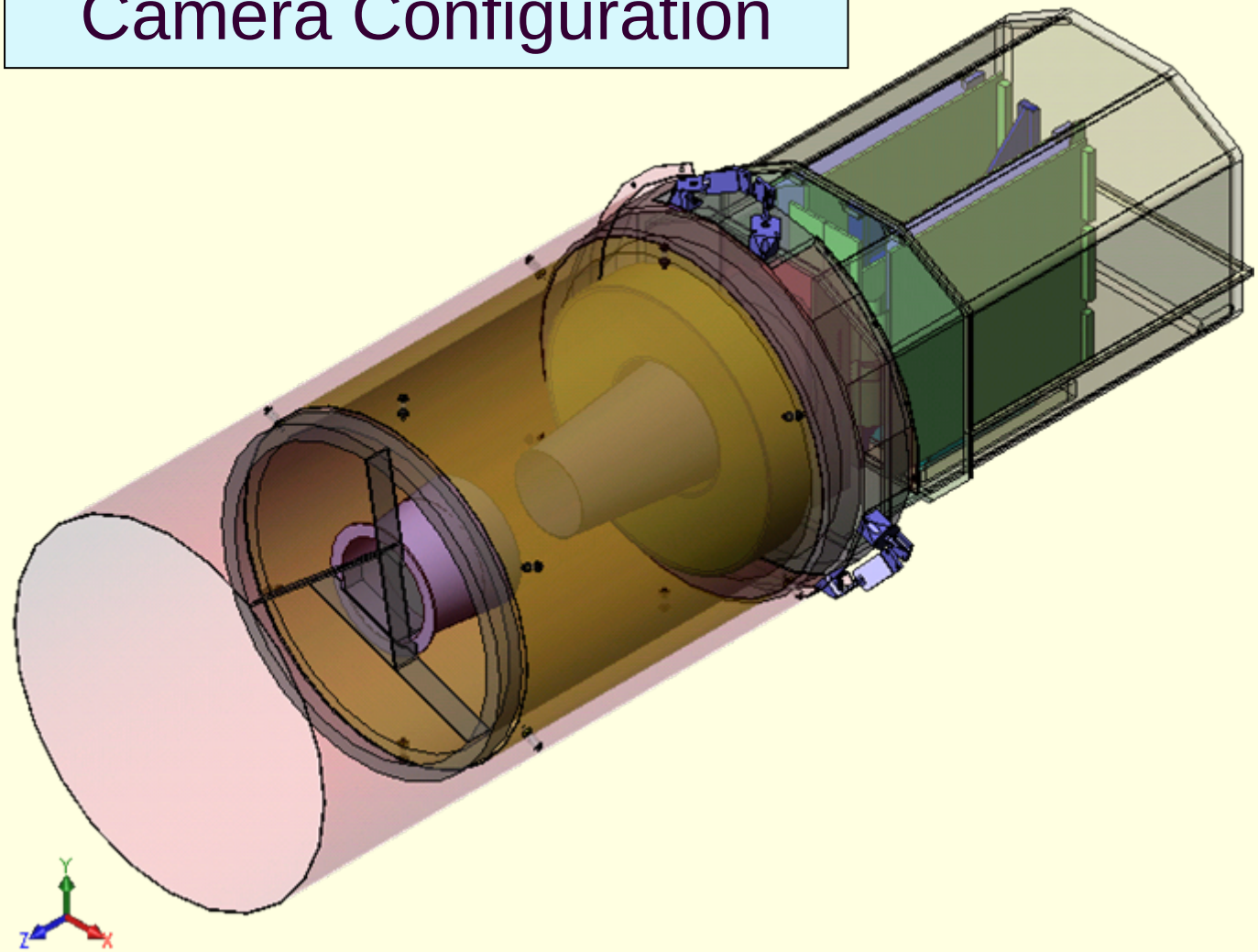
Camera:

- Reflective Telescope Objective with field correction lenses
- Focal plane with 4 detector units, each with three separate arrays
- Separate narrow-band spectral filters for each array, giving 12 bands in all (11 different bands, two identical for 3-D info)
- Camera electronics for amplification and digitization of signals

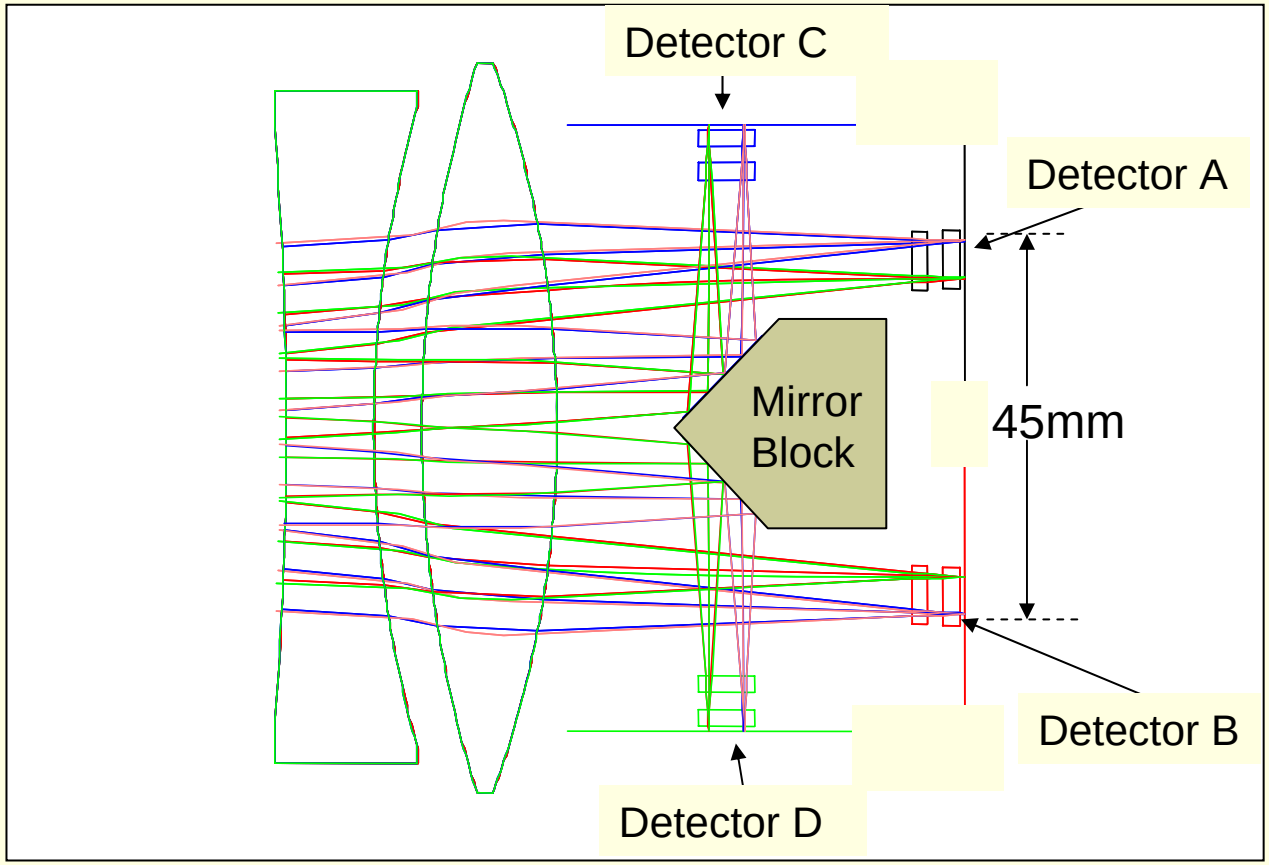
Part of satellite:

- On-board memory to store images until they can be downloaded to ground station
- RF Transmitter and antenna

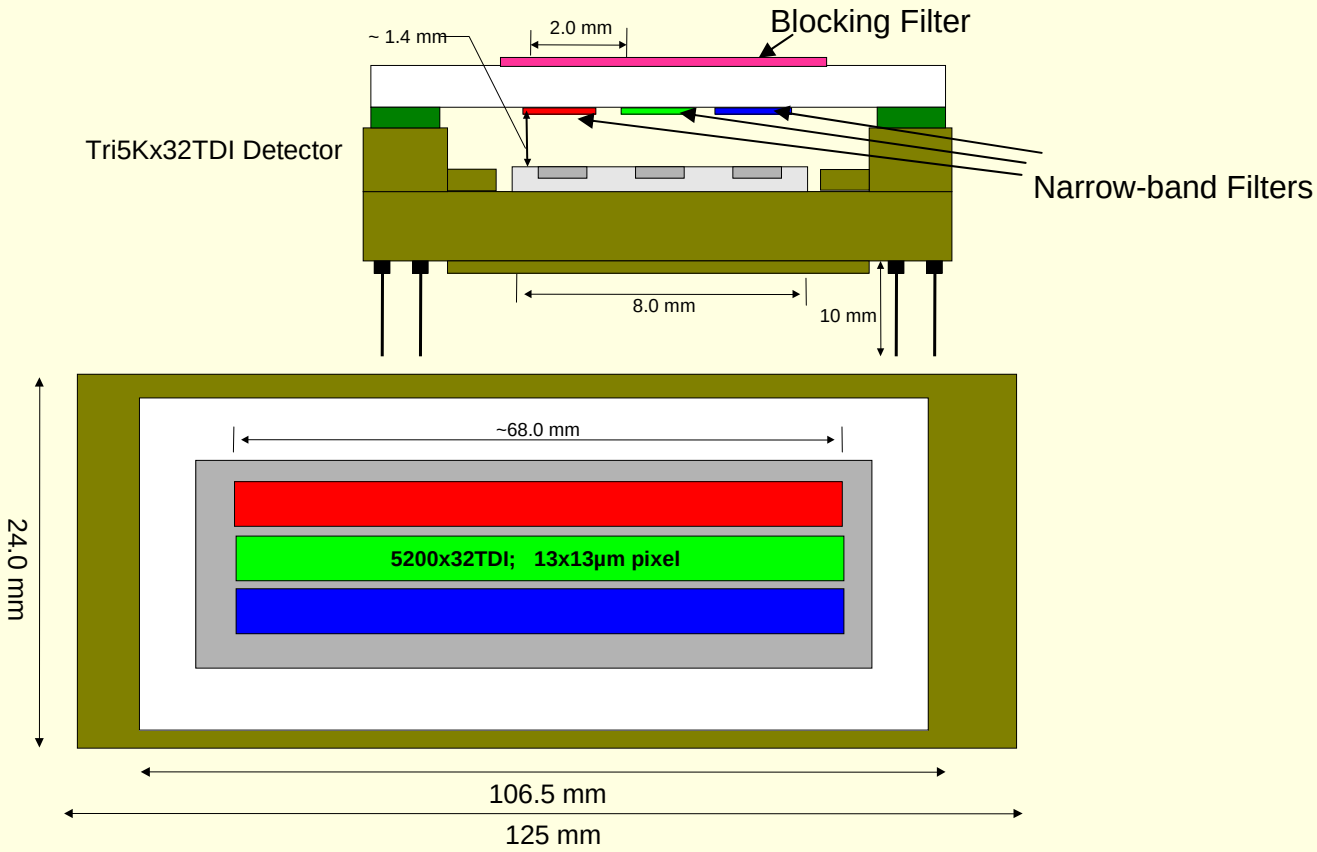
Camera Configuration



Focal Plane Configuration



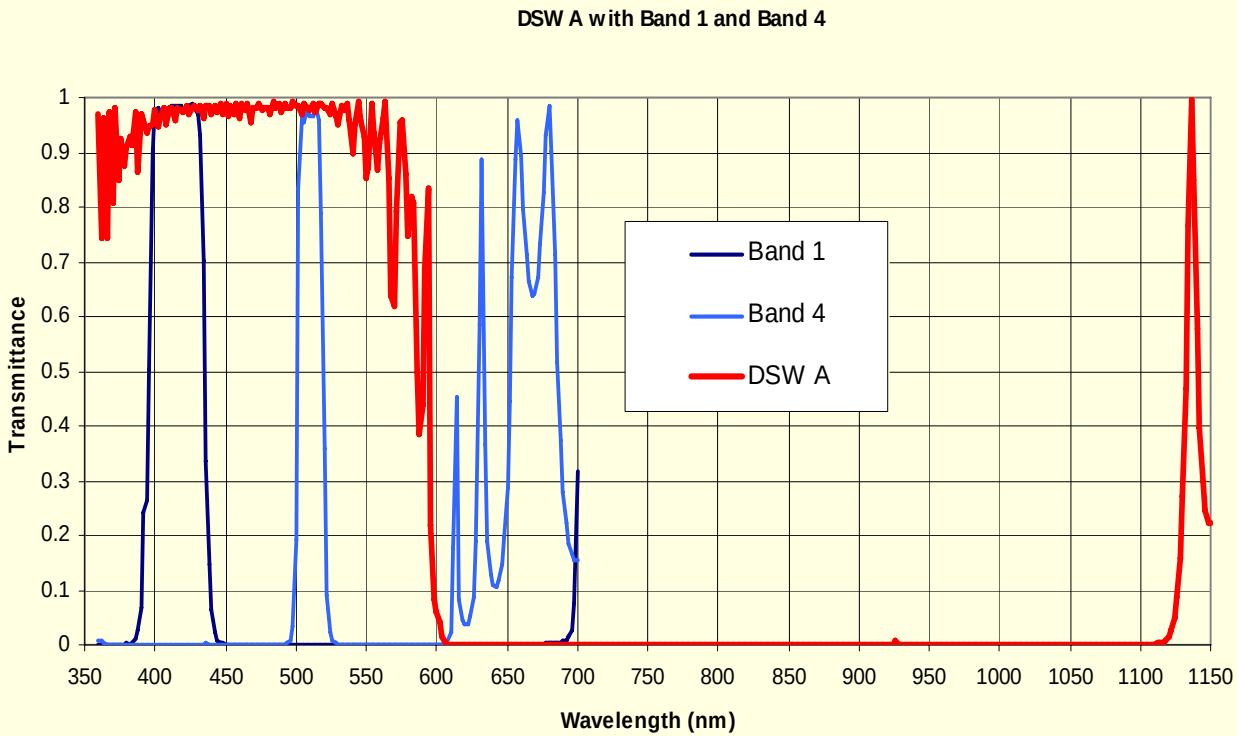
TriT Detector – Schematic Layout



Narrow Band Filters

- High performance interference filters – high transmittance, sharp cut-on and cut-off
- Auxiliary blocking filter to improve out-of-band rejection
- Coated directly on detector window before attachment (3 on each detector unit)

Preliminary Filter Design - example



Electronics Concept

- Detector outputs are amplified and digitized (10 bits)
- Camera controller to manage operation of all 12 channels
- Power supply converts satellite power to voltages needed
- Digital data sent to on-board storage for later transmission

Thermal Control

- Temperature of Optics, structure, focal plane controlled within narrow limits
- Thermal shield around telescope to isolate from external effects
- Thermal interface to satellite bus through two radiator plates
- Control allows telescope to point to Earth or space indefinitely

Interface to Satellite

- Simple mechanical interface - flexures
- Simple thermal interface – radiator plates
- Simple electronic interface – RS422

Calibration Concept

- No on-board calibration source
- Accurate pre-launch radiometric and geometric calibration
- Design for high stability
- Vicarious calibration with known ground sites
- Periodic calibration using the Moon as source