

1. ZA-002 Image Information for Applications Development

The ZA-002 Earth Observing satellite has imaging capability in 6 wavelength bands with application uses in:

Element	Application	Data Requirements
Fishing resources	Vessels position and identification determination, chlorophyll monitoring	High spatial resolution and interrogation-communication
Water quality and levels	Agricultural infrastructure management and planning Disaster monitoring & management	High spatial for water body outline, and extra light-blue-green line for water quality
Ground water	Agricultural management and infrastructure planning	Medium spatial resolution for seepage line identification
Ground coverage	Agricultural, deforesting, land use, and urbanisation management	High spatial and multi-spectral resolution in more than 3 bands
Plant health	Plant stress monitoring	Green, red, red-edge and NIR bands needed

The sensor has a swath width of approximately 45km, with a ground sampling distance (resolution) of 6.25 m. The satellite has an off-nadir viewing capability, resulting in an accessible viewing area of about 530km in diameter, where specific scenes are required. Using this off-nadir viewing capability, any point in South Africa can be revisited within 5 days.

The principle will be to image during daytime passes and download during nighttime passes, so data should be available within 12 hours at the download station. The images will be sensor artifact corrected. Files will be in GeoTIFF format (one band per file), and an associated standard format Metadata file.

Further pre-processing on the received raw imagery will provide the images in radiometric corrected, geometric corrected, and GIS ready products.

The design lifetime of the mission is 3 years.

1.1 ZA-002 Imager Payload Specifications

The ZA-002 Earth Observation satellite is a high resolution multi-spectral line-scan micro satellite system with the following payload specifications:

1. Ground Sampling Distance: 6.25 m
2. Spectral bands : 6
3. Scene size : 45km x 45km
4. Total Storage capacity : 24 GB storage capacity, 40 scenes
5. Downlink capability per station: 6 GB, 10 scenes in all six bands for SA ground station, the CSIR Satellite Applications Centre (SAC).
6. Revisit time : At least every 5 days (with 30deg side viewing)
7. Orbit : 510km, sun synchronous, ascending day time
8. Downlink rate : 72 Mbit/s S-band downlink

The spectral content of each band: wavelength, band and information:

1. 440-510 nm Blue : Water bodies, soil/vegetation, deciduous/coniferous
2. 520-540 nm Xantophyll : Silt in water and deforest-land/urban-areas
3. 520-590 nm Green : Green-reflectance-peak for plant vigour
4. 630-685 nm Red : Chlorophyll-absorption, detecting-roads/bare-soil
5. 690-730 nm Red-edge : Plant stress
6. 845-890 nm NIR : Plant-biomass-estimates, water-bodies/vegetation

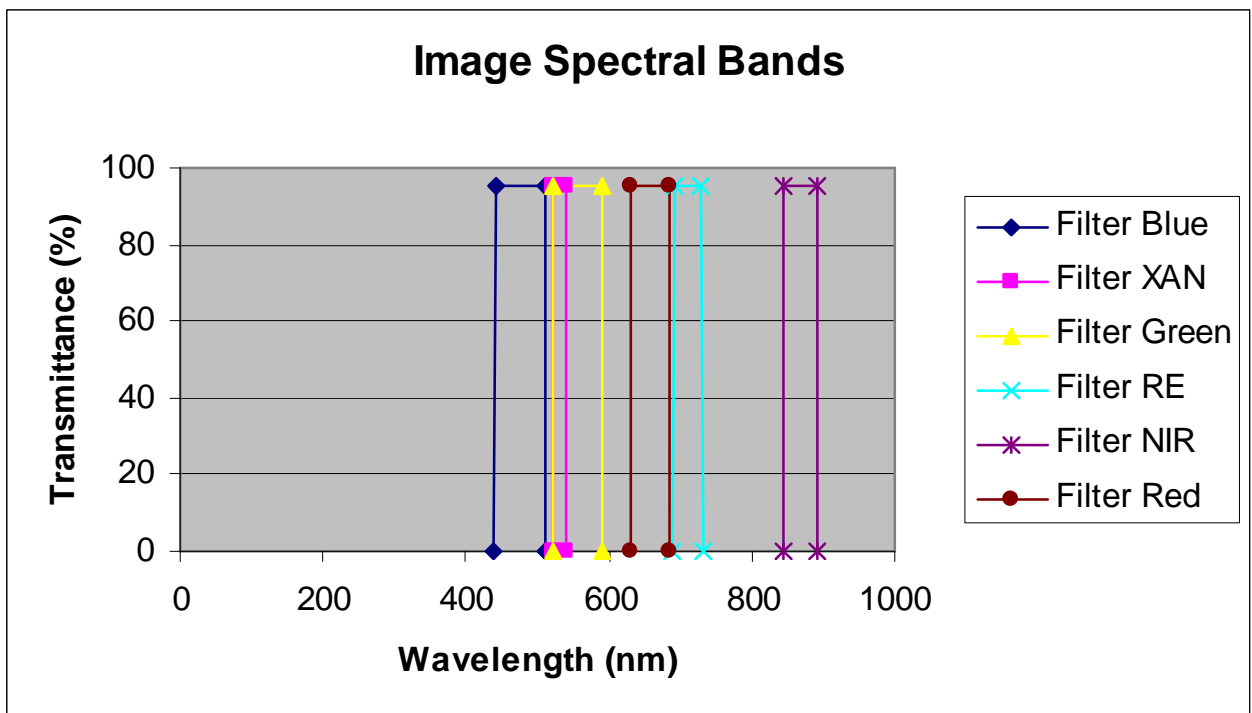


Figure1: Image Spectral Bands

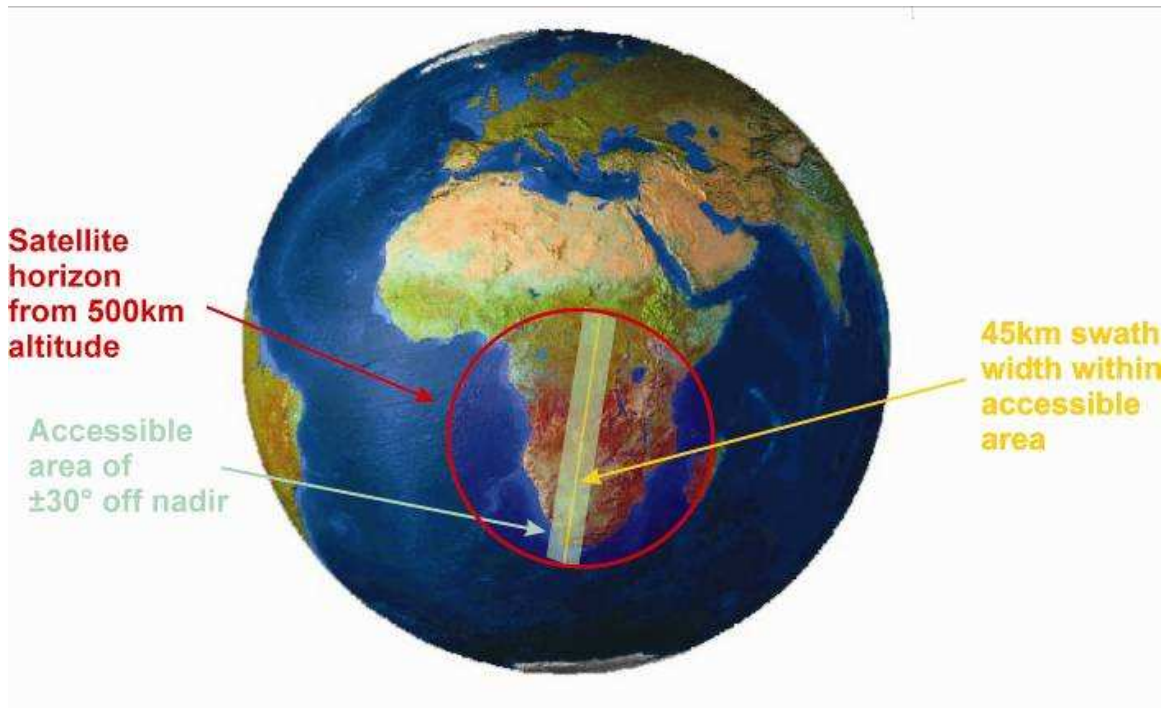


Figure 2: Example ZA-002 Satellite horizon coverage for image acquisition