X Band Remote Sensing at ITR

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Outline

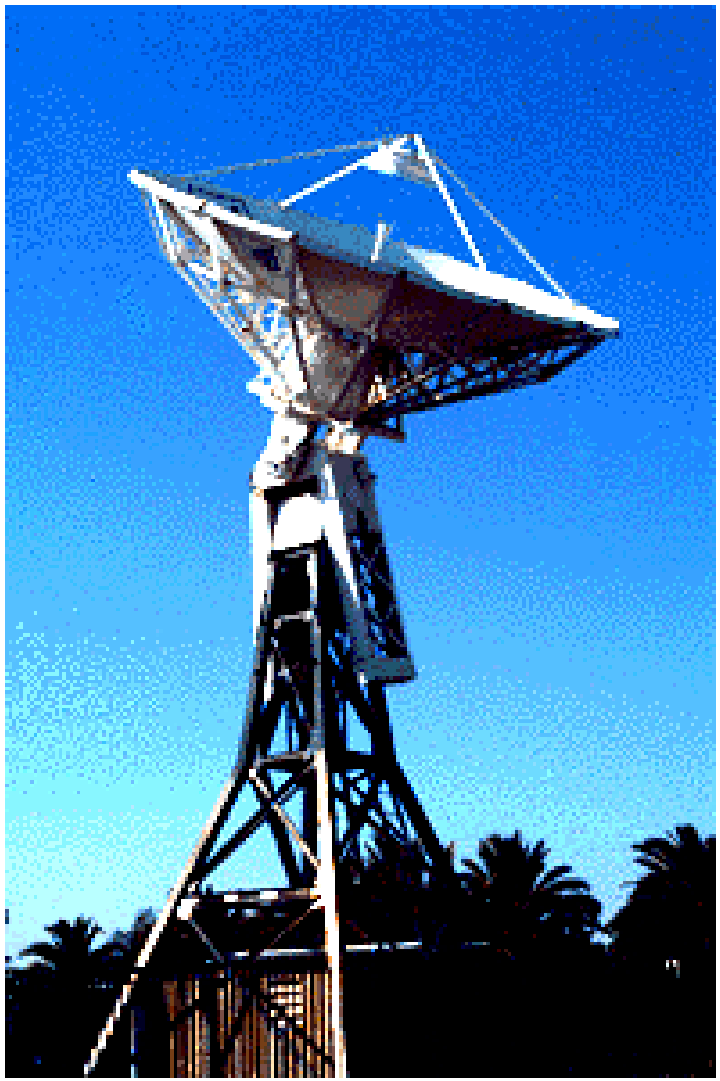
- ITR Remote Sensing Facilities:
  - ASTRA Tracking Antenna
  - ERSDEM Receiver System
  - Image Processing and Display Software
- A Sample Application: Fire Detection
- Summary and Future Plans

The ASTRA system

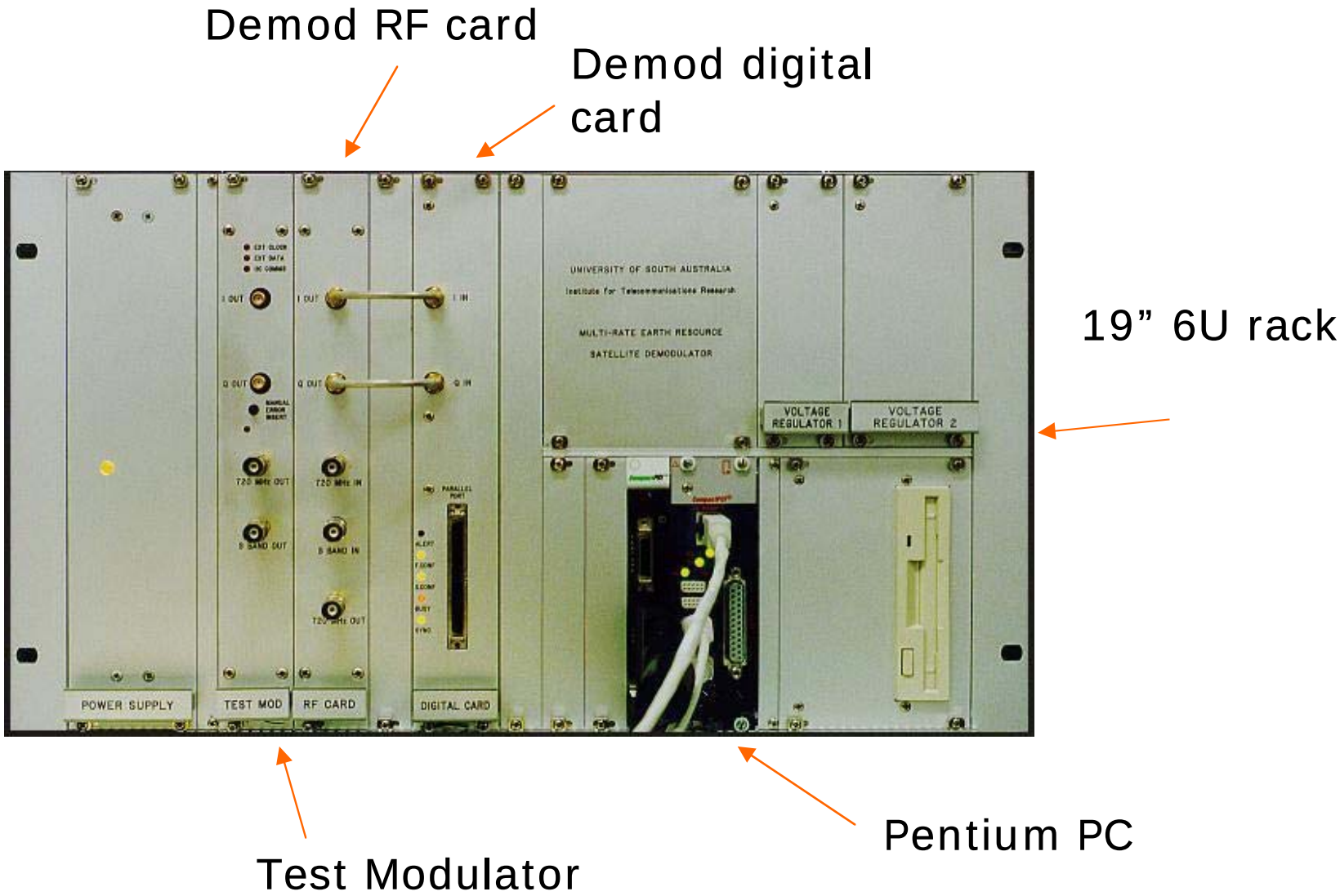
- Built by ITR
- Ku-band (12.2 - 14.4GHz) Dish
- Ex-NASA Hydraulically controlled X-Y mount pedestal.

ASTRA Specifications

- Type Gregorian
- Frequency Band up to 12/14 GHz
- Manufacturer Andrews Diameter 6.8m
- Polarisation Circular
- Operating Band 7.25GHz - 8.4GHz
- Efficiency typ. 75%
- Gain 54.3dB at 8.40GHz (X-Band)
- VSWR 1:3:1 Sidelobes 1st -13dB
- Beamwidth(-3dB) 0.40 degrees at 8.40GHz (X-Band); 0.34 degrees at 7.25GHz (X-Band)



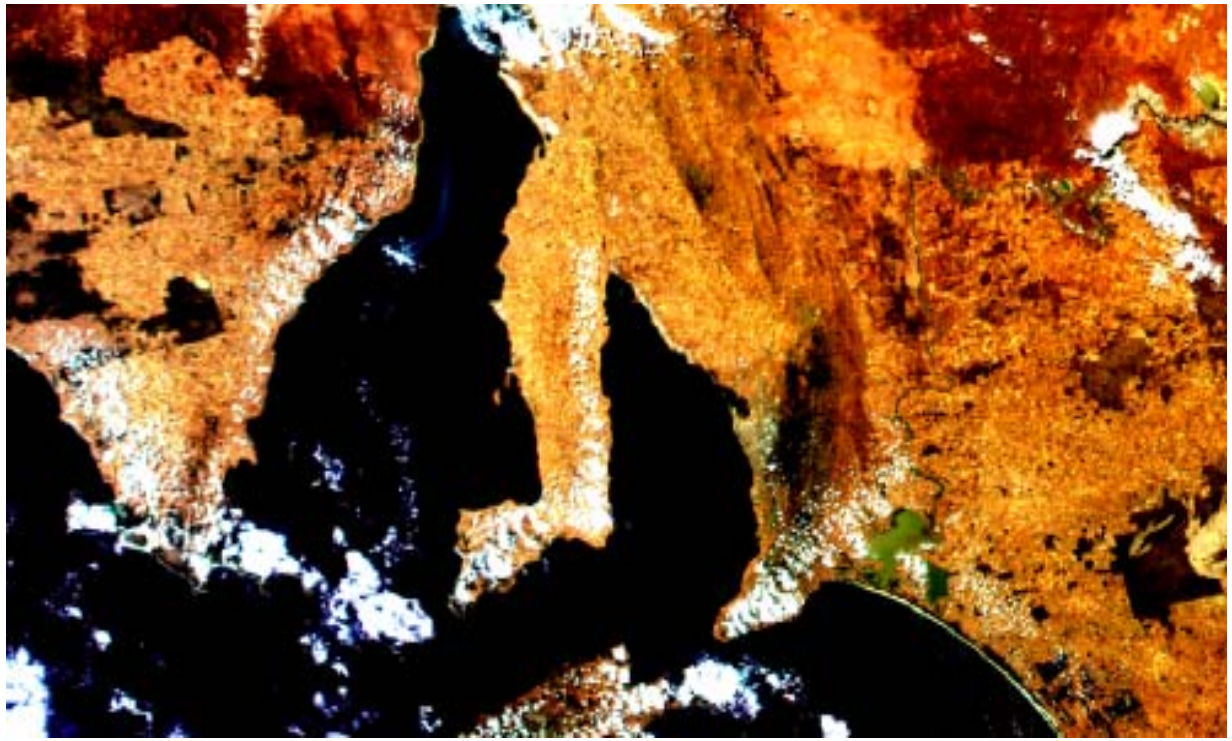
Earth Resource Satellite Demodulator
ERSDEM-2



Earth Resource Satellite Demodulator
ERSDEM-2: Features

- Software configurable to any bit rate < 170 Mbit/s
- Various data and control interfaces
- Test Modulator and X band down converter options
- Sold to US Mainland, Japan, ACRES, Hawaii
- All ITR design using DSP methods where possible
- New project for a low speed version (up to MODIS)

First MODIS Image of South Australia from ITR (12/2000)



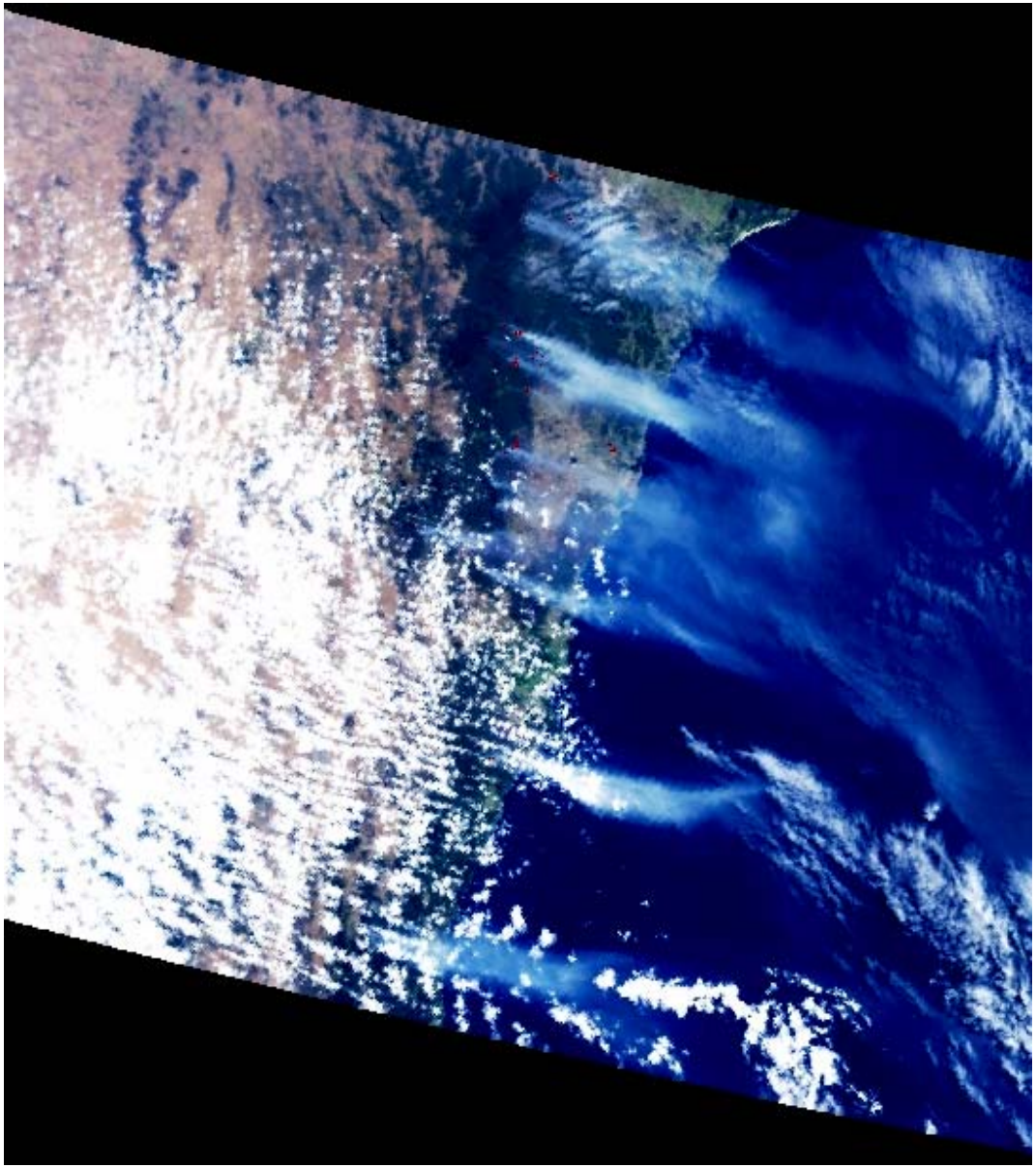
- NASA's Terra satellite
- ITR's 6.8m Tracking Antenna (ASTRA)
- ITR's ERSDEM Demod

Image Processing and Display System

- Currently using custom packet formatting software – but moving to RT-STPS and IMAPP software combination
- Custom Matlab code is currently used for the fire detection application. This provides results (ie estimated fire locations) within about 10 mins of a MODIS pass.

Sydney Bushfires, Jan 2, 2002

MODIS Image processed by ITR.



Some of the locations of the fires observed on Jan 2nd.

the following fires were found:

# latitude	longitude	posit-x	posit-y
-32.55949	150.74716	205	879
-32.56206	150.76143	206	881
-32.56454	150.77518	206	882
-32.56983	150.74458	207	879
-32.57239	150.75883	207	880
-32.58002	150.80135	208	884
-32.63162	150.69244	214	874
-32.68021	150.62907	219	868
-32.71923	150.60486	223	866
-32.75260	150.84924	227	889
-32.75512	150.86324	227	890
-32.76536	150.58698	228	865
-33.22128	150.48309	279	855
-33.22905	150.46631	280	854
-33.24482	150.55266	282	861
-33.24743	150.56700	282	863
-33.25515	150.55009	283	861
-33.25775	150.56442	283	863
-33.28513	150.38460	286	846
-33.33783	150.67160	292	872

Summary and Future Plans

- ITR has an operational facility for remote sensing signal acquisition from X band to data ingest and display.

- ITR is interested in the following areas:
  - –Remote-sensing receiver and data-link design
  - –Use of ASTRA for data collection from remote sensing satellites
  - –“real-time” applications of MODIS data for local applications (eg fire detection, algae bloom detection etc)
  - –outreach programs (eg to local high schools) to illustrate remote sensing science and applications