

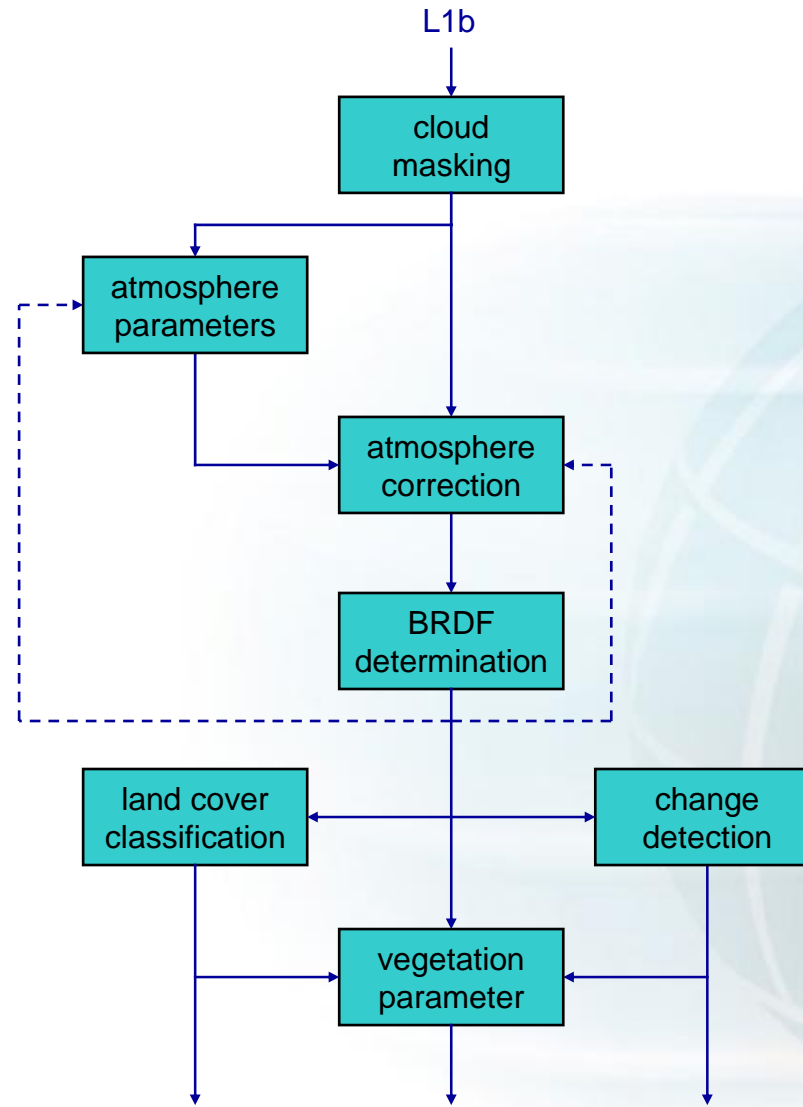


MODIS Processing at WASTAC / DLI

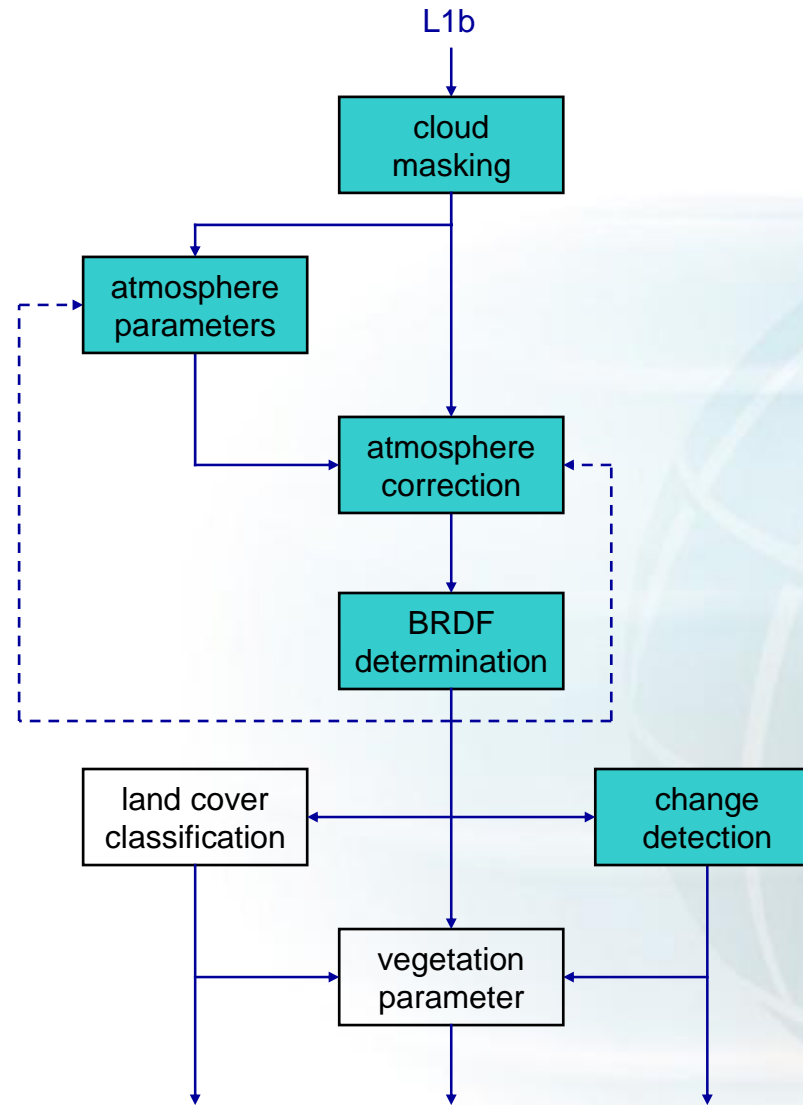
Satellite Remote Sensing Services
Department of Land Information
Government of Western Australia



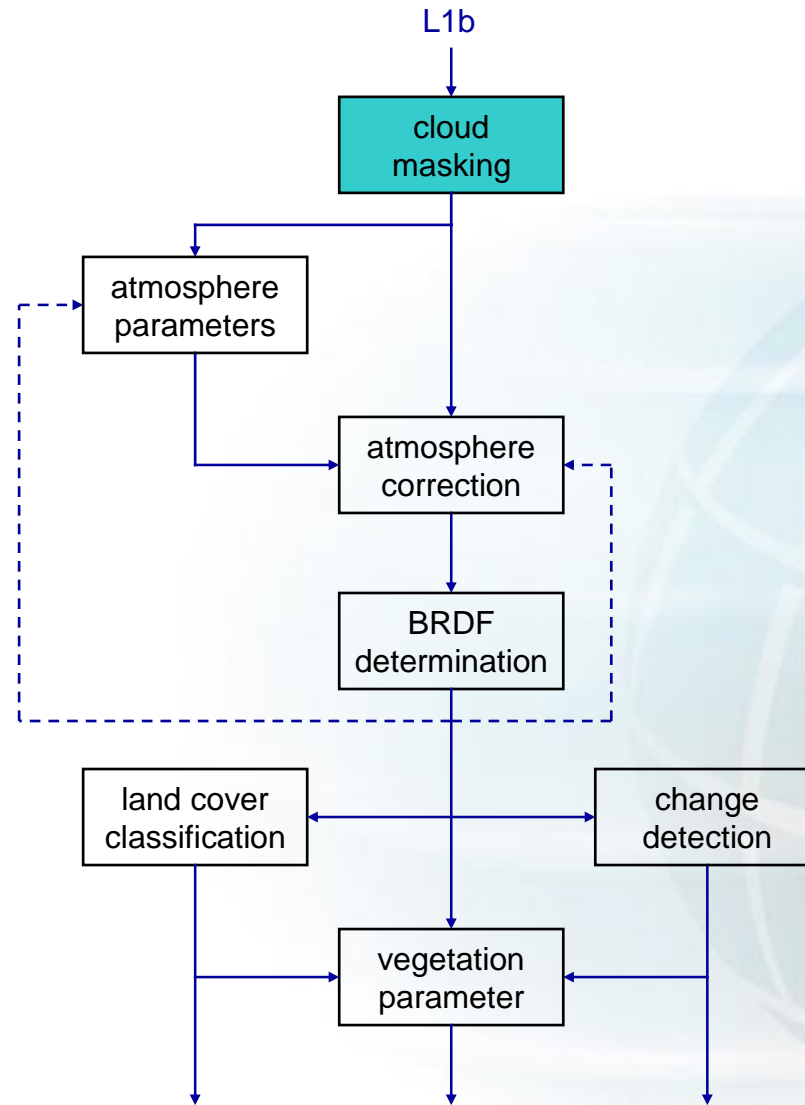
MODIS Processing Stream - Land



MODIS Processing Stream - Land



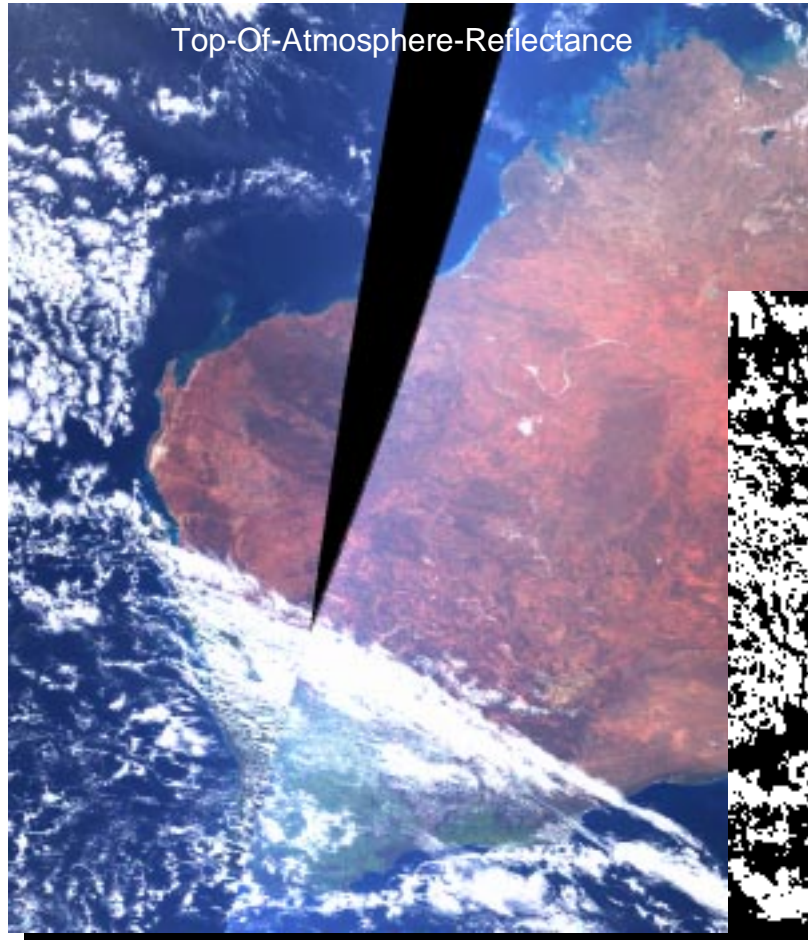
MODIS Processing Stream - Land



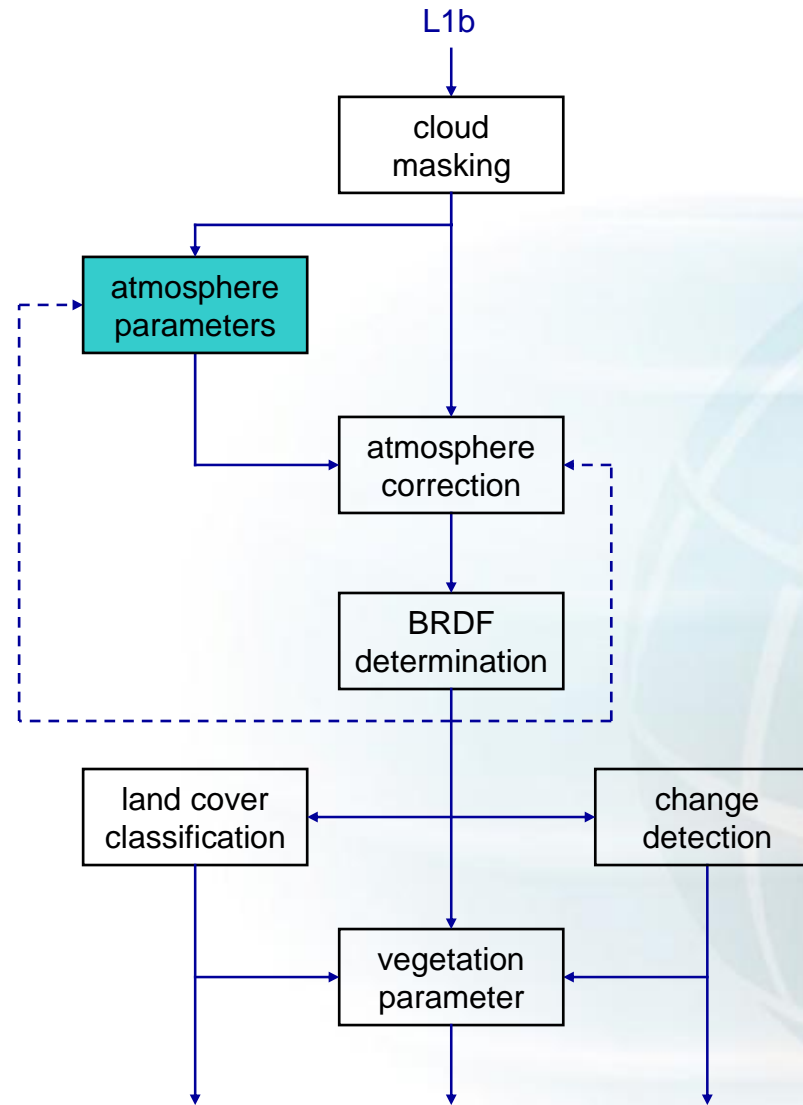


Cloud Mask

MODIS
09/09/2003
01:27UTC
03:04UTC



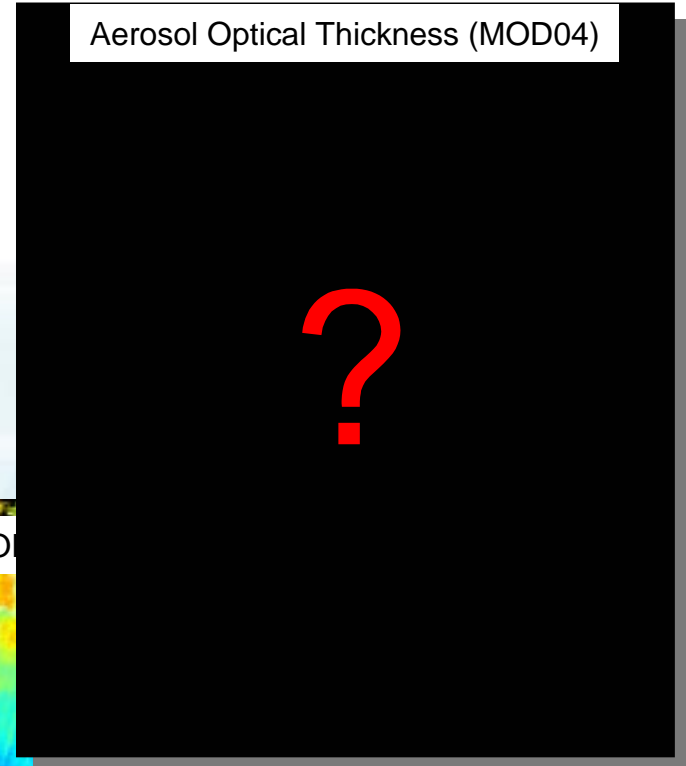
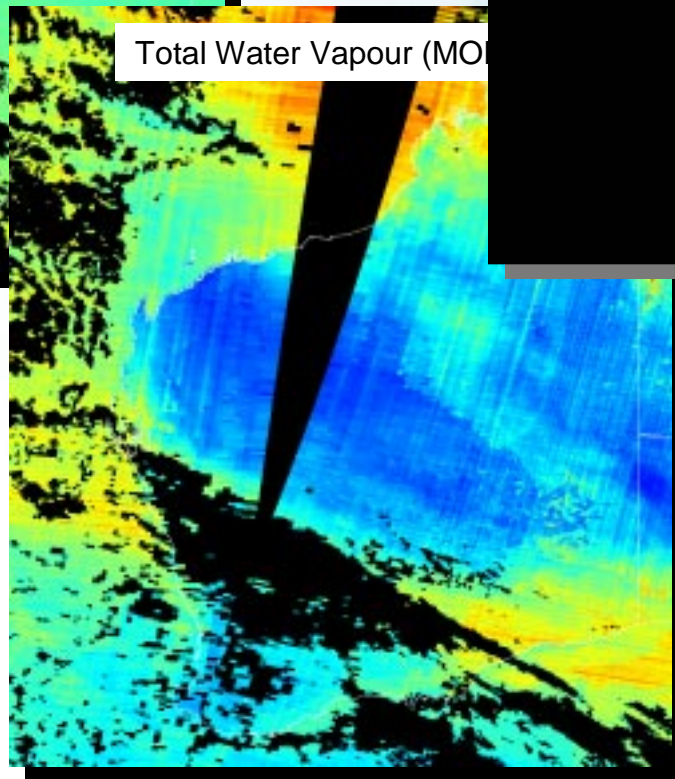
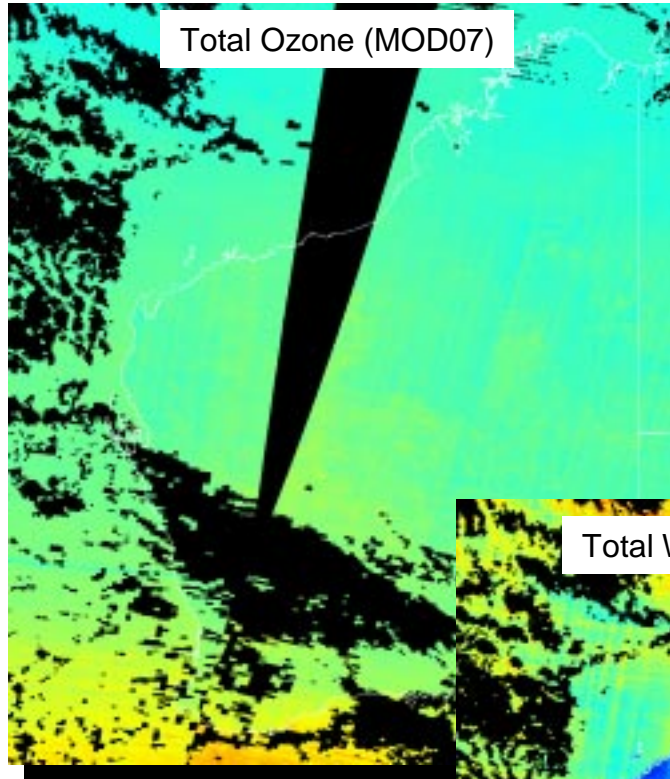
MODIS Processing Stream - Land



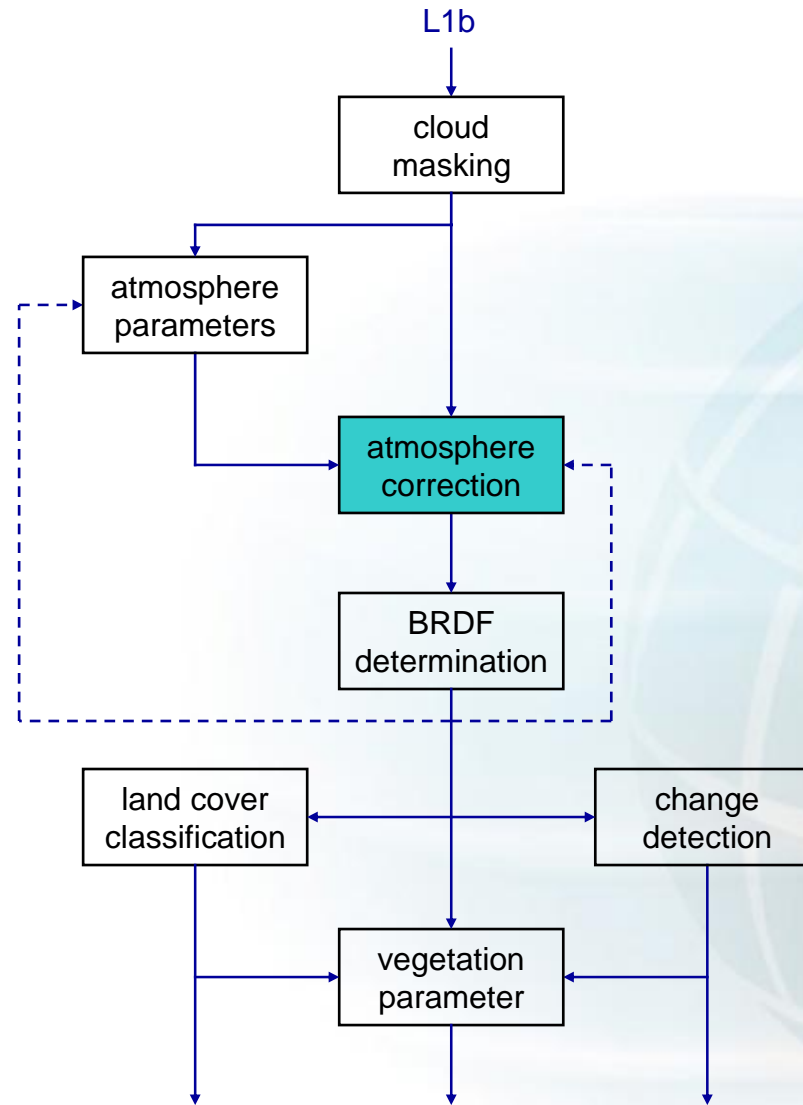


Atmosphere Parameters

MODIS
09/09/2003
01:27UTC
03:04UTC



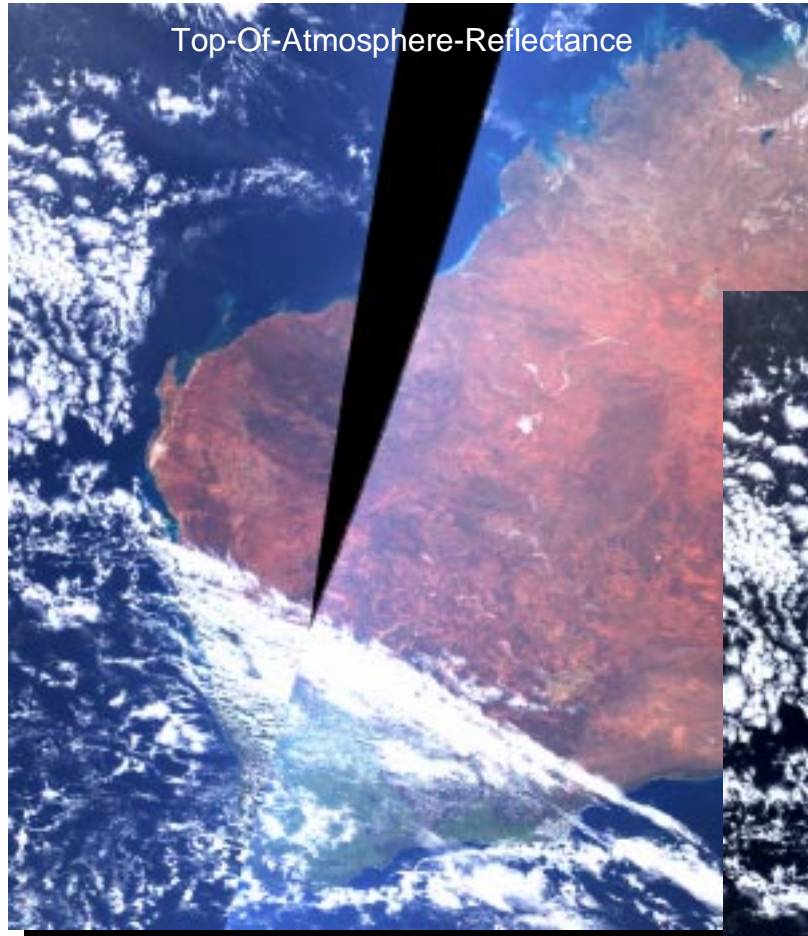
MODIS Processing Stream - Land



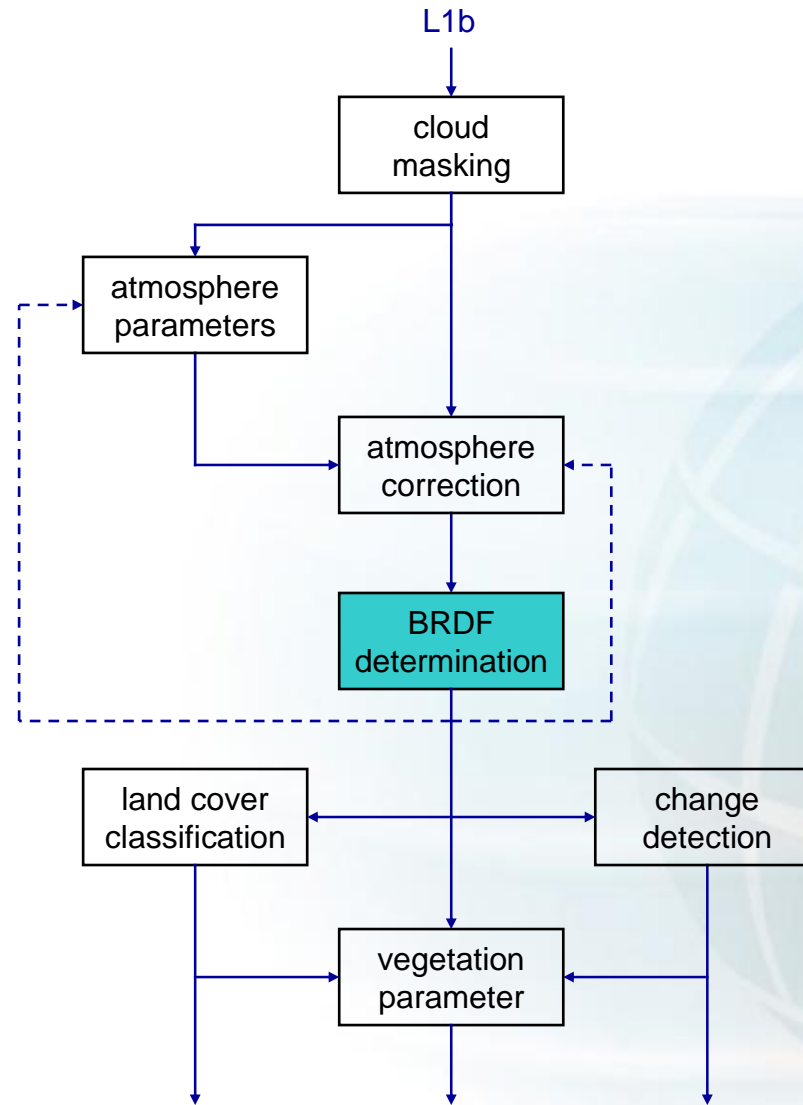


Atmosphere Correction (SMAC)

MODIS
09/09/2003
01:27UTC
03:04UTC



MODIS Processing Stream - Land





BRDF Determination (Kernel Based Model)

→ directional reflectance is a linear combination of base functions

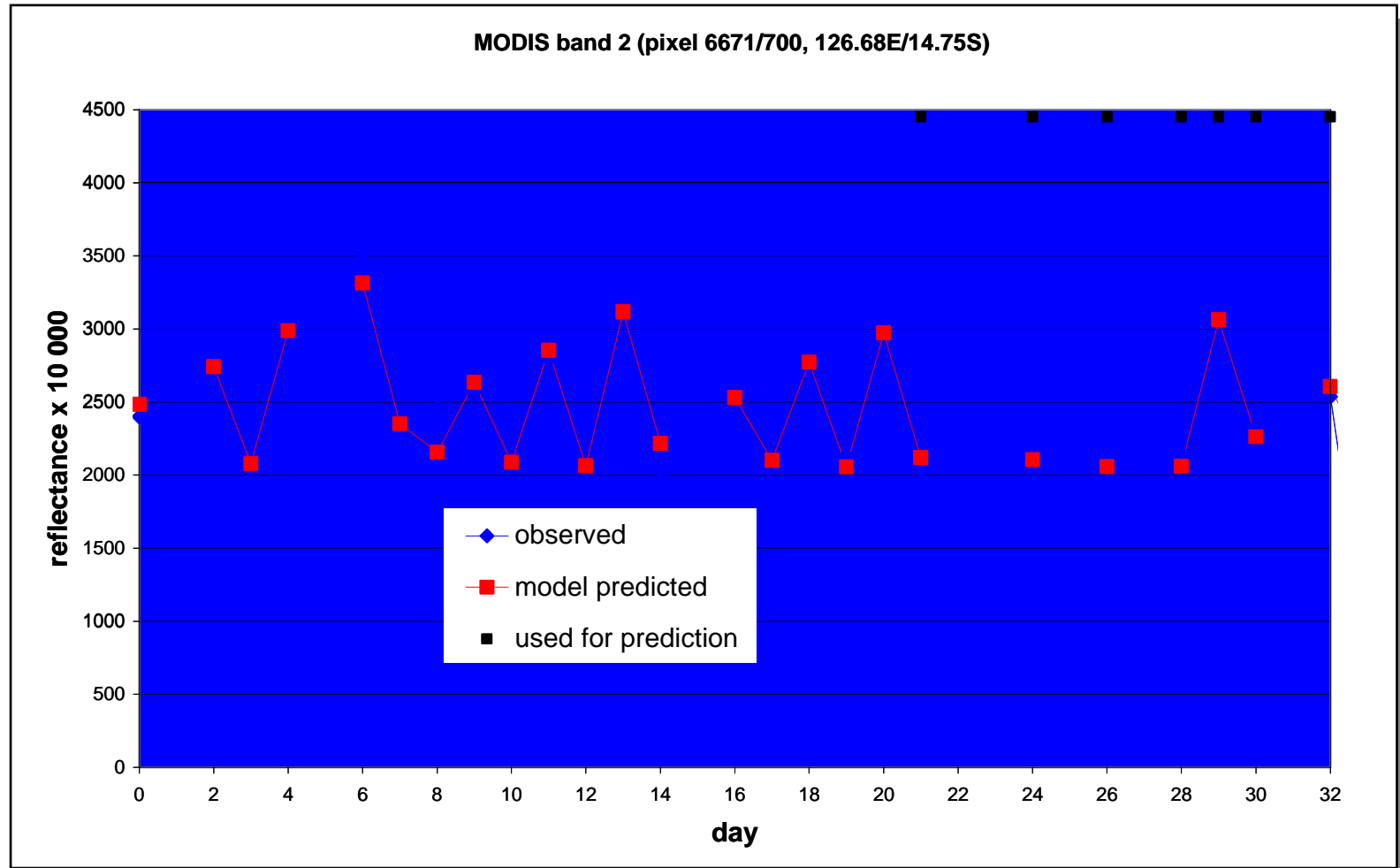
$$R(\theta, \nu, \phi, \lambda, x) = f_{\text{iso}}(\lambda, x) \cdot K_{\text{iso}} + f_{\text{vol}}(\lambda, x) \cdot K_{\text{vol}}(\theta, \nu, \phi) + f_{\text{geo}}(\lambda, x) \cdot K_{\text{geo}}(\theta, \nu, \phi)$$

isotropic scattering

volumetric scattering
horizontally homogeneous canopies

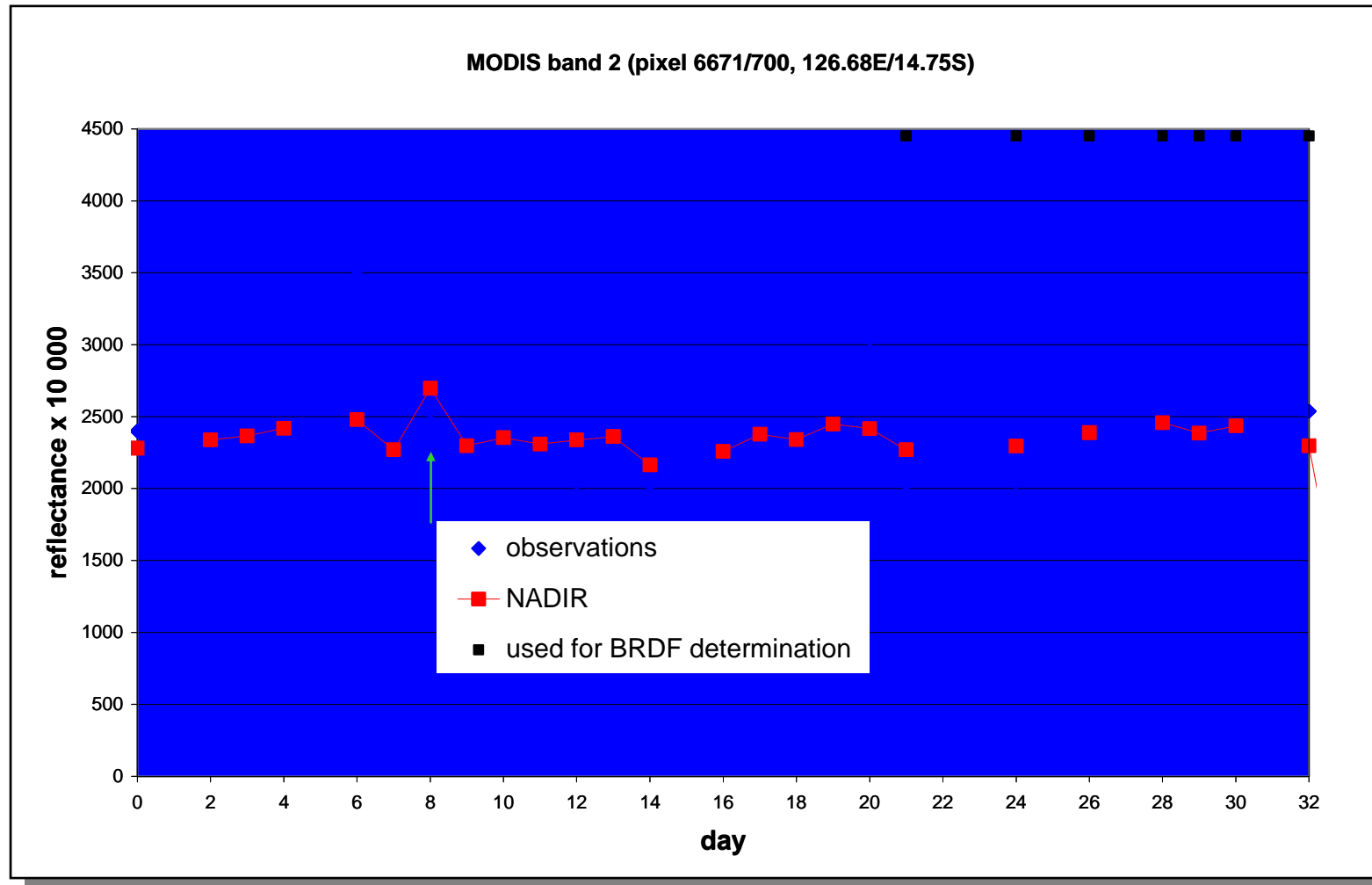
geometric scattering
3d objects that cast shadows

BRDF Determination





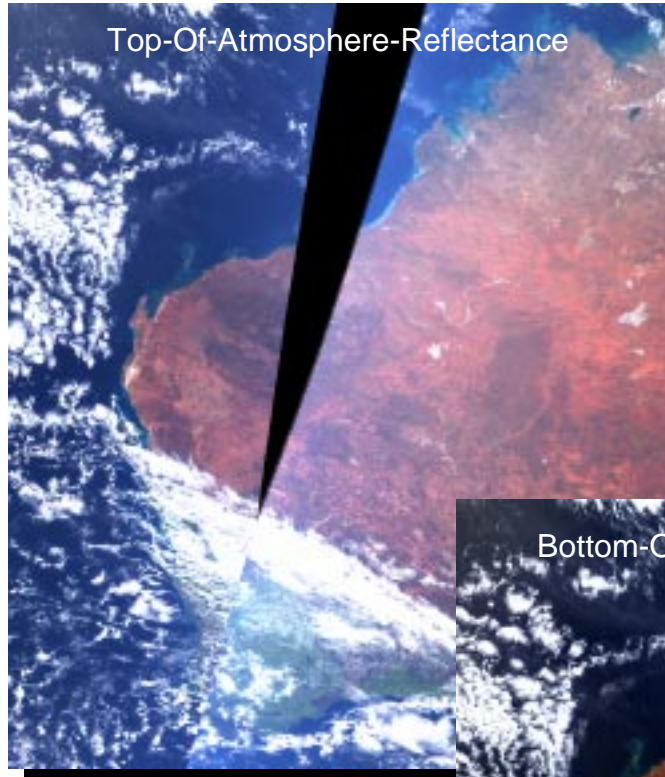
BRDF Determination (Kernel Based Model)



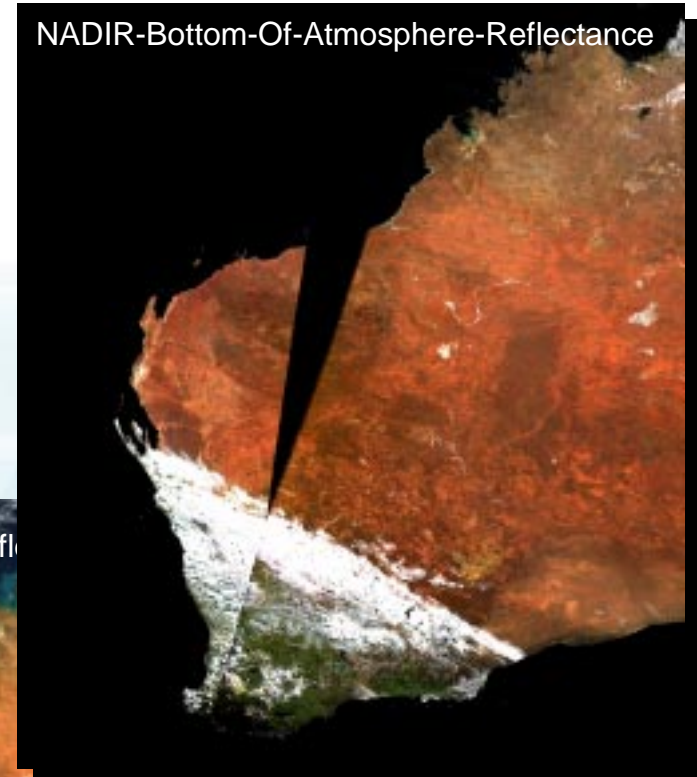


Atmosphere And BRDF Correction

MODIS
09/09/2003
01:27UTC
03:04UTC



Top-Of-Atmosphere-Reflectance



NADIR-Bottom-Of-Atmosphere-Reflectance

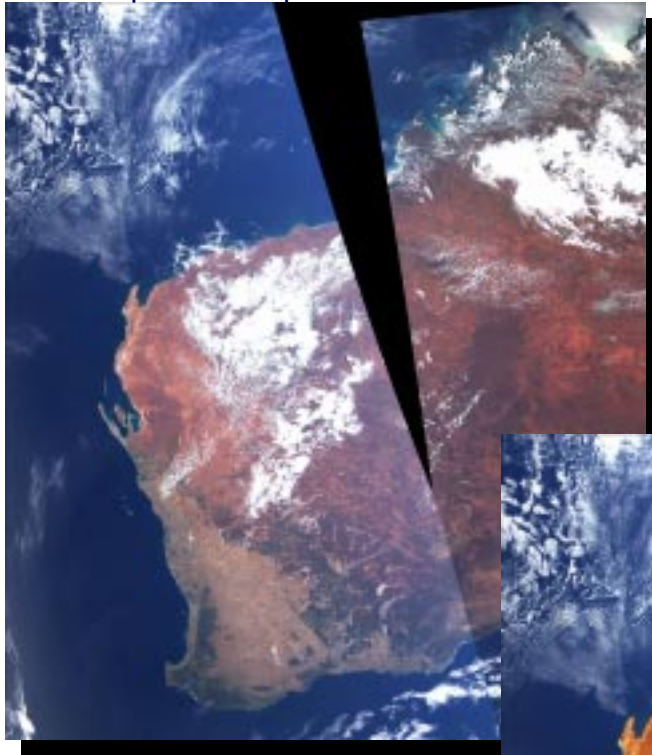


Bottom-Of-Atmosphere-Reflectance

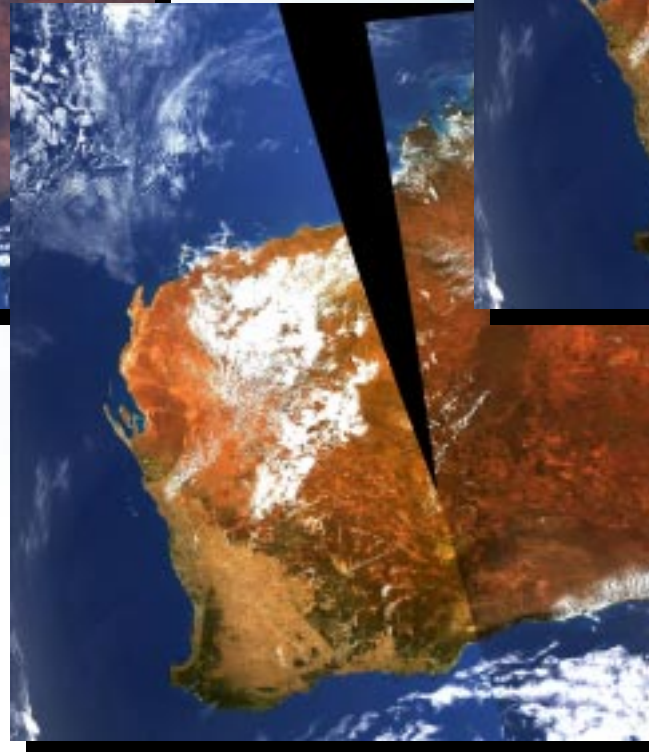


Atmosphere And BRDF Correction

top-of-atmosphere reflectance



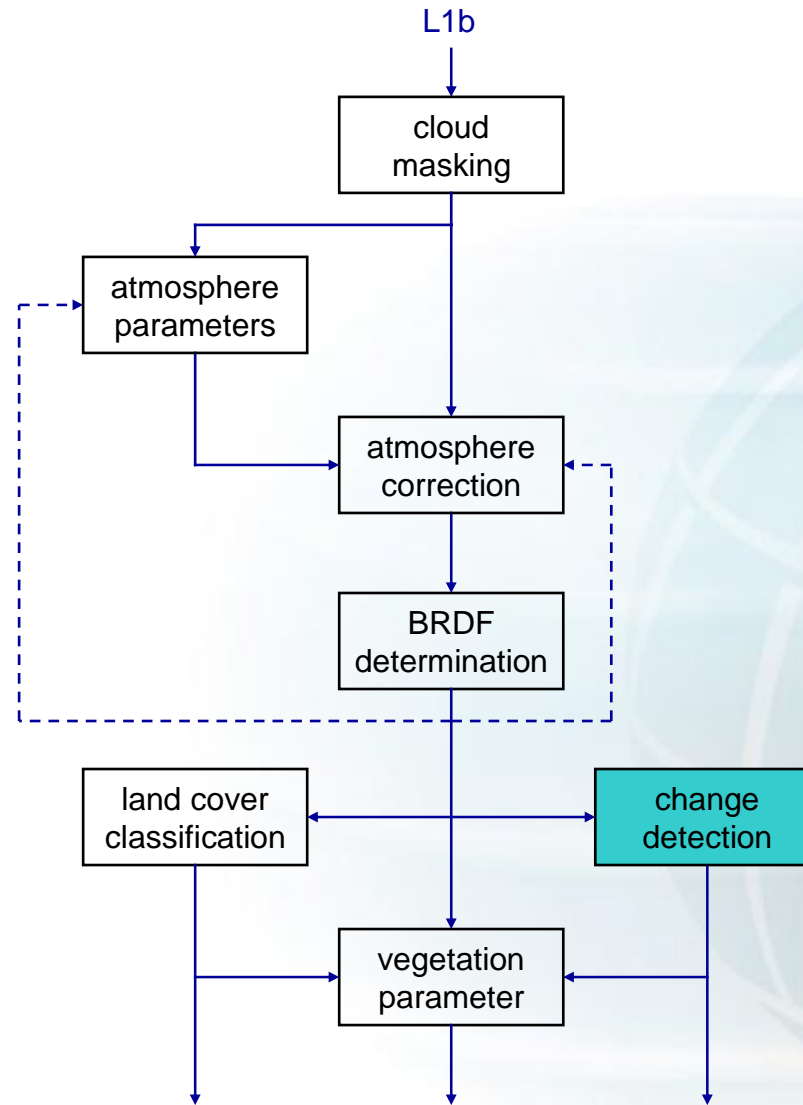
NADIR bottom-of-atmosphere reflectance



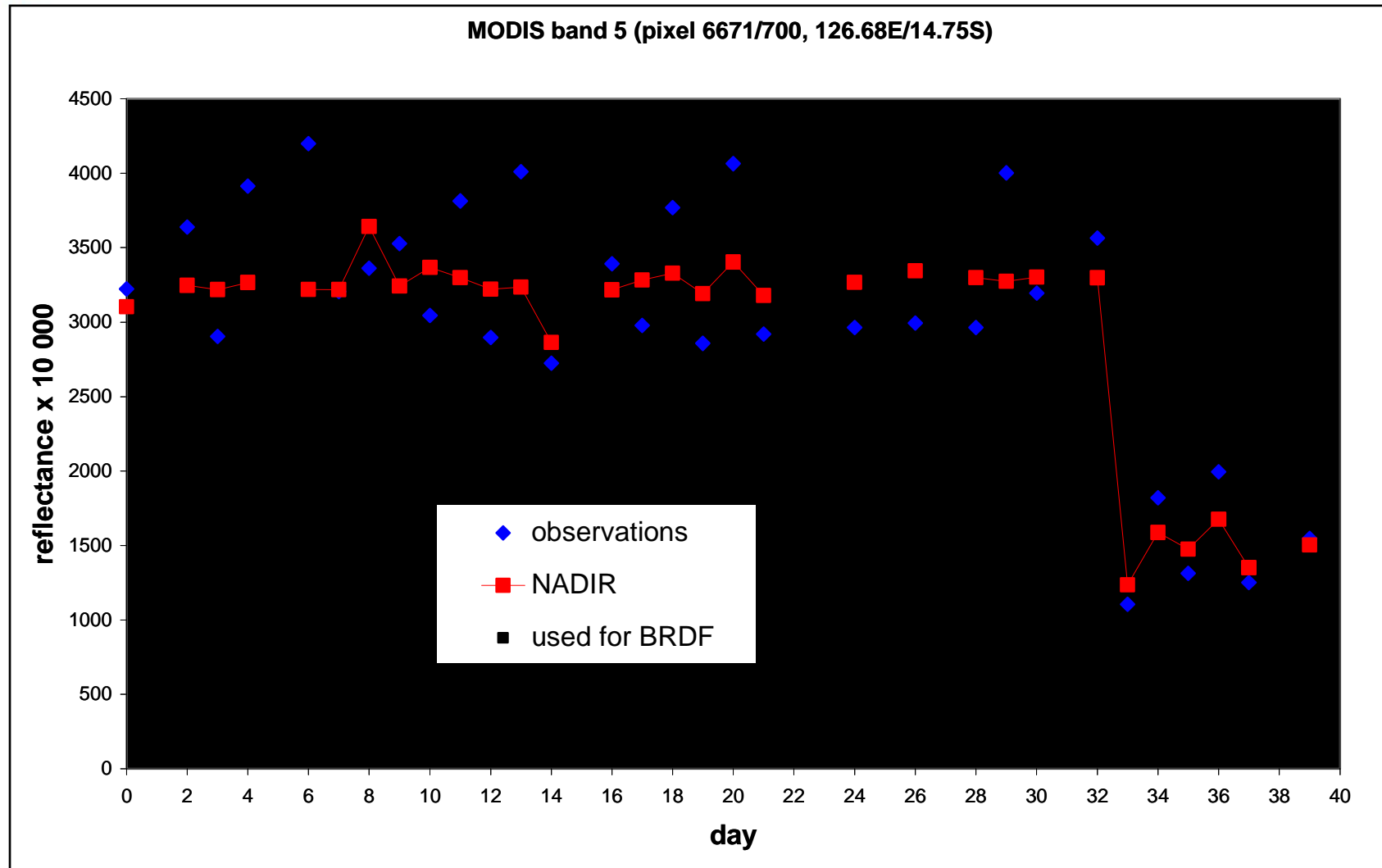
bottom-of-atmosphere reflectance

Sensor: MODIS/Aqua
Date: 22/11/2003 consecutive orbits at 04:43UTC + 06:20UTC
Bands: 1/4/3
Receiving Station: WASTAC - Perth, Australia
Processing: Satellite Remote Sensing Services, DLI, WA
atmosphere correction using the Simplified Method for
Atmospheric Corrections (SMAC)
BRDF correction using Ross-Thick/Li-Sparse kernel driven model
corrections applied to land pixels only

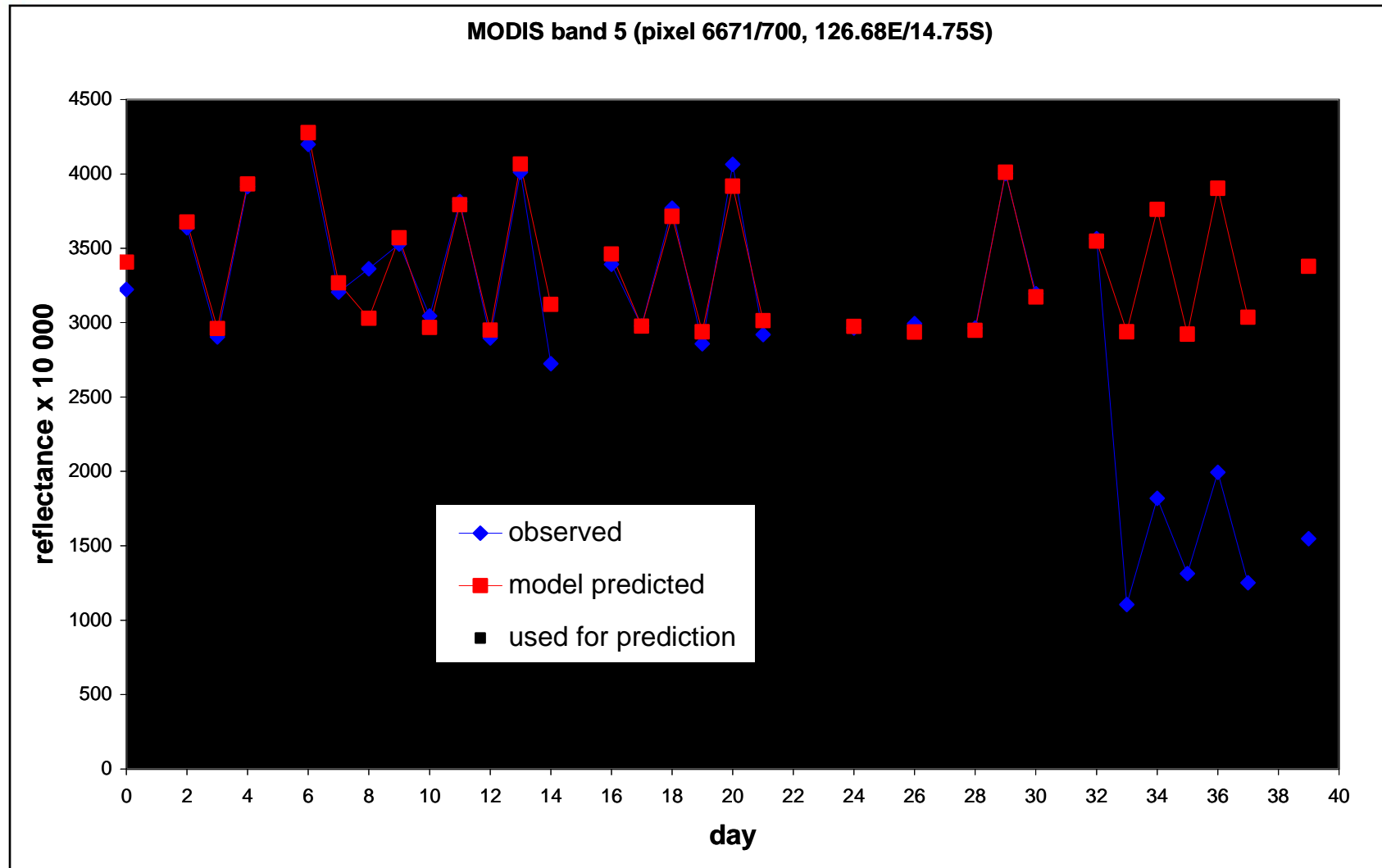
MODIS Processing Stream - Land



Surface Reflectance

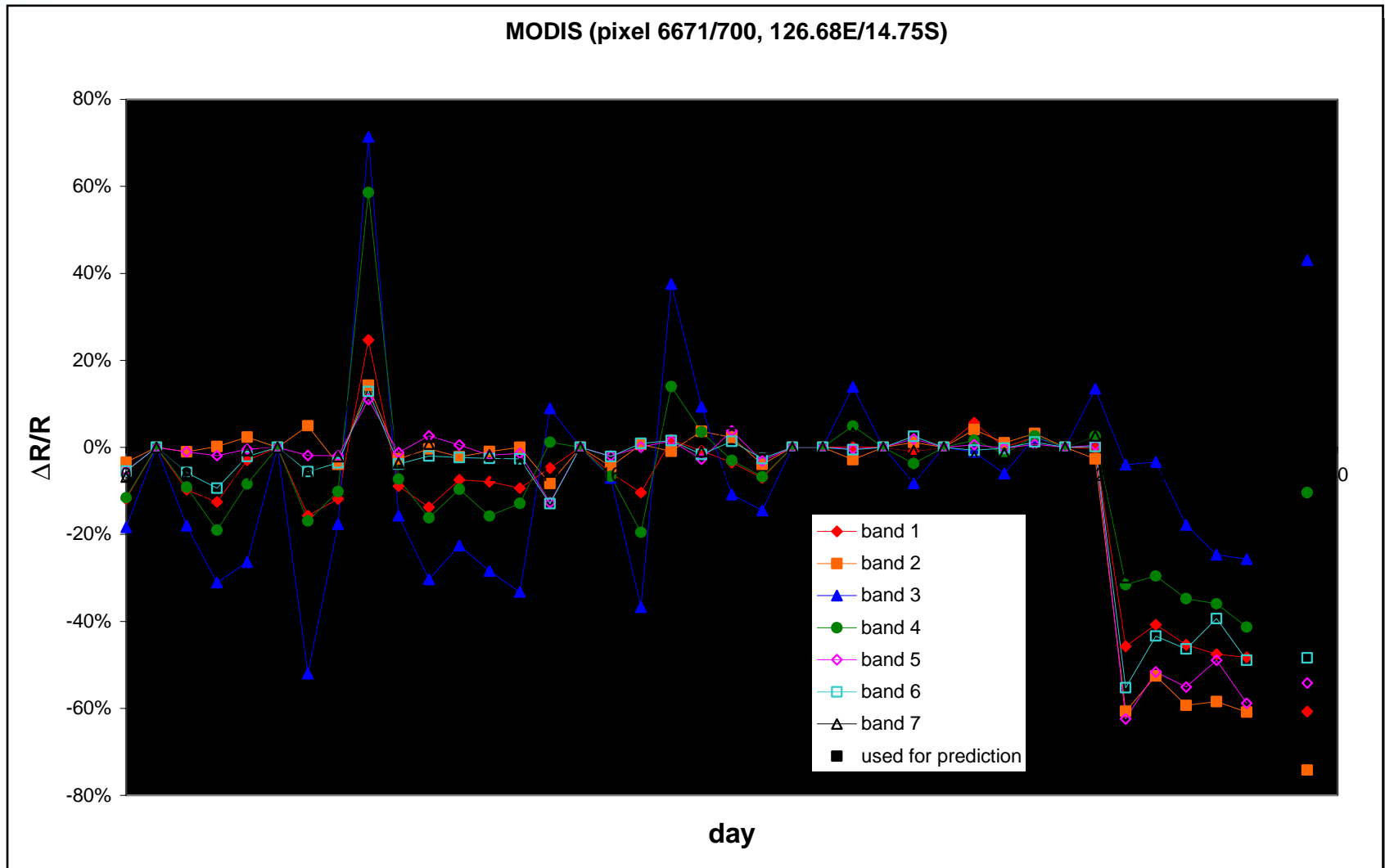


Surface Reflectance





Deviation From Predicted Surface Reflectance





Basic Concept Of Land Cover Change Detection

calculate a statistical measure related to the probability of changes in surface reflectivity

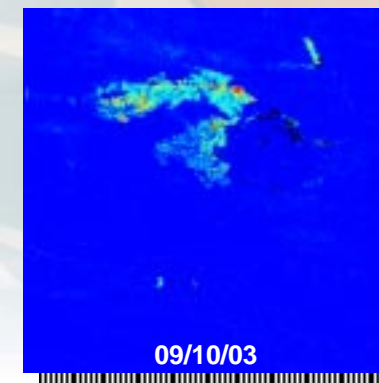
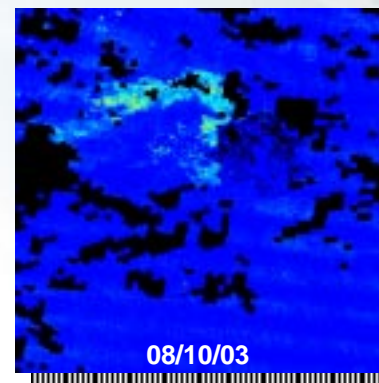
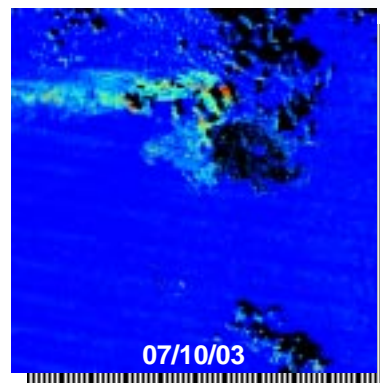
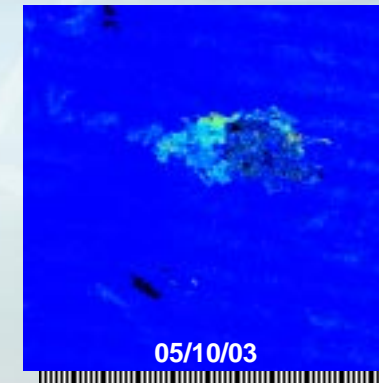
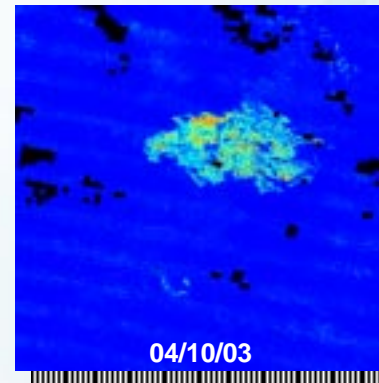
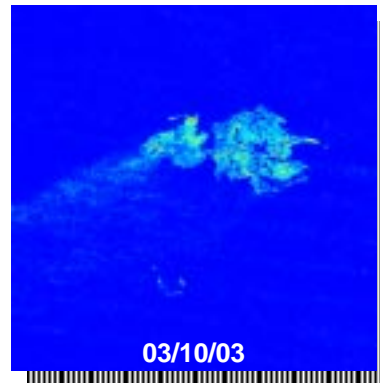
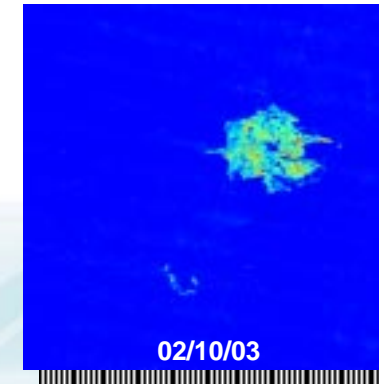
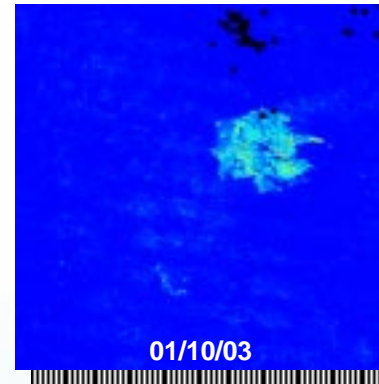
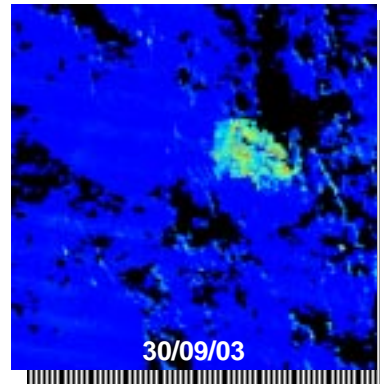
→ Z-score (Roy et al. 2002)

“... adaptive to the viewing and illumination angles of the new observation, as well as the angular distribution and number of the previous samples used in the modeling.”

“... also adaptive to the amount of noise in the data ...”

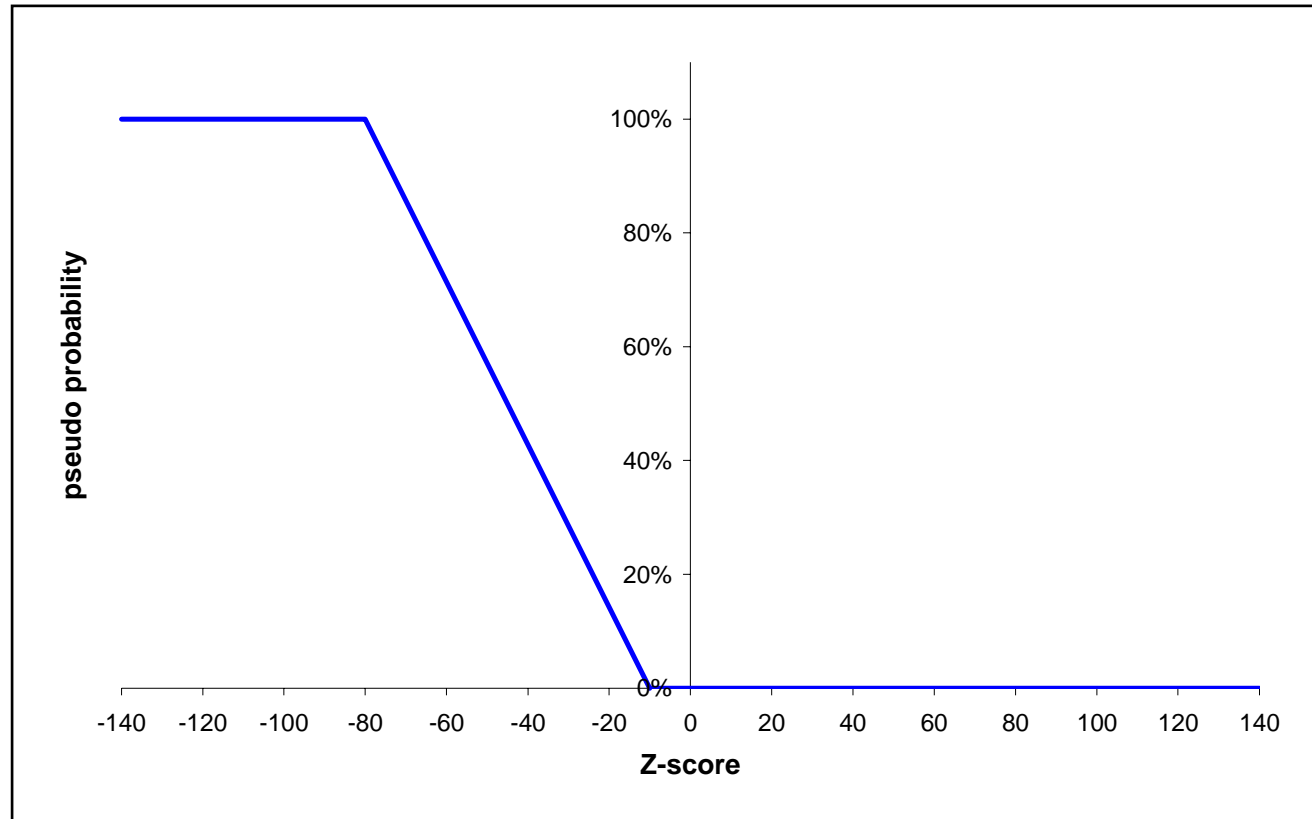


Z-Score (Band 2) Of Fire Affected Area

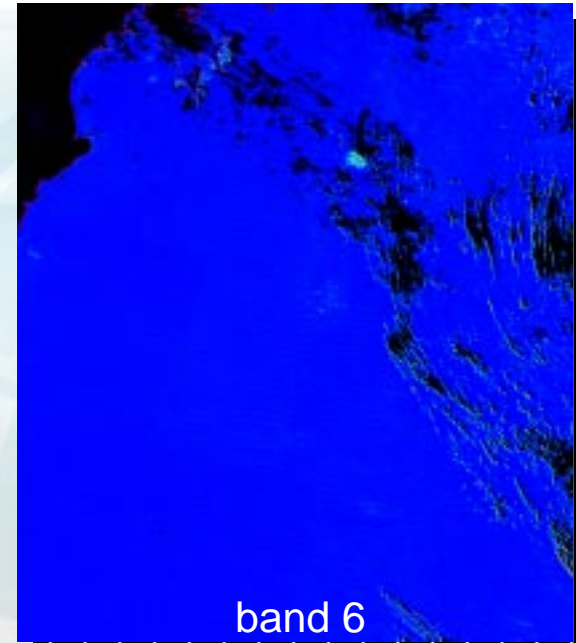
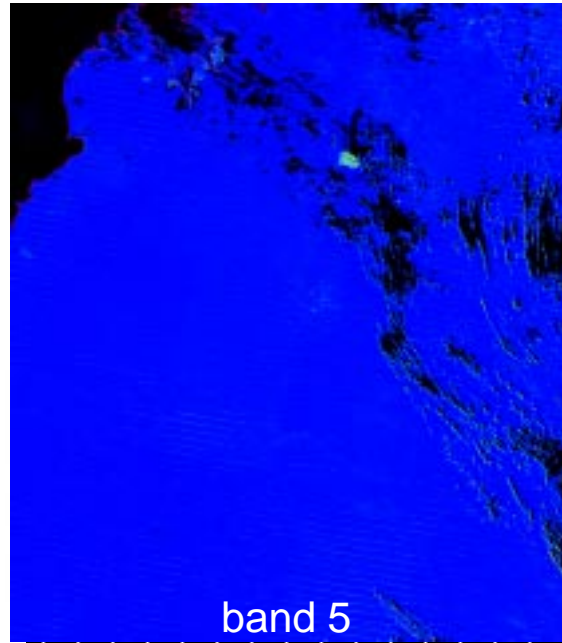
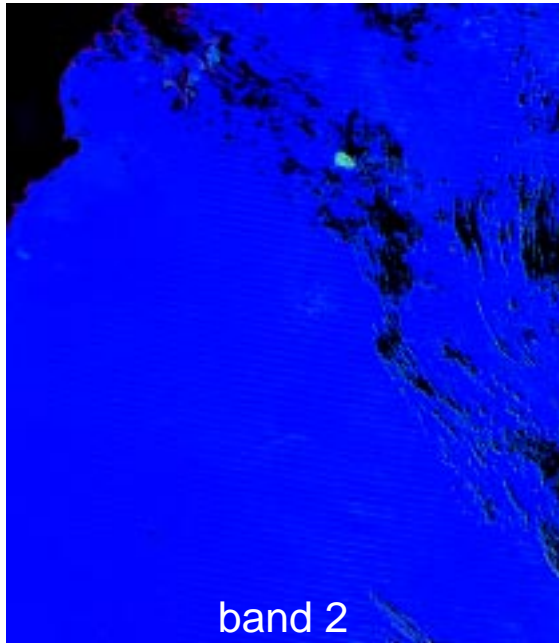




Pseudo Probabilities To Detect Land Cover Change



Z-Score (30/09/2003)



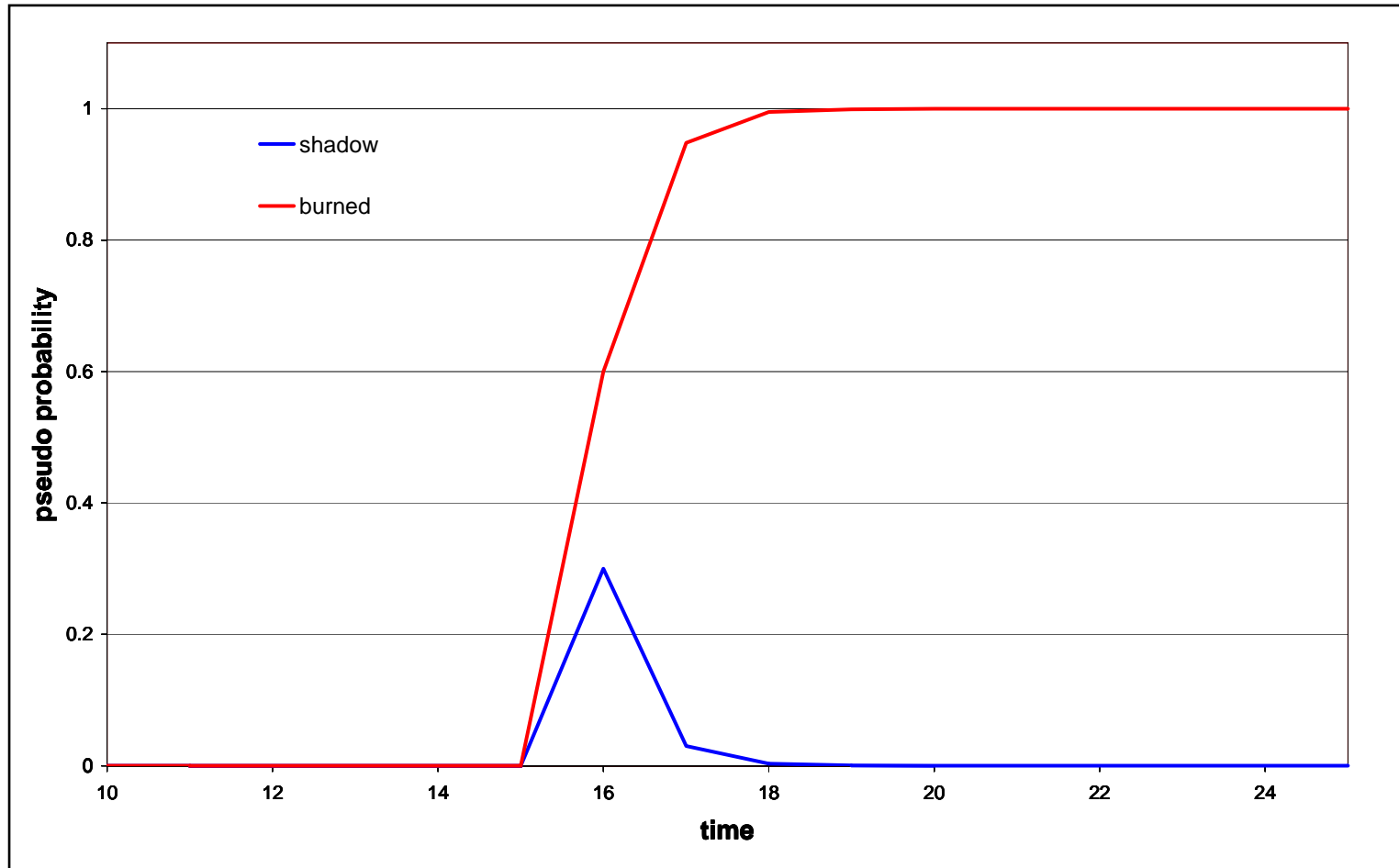


Pseudo Probabilities To Detect Land Cover Change

- probabilities of consecutive observations are combined
→ reliability increases over time
- probabilities of different algorithms (temporal, spectral, textural) are added
→ reliability increases



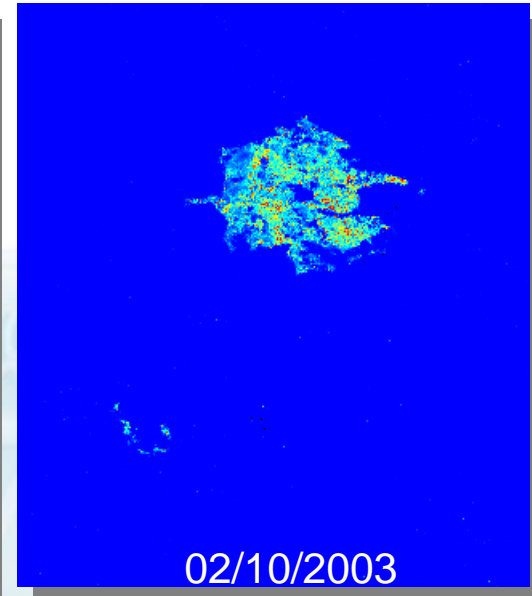
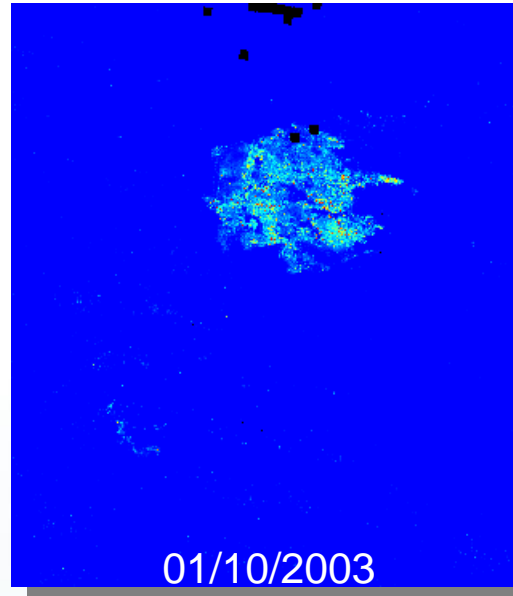
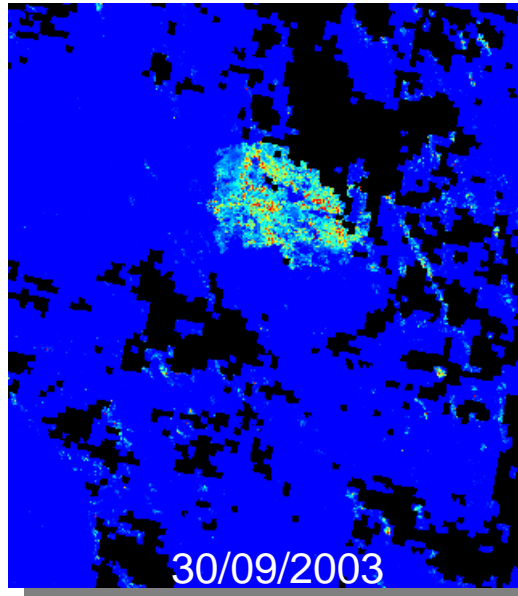
Pseudo Probabilities To Detect Land Cover Change



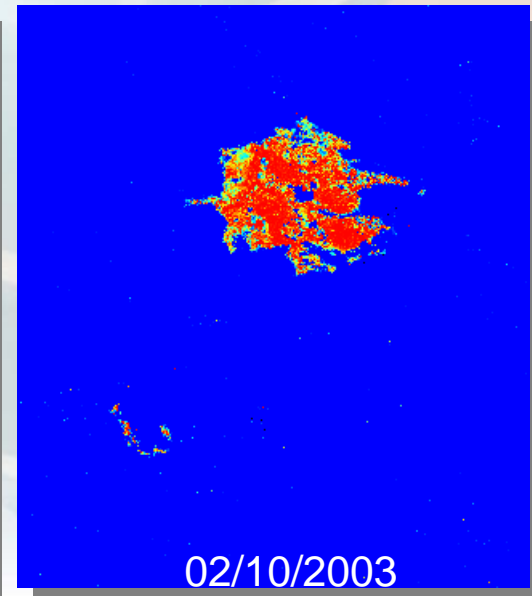
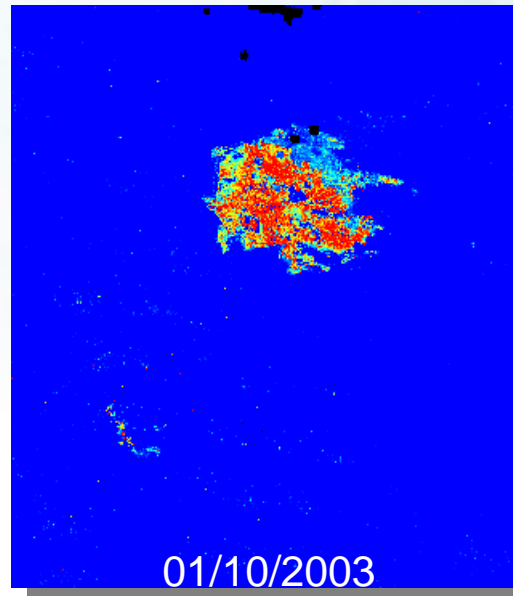
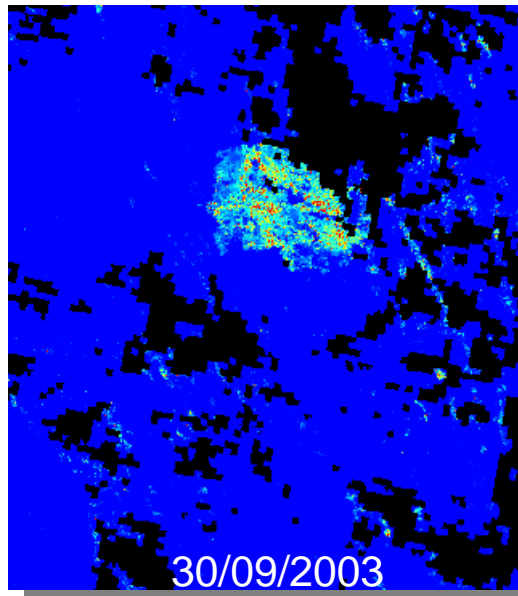


Pseudo Probabilities For Land Cover Change

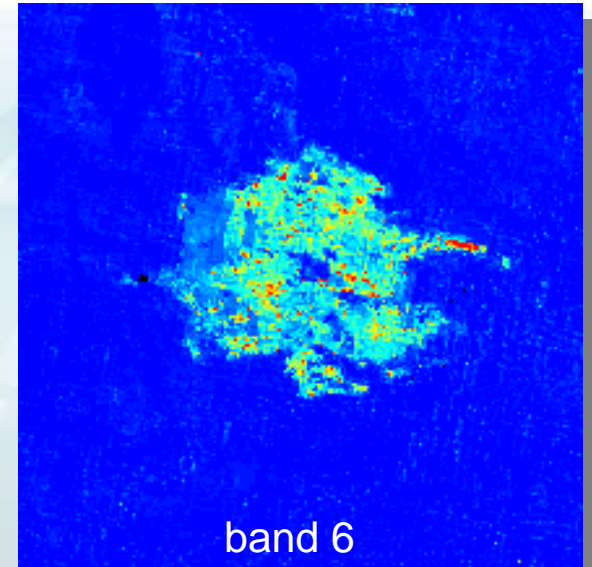
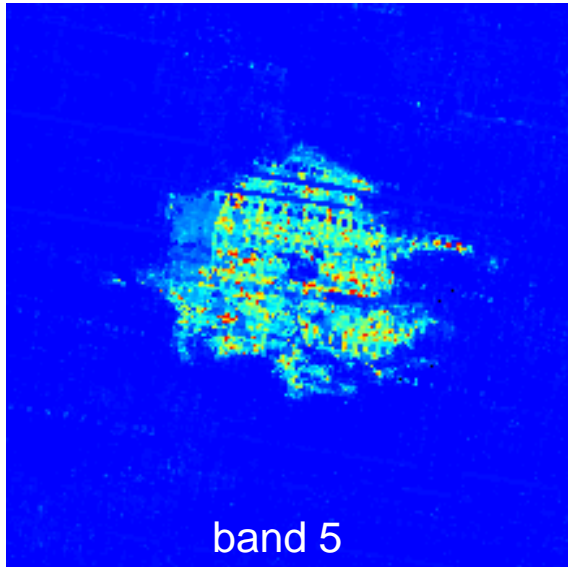
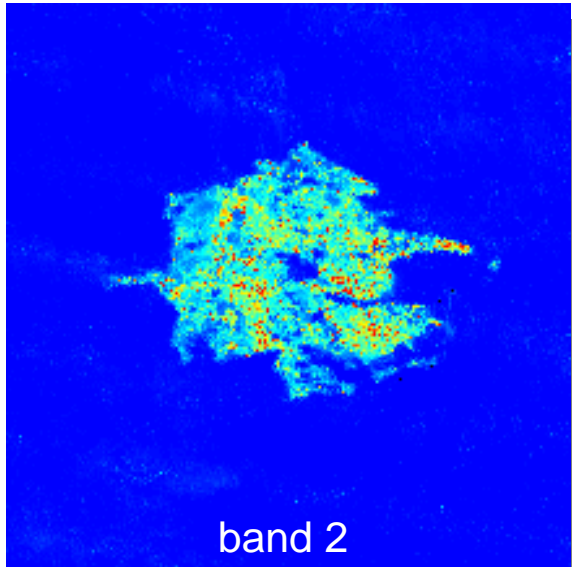
single-day probabilities



multi-day probabilities



Z-Score (02/10/2003) Differences Between Bands





MODIS Near Real Time Fire Affected Area Maps

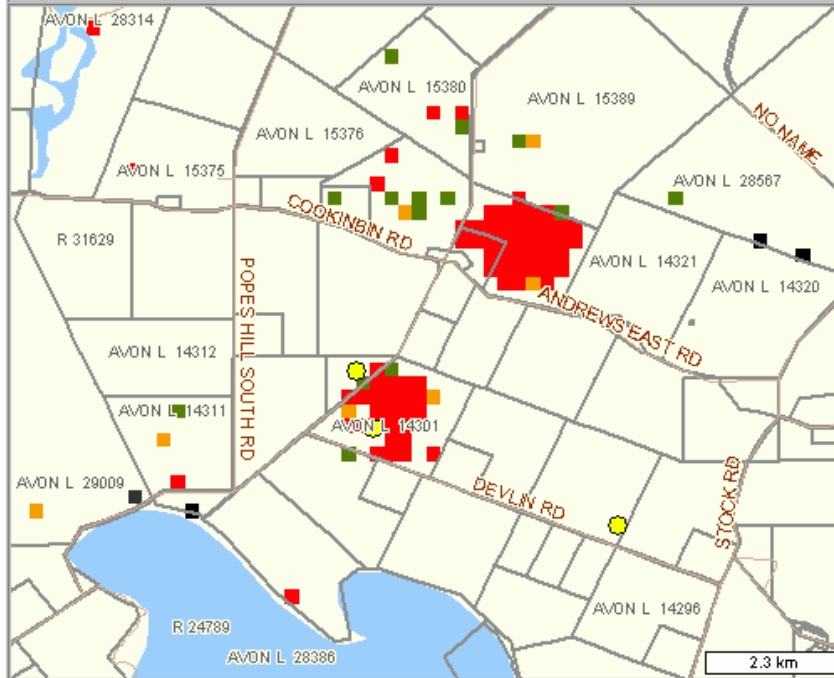


select FHS date start 7 April 2004
select FHS date end 16 April 2004
go

Fire Hotspots between 7/04/04 and 16/04/04

zoom to point: Lat. -31.062 Long. 118.467 go

⚠ NOAA-16 passes are not currently being processed due to the degradation of the sensor. If it improves processing will recommence.



- Refresh Map
- MODIS Hotspots and Images
- NOAA Hotspots and Images
- MODIS Greenness Maps
- NOAA Fire Affected Area Maps
- Lightning Data
- Near Real Time Firescars - WA
- Other Map Datasets

- Legend**
- roads - primary
 - Cadastral
 - city / town
 - State Boundaries
 - water
 - Lightning Strike
 - NOAA FHS
 - MODIS FHS

Map Service by Department of Land Information

Contains Maps © Geoscience Australia



MODIS Near Real Time Fire Affected Area Maps

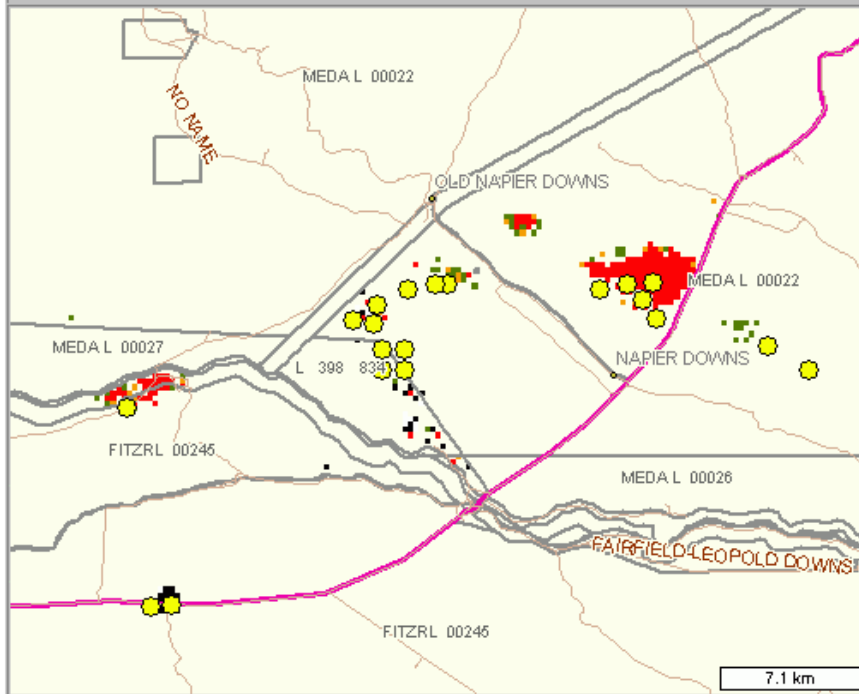


select FHS date start: 10 April 2004
select FHS date end: 24 April 2004
go

Fire Hotspots between 10/04/04 and 24/04/04

zoom to point: Lat. -33.163 Long. 116.497 go

⚠ NOAA-16 passes are not currently being processed due to the degradation of the sensor. If it improves processing will recommence.



- Refresh Map
- MODIS Hotspots and Images
- NOAA Hotspots and Images
- MODIS Greenness Maps
- NOAA Fire Affected Area Maps
- Lightning Data
- Near Real Time Firescars - WA
- Other Map Datasets

Legend

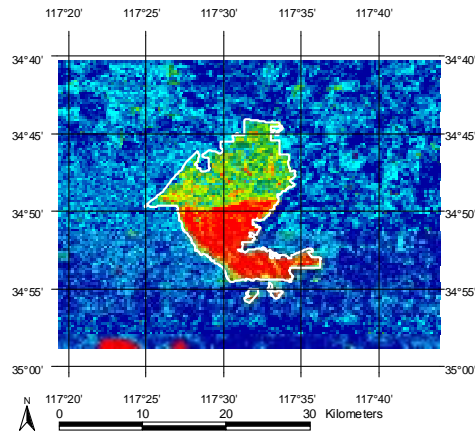
- roads - primary
- Cadastre
- city / town
- State Boundaries
- water
- Lightning Strike
- NOAA FHS
- MODIS FHS



Burn Intensity Mapping (First Results)

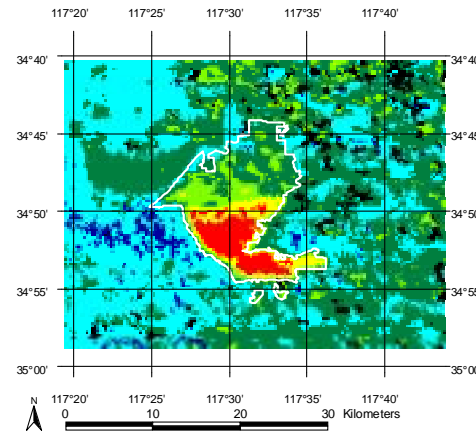
Landsat ETM+

NBR Classification February - December



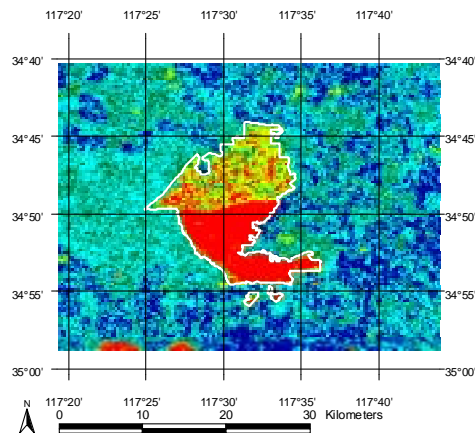
MODIS

NBR Classification: FAA north prefire mean - FAA north postfire mean



Fire Affected Area 1
- Classification of burn severity -

NBR Classification February - November



Legend

- Class 1: Δ NBR < 0
- Class 2: Δ NBR 0 to < 200
- Class 3: Δ NBR 200 to < 400
- Class 4: Δ NBR 400 to < 600
- Class 5: Δ NBR 600 to < 800
- Class 6: Δ NBR >= 800



MODIS Greenness Index

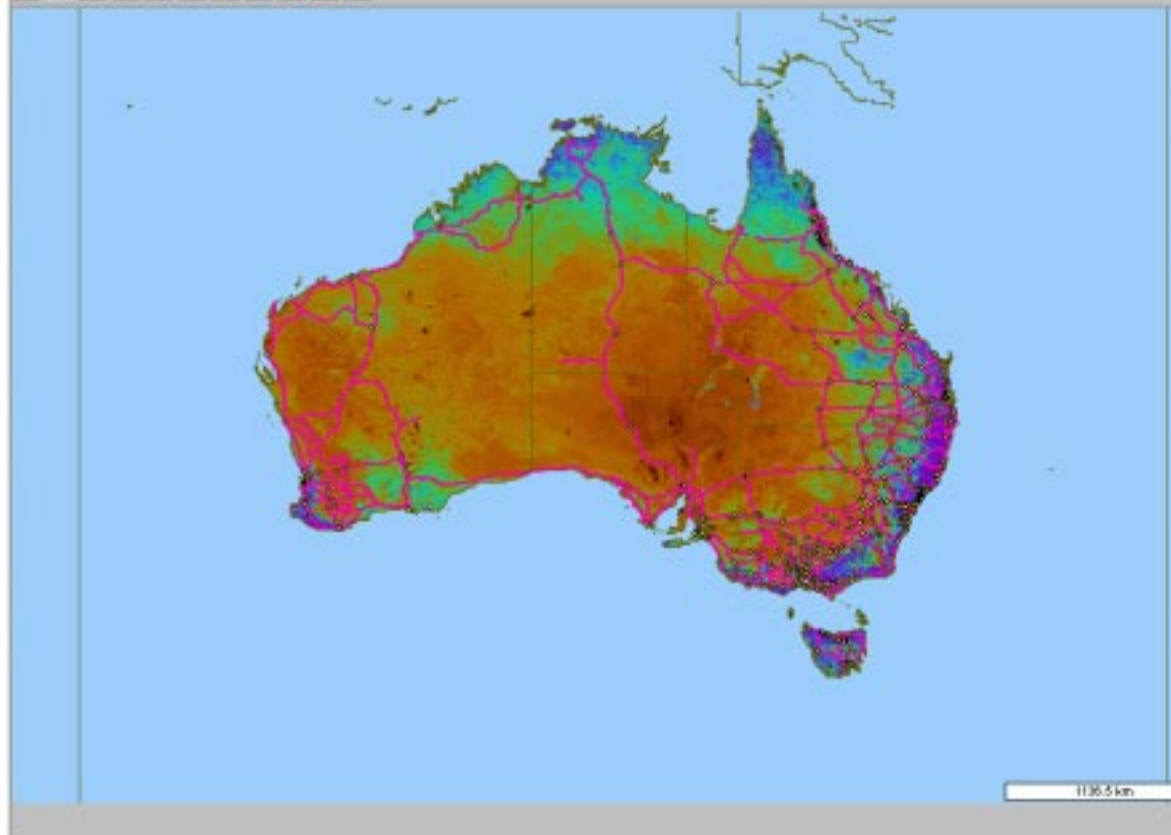


select FHS date start: 24 April 2004
select FHS date end: 24 April 2004
go

Fire Hotspots for 24/04/04

zoom to point: Lat: -33.163 Long: 116.497 go

⚠ NOAA-16 passes are not currently being processed due to the degradation of the sensor. If it improves processing will recommence.



Refresh Map

MODIS Hotspots and Images

NOAA Hotspots and Images

Hide MODIS Greenness List

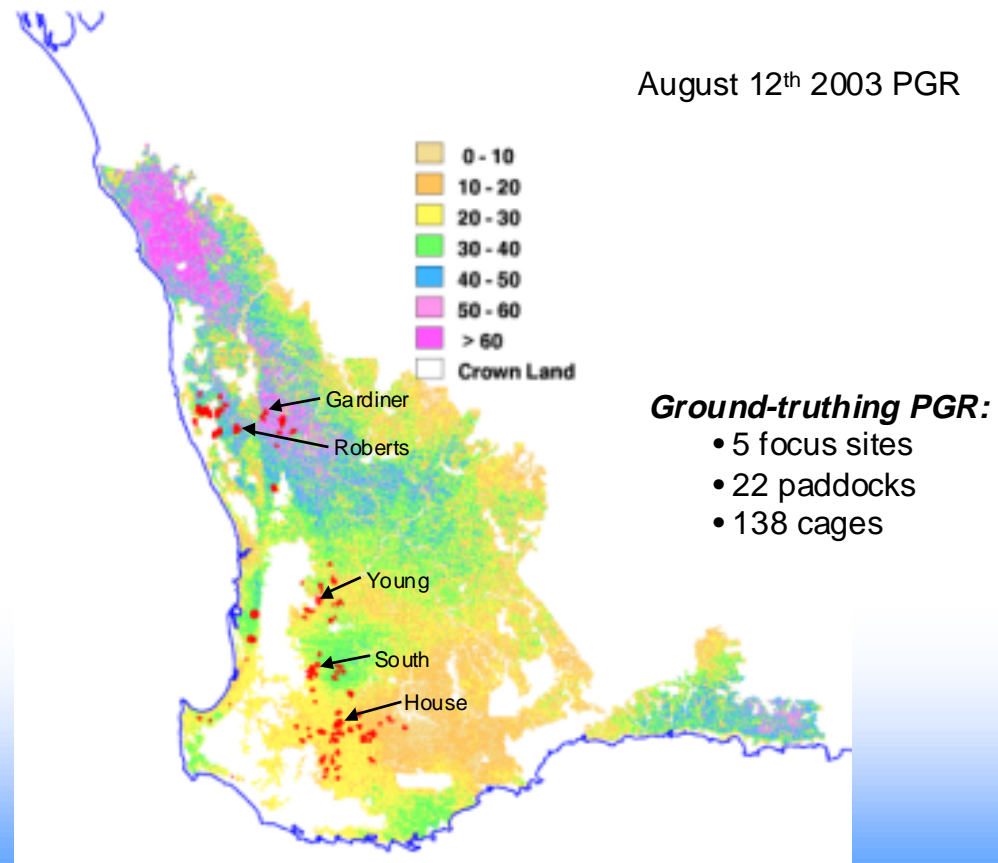
GREEN VEGETATION COVER

low medium high

Image Image Date

<input type="checkbox"/>	01 Jan 2003
<input type="checkbox"/>	08 Jan 2003
<input type="checkbox"/>	15 Jan 2003
<input type="checkbox"/>	22 Jan 2003
<input type="checkbox"/>	29 Jan 2003
<input type="checkbox"/>	05 Feb 2003
<input type="checkbox"/>	12 Feb 2003
<input type="checkbox"/>	19 Feb 2003
<input type="checkbox"/>	26 Feb 2003
<input type="checkbox"/>	05 Mar 2003
<input type="checkbox"/>	12 Mar 2003
<input type="checkbox"/>	19 Mar 2003
<input type="checkbox"/>	26 Mar 2003
<input type="checkbox"/>	02 Apr 2003
<input type="checkbox"/>	09 Apr 2003
<input type="checkbox"/>	16 Apr 2003
<input type="checkbox"/>	23 Apr 2003
<input type="checkbox"/>	30 Apr 2003
<input type="checkbox"/>	07 May 2003
<input type="checkbox"/>	14 May 2003

Pasture Growth Rate





Future Developments

- adaptation and integration of the NASA aerosol retrieval and atmosphere correction processor to the DB system
- development of an algorithm for aerosol retrieval that utilises the continuous data stream at WASTAC / DLI
- validation of the automatic fire scar mapping using Landsat TM
- integration of other fire scar mapping algorithms (thermal, textural)
- development of an algorithm to map severity of fires
- development of algorithms to derive vegetation parameters (LAI, fAPAR, water content, ...)



END