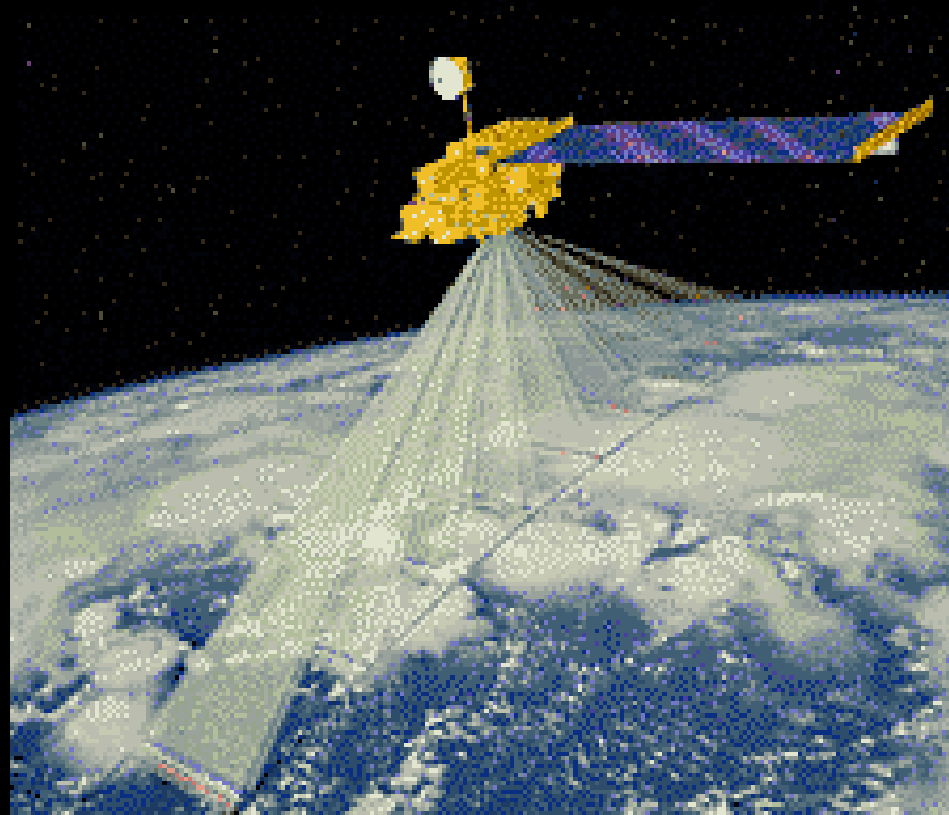


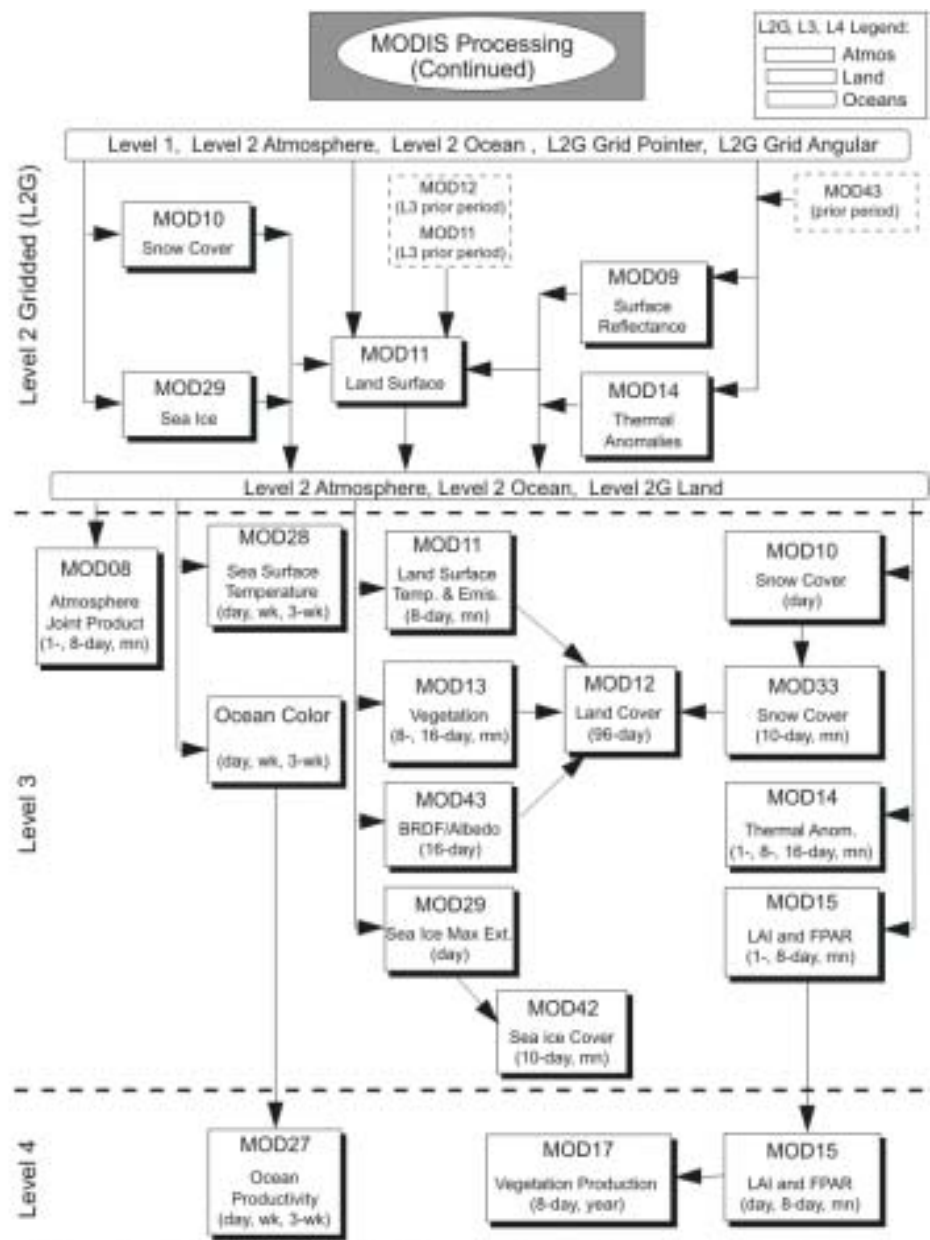
Software for processing data from Instruments on TERRA

Peter Turner CSIRO Atmospheric Research



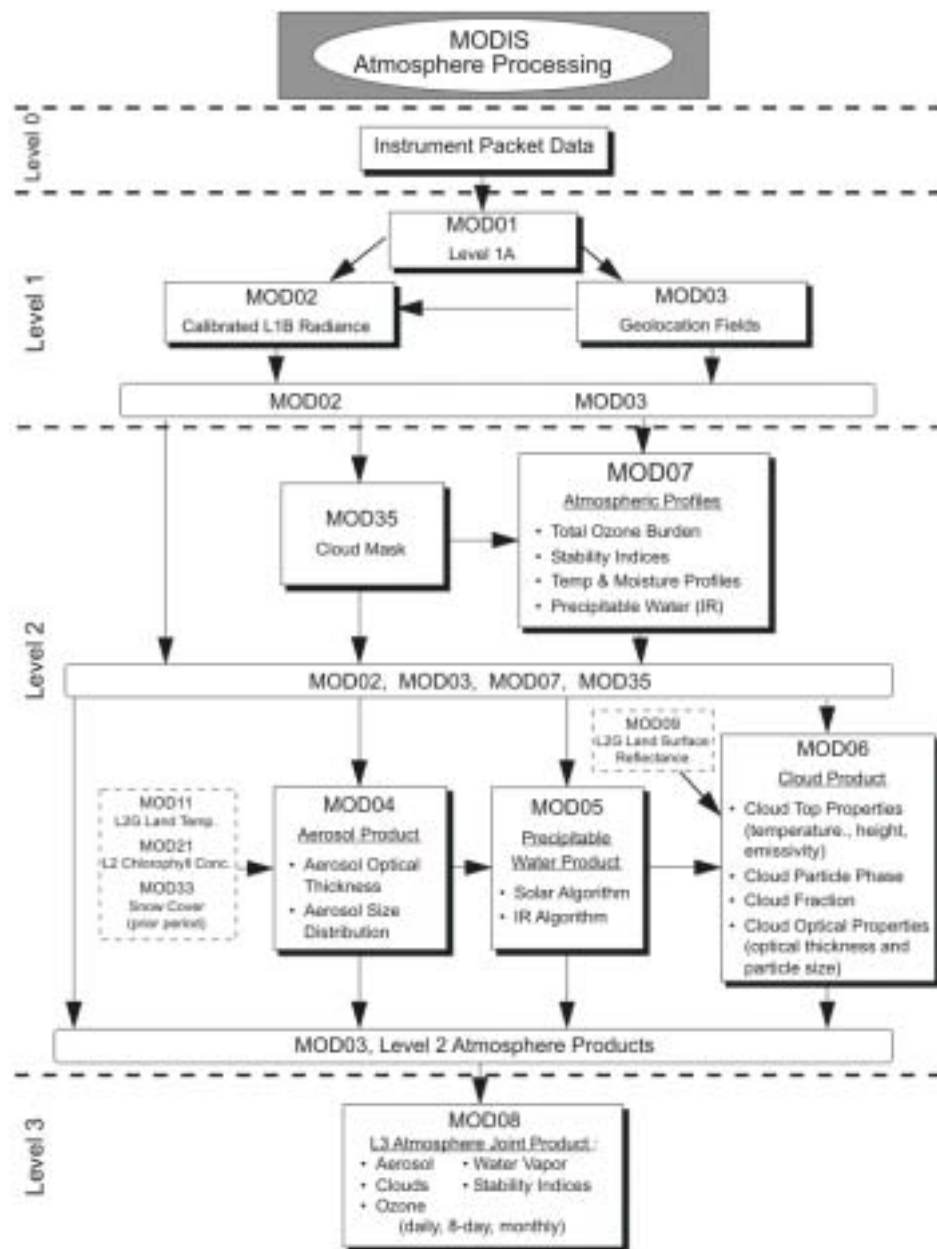
MODIS data processing

- Huge number of MODIS data products available
- Web supply system is not real-time and can suffer from long processing delays (currently 8/10 weeks)
- Processing software can be obtained through the right contacts but is very complex
- Most products from level 1b up are in HDF format either in "swath" or integerised sinusoidal projection

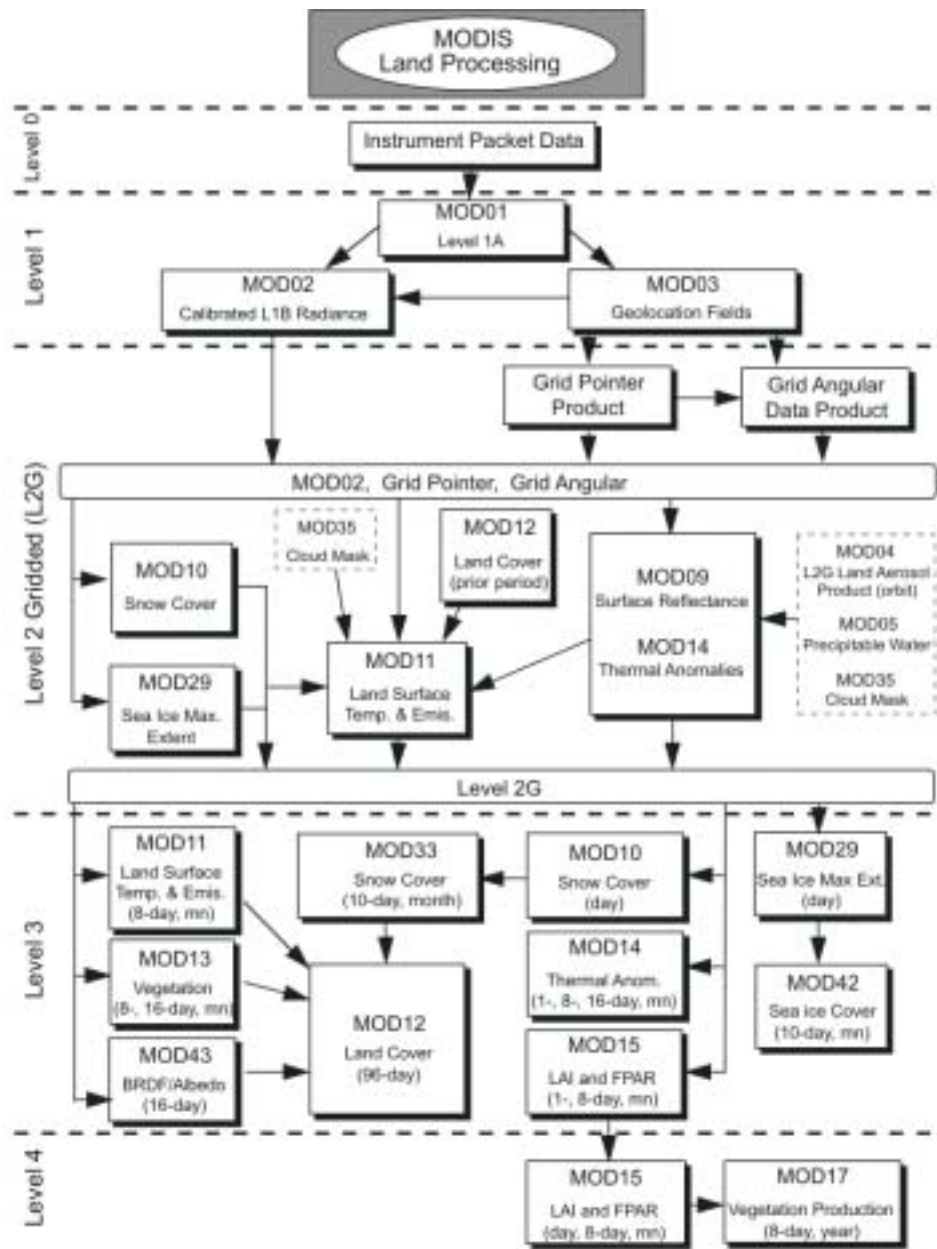


Flow Diagram Showing Interrelationship of MODIS Atmosphere, Land, and Ocean Products (Continued).

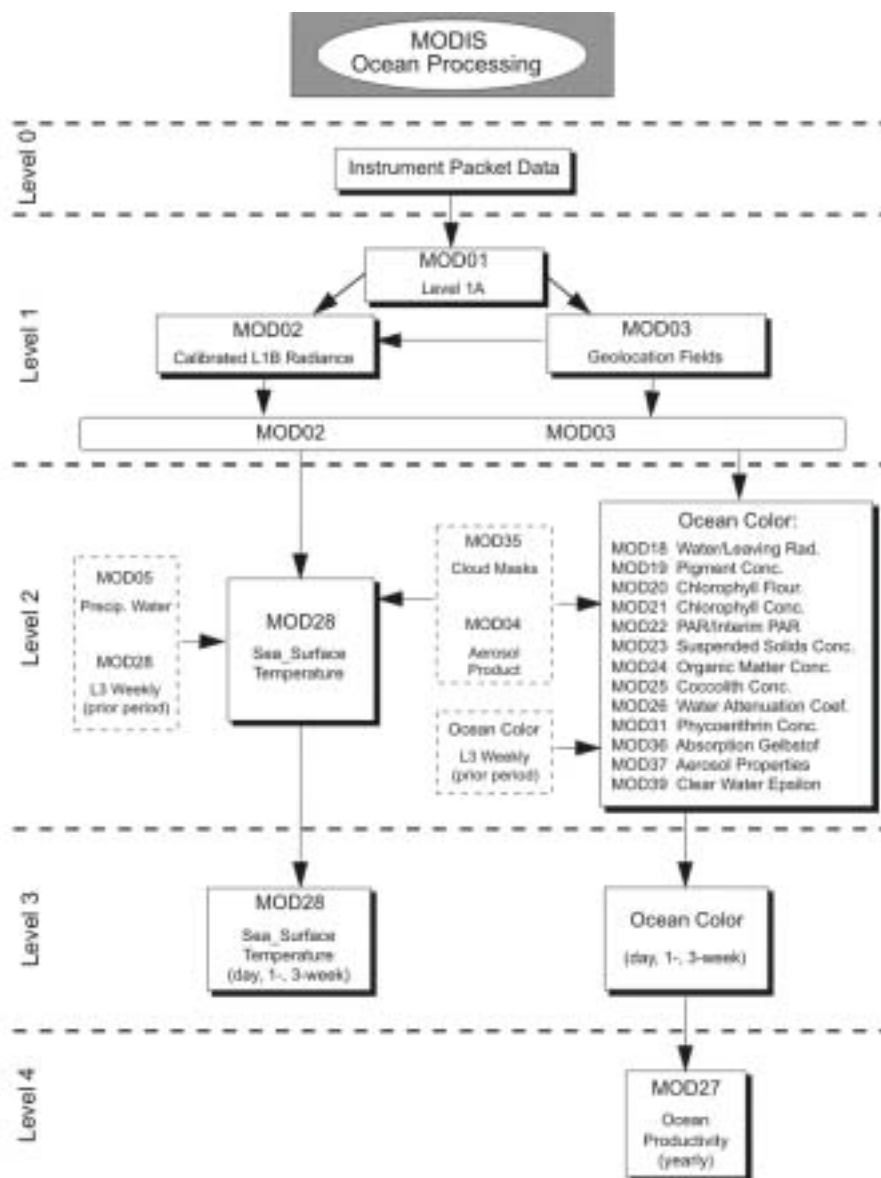
low Diagram Showing Interrelationship of MODIS Atmosphere, Land, and Ocean Products.



Flow Diagram Showing Interrelationship of MODIS Atmosphere Products.



Flow Diagram Showing Interrelationship of MODIS Land Products.



Flow Diagram Showing Interrelationship of MODIS Ocean Products.

MODIS Reprojection Tool (USGS)

- Allows user to reproject gridded level 2G, 3 and 4 land products
- Can reproject from Integerised Sinusoidal Projection to a number of standard map projections.
- Does not support swath data products



URL <http://edc.usgs.gov/programs/sddm/modisdist>

CAPS

- General interface to HDF allowing manipulation and display
A range of TERRA data products
- Allows user to reproject swath data products
- Can reproject from Integerised Sinusoidal Projection to a number of standard map projections but requires some scripts to be written.
- SMAC atmospheric correction available for MODIS and MISR channels. Hope to make locally developed MAPS code available



URL <http://www.dar.csiro.au/rs/capshome.html>

General display capabilities for HDF data provided by CAPS

The screenshot shows the CAPS Version 2.6.0 HDF Browser window. The interface includes a menu bar with 'Browse', 'Command', and 'Help'. The main area displays the file path '/bdata/pjt/layers/rouj_v670.hdf' and a tree view of the data structure. The tree view shows a group 'k' containing 'k_v670', which in turn contains '_FillValue', 'latitude', and 'longitude'. Below the tree view, there is a table for the selected dataset 'k_v670' with columns for 'Units', 'Expr', 'Range', and 'Step'. The 'Range' column is highlighted with a red arrow and labeled 'Sub and re sampling'. At the bottom of the window, there are buttons for 'Range', 'Text', 'Graph', 'Image', 'Animate', 'NAO', and 'Cancel'. The 'Image' button is highlighted with a red arrow and labeled 'Image display', and the 'NAO' button is highlighted with a red arrow and labeled 'Data out'. Red arrows also point from the text 'File selection' to the 'File' field and 'SDS selection' to the 'k_v670' entry in the tree view.

File selection

SDS selection

Sub and re sampling

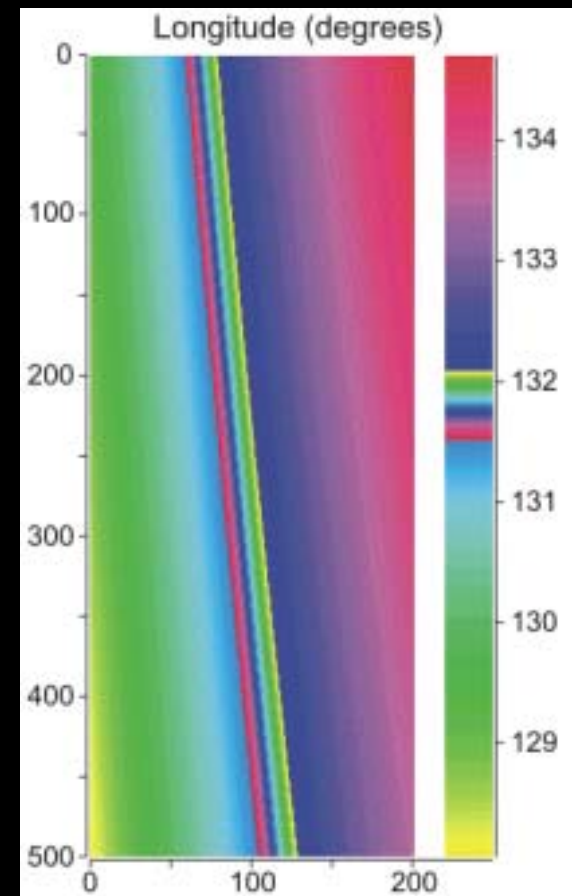
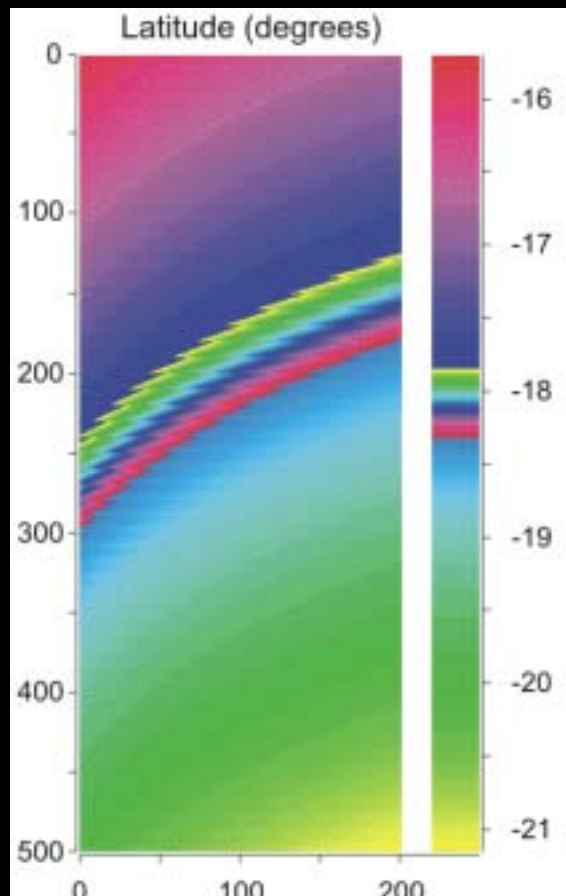
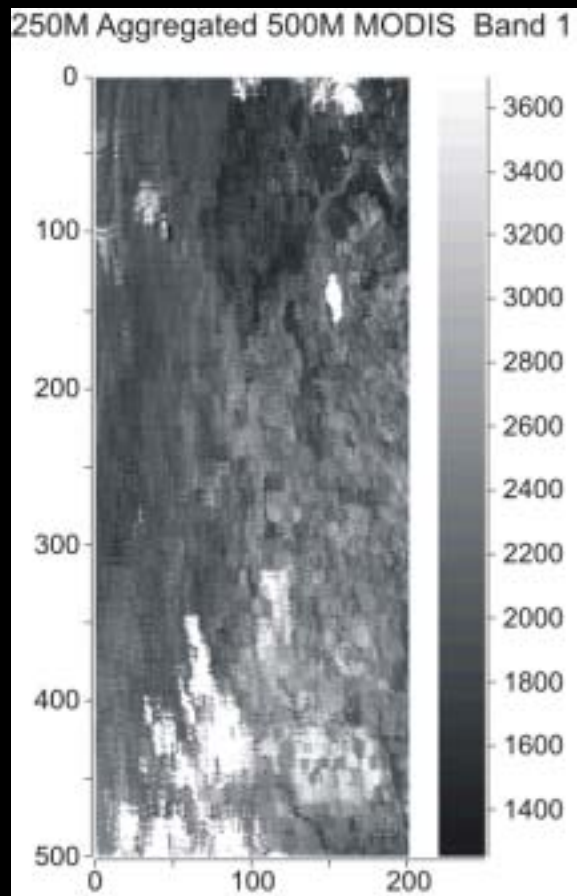
Image display

Data out

	Units	Expr	Range	Step
k	<input type="checkbox"/>	<input type="checkbox"/>	0 3	1
latitude	<input type="checkbox"/>	<input type="checkbox"/>	-5 -45	-0.01
longitude	<input checked="" type="checkbox"/> index	<input type="checkbox"/>	0 5001	1

CSIRO

MODIS panoramic bowtie effect (level 1b data)

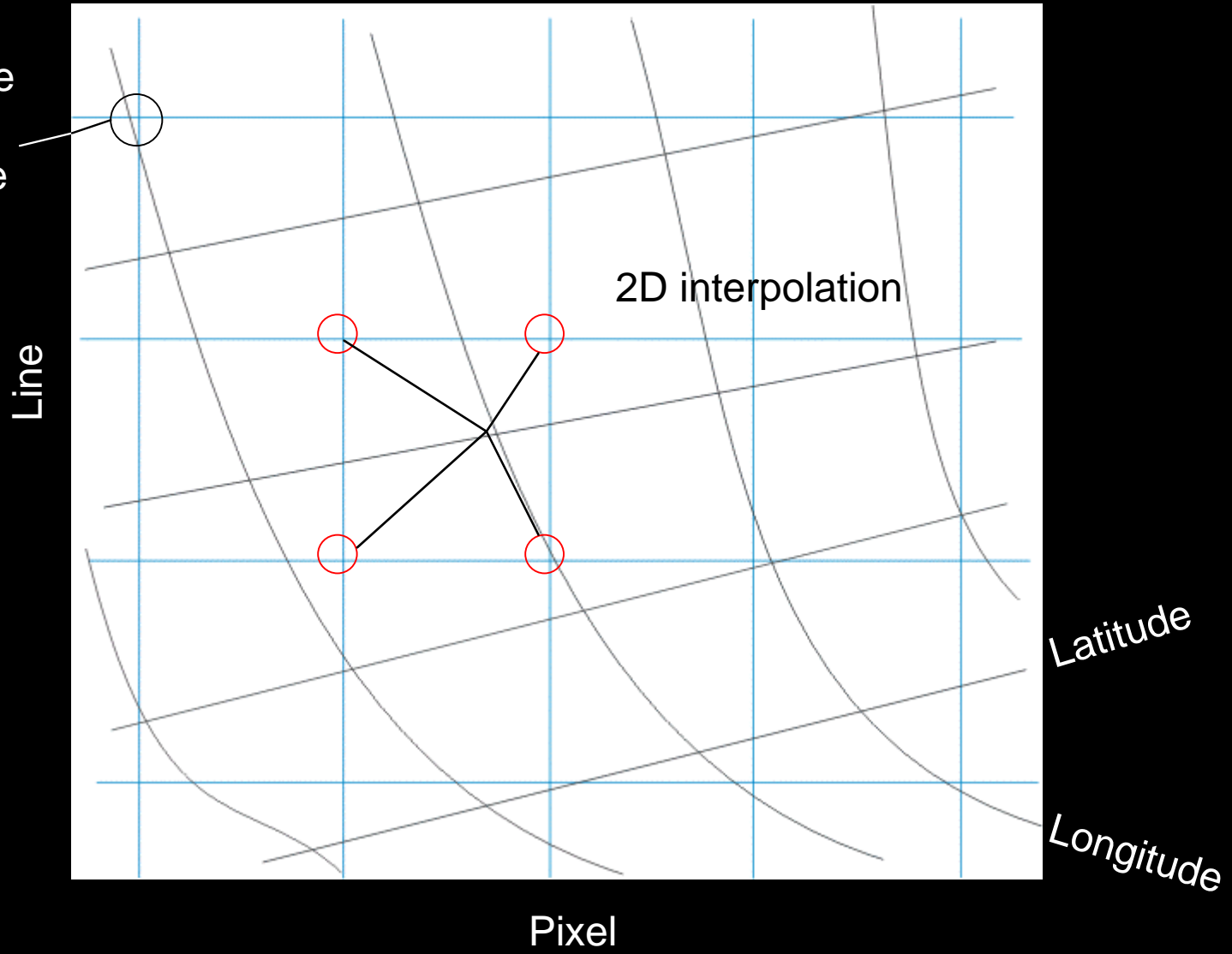


Over sampling at the edges replicating some values



Reprojecting the 1b data using CAPS

Radiance
Latitude
Longitude



Calculate the
Geographic
limits

```
#
# modis_remap--
#
# Map a modis data channel into a latitude and longitude
# grid
proc modis_remap {step_lat step_lon latitude longitude data} {
# assume international date line is not in range
  nap "min_lat = min(min(latitude)) - step_lat"
  nap "max_lat = max(max(latitude)) + step_lat"
  nap "min_lon = min(min(longitude)) - step_lon"
  nap "max_lon = max(max(longitude)) + step_lon"

  nap "axis_yCV = ap0(max_lat, min_lat, -step_lat)"
  nap "axis_xCV = ap0(min_lon, max_lon, step_lon)"
  nap "page_xCV = (axis_xCV)"
  nap "page_yCV = (axis_yCV)"
# Calculate fractional line and pixel coordinates for
# each new grid element
  nap "inverseGrid = invert_grid(
    (latitude), page_yCV,
    (longitude), page_xCV
  )"
#
# Interpolate the data to the new grid
  nap result = data(inverseGrid)
  return "$result"
}
```

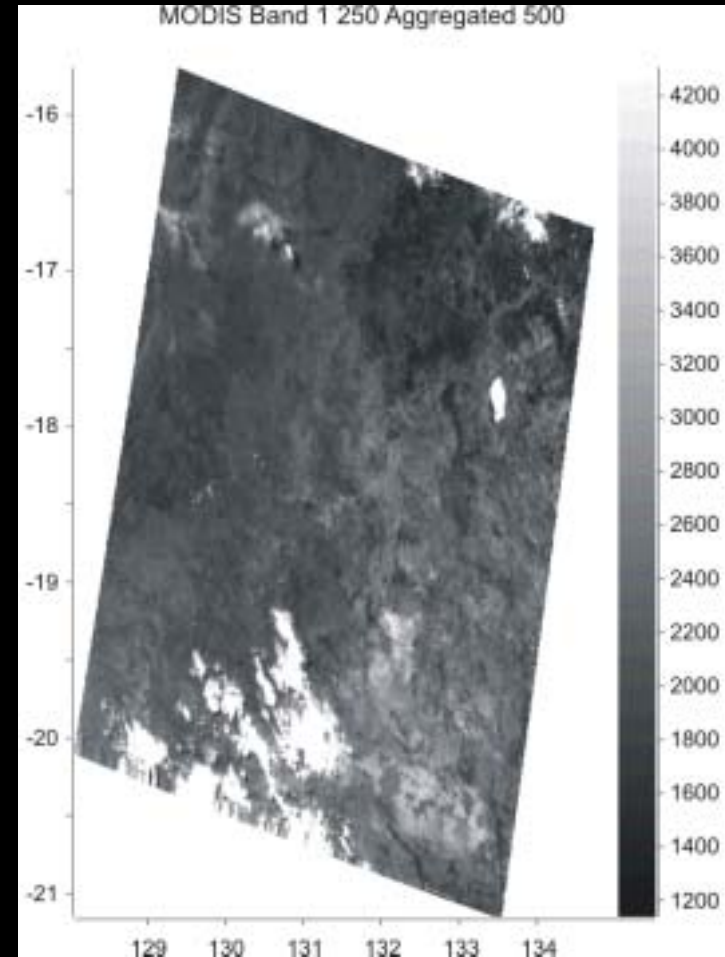
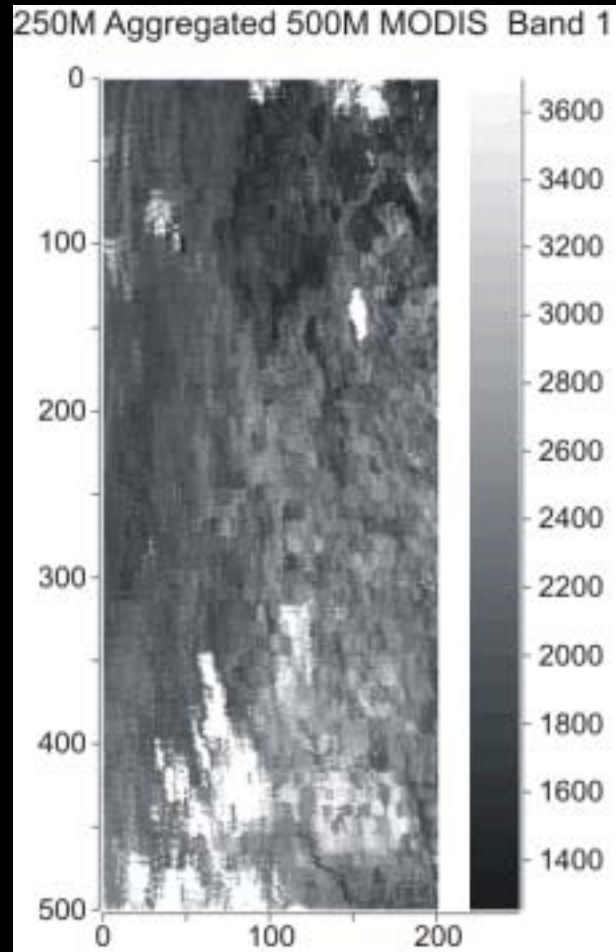
Data plus latitude
and longitude with
required new grid

Fractional line
and pixel values
for new grid

Interpolate
data to new
grid



Original 1b image and reprojected view



Summary

- MODIS and MISR are providing a complete range of data products via the web in HDF format
- Web supply system is not real-time and can suffer from long processing delays (currently 8/10 weeks)
- Processing software can be obtained through the right contacts but is very complex
- Most products from level 1b up are in HDF format and we can read, display and remap data from 1b up using CAPS (should be able to reproject sinusoidal projection)
- Atmospheric radiance correction available using SMAC and CSIRO developed MAPS system being added

