Tracking change in the Motueka using ENVISAT

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Land cover change in the ICM project

• Interaction of ecosystem components
  land change → river → coastal environment

• Land cover change will impact on sediment and other contaminants entering river

• Want regular, year round monitoring

• Tie in with terrain, rain fall, soils, state of riparian strip etc to model transport into the river.
ENVISAT

• The world’s largest remote sensing satellite

• Launched in 2002 by European Space Agency

• Carries 8 instruments to look at earth’s atmosphere, oceans and land surface

• Studying the big global environmental questions
  – Can we slow down global warming?
  – How badly damaged is the ozone layer?
  – What causes El Niño?
  – What is happening to the world’s forests?
  – Why are our sea levels rising?
  – What are the effects of atmospheric pollution?
  – Are natural disasters becoming more frequent?
ENVISAT instruments

Advanced Synthetic Aperture Radar (ASAR)

Medium Resolution Imaging Spectrometer (MERIS)

Advanced Along-Track Scanning Radiometer (AATSR)

Others
- Radar Altimeter 2 (RA-2)
- Microwave Radiometer (MWR)
- Doppler Orbitography and Radiopositioning Integrated by Satellite (DORIS)
- Laser Retro Reflector (LRR)
- Michelson Interferometer for Passive Atmospheric Sounding (MIPAS)
- Global Ozone Monitoring by Occultation of Stars (GOMOS)
- SCanning Imaging Absorption spectroMeter for Atmospheric CHartographY (SCIAMACHY)
MERIS

- Remote sensing is a trade off
  - Resolution
  - Orbits
  - Spectral capability
  - Cost

- MERIS
  - Low resolution
  - Wide angle – high repeat cycle
  - 15 well calibrated narrow spectral channels
  - Low cost

- Atmospherically corrected reflectance and high level products
  - NDVI
  - fPar
  - Standardised algorithms
  - Sub-pixel approaches
Data used in the study

- MERIS images
- ASAR images
- TM/ETM images
- TDC Aerial surveys
- Aerial photographs
- Horticultural change maps
- Weyerhaeuser forestry clear-felling records
MERIS quarter scene

- January 2003
- 14 Spectral bands from 413 to 885 nm (mostly 10nm wide)
- 300 m spatial resolution
- Physical parameters from ESA algorithms
- BOA reflectance
- Algal, yellow substance, sediment, veg index, fpar, surface pressure, aerosols, cloud properties.
Photo interpretation between aerial surveys
Large plot averages

- NDVI
- cleared_01
- forest_01
- forest_02
Jan04
Image Discontinuity
Ocean Products

- Generated using standard ESA algorithms developed from experience with SeaWiFS.
- Algal 1
- Algal 2
- Yellow substance
- Total suspended
- Photosynthetic radiation
Suspended Sediment
Summary

- 21 MERIS image sequence covering 2 years
- Land cover change has clear spectral differences
- Scale of change is marginal for MERIS scale - need to use sub-pixel techniques
- Rectification needs to be more accurate
- Discussing solutions with ESA
- Ocean products available for comparison with in situ measurements