

# The AIRSAR campaign to Central and South America March 2004

Bruce Chapman, JPL

# What is AIRSAR in 2004?

- Flies at 28,000 ft on NASA DC-8 @800km/hr
- up to 12 hour flights (over 9,000km)
- New navigation system for increased likelihood of successful repeat pass INSAR.
- Simultaneous C, L, P band
- C and L-band single-pass INSAR
- Fully polarimetric at all bands
- 80, 40, and 20Mhz bandwidth
  - 1.7m, 5m, 10m pixel spacing
- 12-18 km cross track swath
- Height accuracy can be better than 2m in height.
- Data distribution by ftp

# AIRSAR Status

- Just completed deployment to Central and South America (and Antarctic Peninsula)
- Processing from this deployment to commence on July 1.
- Possible future deployments?

# New AIRSAR Products for 2004

- GEOTIFF format when collected in InSAR mode
  - Floating point values
  - UTM projection
  - Polarimetric data
    - HH, HV, VV, HH-VV phase difference
  - InSAR data
    - DEM, VV backscatter, Incidence angle, Correlation
- Mosaics
  - Now 'operational' for InSAR data via comparison with SRTM DEM data
  - GEOTIFF format

# March 2004 deployment

## Sites in :

- Mexico
- Guatamala
- El Salvador
- Costa Rica
- Honduras
- Nicaragua
- Panama
- Chile
- Antarctic Peninsula

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

# March 2004 Deployment

- 13 flight days between March 1 - 22, 2004
- 176 flightlines
- 119 flight hours
- Almost 100,000 km traveled
- Acquired data
  - Over 30 hours, 45 tapes
  - 13,740 km along track
  - Over 100,000 sq. km

Yaw Angle: -1.3 deg  
Center lat: 17:24:22 N  
Center lon: 89:22:55 W  
GMT time: 19:32:31  
Framecount: 6996241

Yaw Angle: -1.3 deg  
Center lat: 17:24:22 N  
Center lon: 89:19:57 W  
GMT time: 19:32: 7  
Framecount: 6975761

Yaw Angle: -1.4 deg  
Center lat: 17:24:22 N  
Center lon: 89:16:58 W  
GMT time: 19:31:42  
Framecount: 6955281

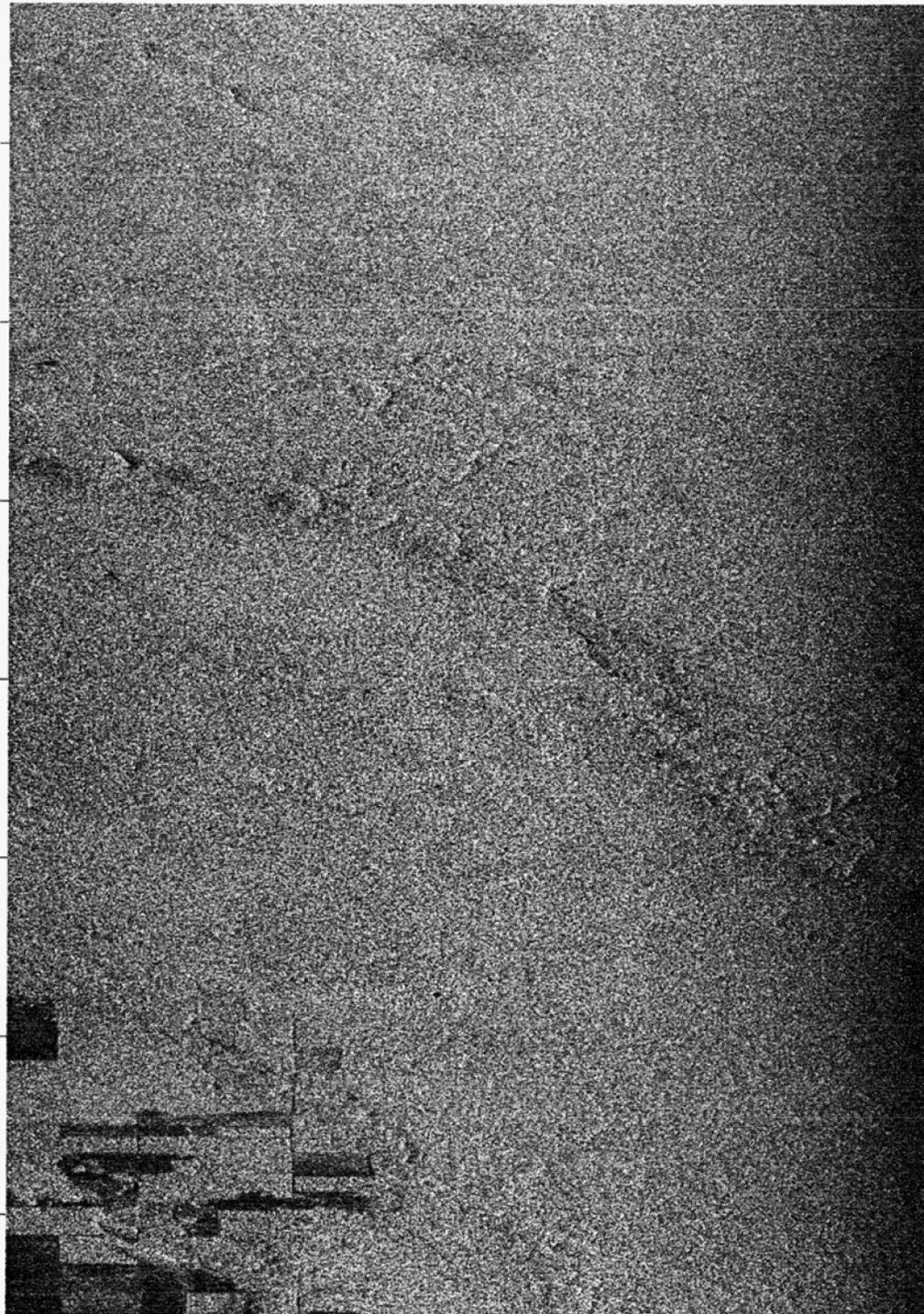
Yaw Angle: -1.5 deg  
Center lat: 17:24:22 N  
Center lon: 89:14: 0 W  
GMT time: 19:31:18  
Framecount: 6934801

Yaw Angle: -1.5 deg  
Center lat: 17:24:22 N  
Center lon: 89:11: 1 W  
GMT time: 19:30:54  
Framecount: 6914321

Yaw Angle: -1.6 deg  
Center lat: 17:24:22 N  
Center lon: 89: 8: 3 W  
GMT time: 19:30:29  
Framecount: 6893841

Yaw Angle: -1.6 deg  
Center lat: 17:24:22 N  
Center lon: 89: 5: 4 W  
GMT time: 19:30: 5  
Framecount: 6873361

Yaw Angle: -1.7 deg  
Center lat: 17:24:22 N



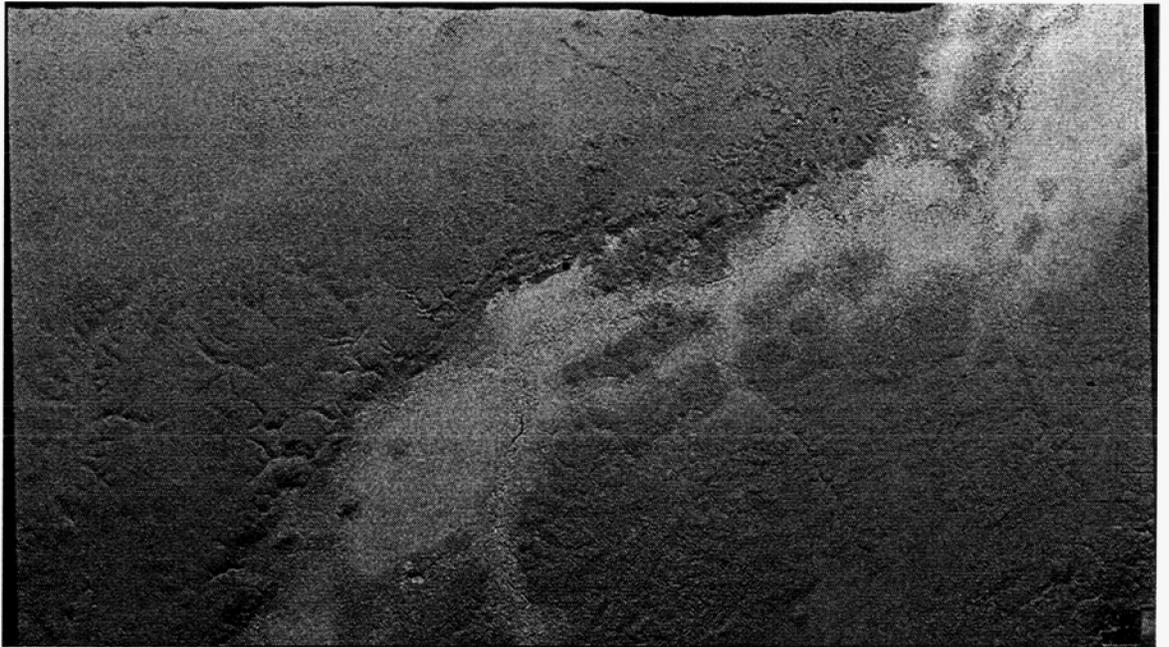
# Mayan Biosphere Reserve

CLP Band overlay

First fully processed  
AIRSAR image from  
the deployment (not  
yet calibrated)



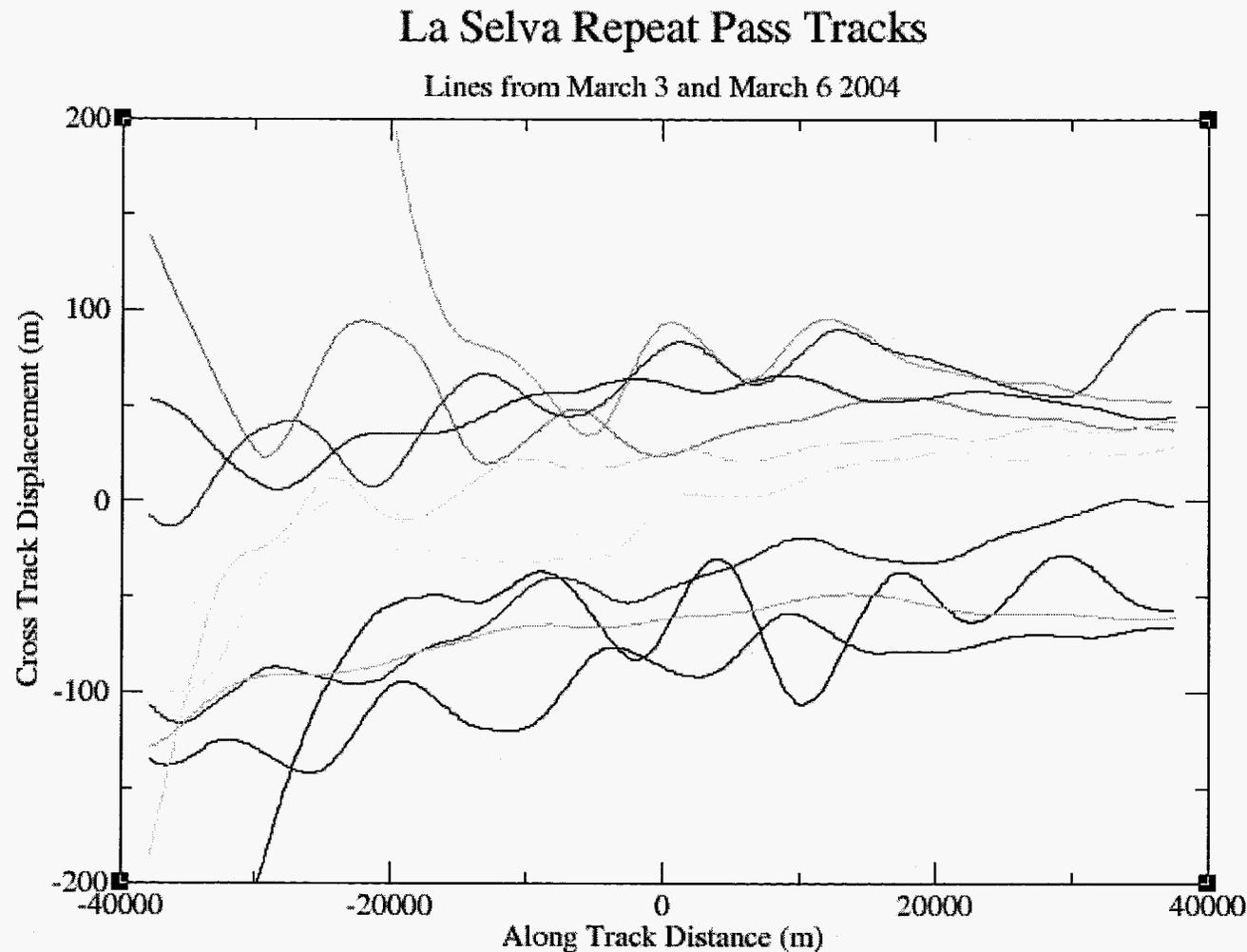
C-band VV and height



# Objectives

- Technology demonstration
  - Using P-band Polarimetry for archeological discovery and forest classification in tropical forests
  - SAR/Lidar vegetation showdown:
    - Multi-altitude C, L band interferometry to measure forest structure
    - Repeat pass interferometry
    - P-band classification and biomass estimates
    - Effect of temporal decorrelation
  - ATI mode to measure fresh water discharge rates
- Exploration
  - Antarctic Peninsula
  - Discovery of unknown Mayan Archeology sites

# La Selva Repeat Pass Lines- March 3, 6, 21



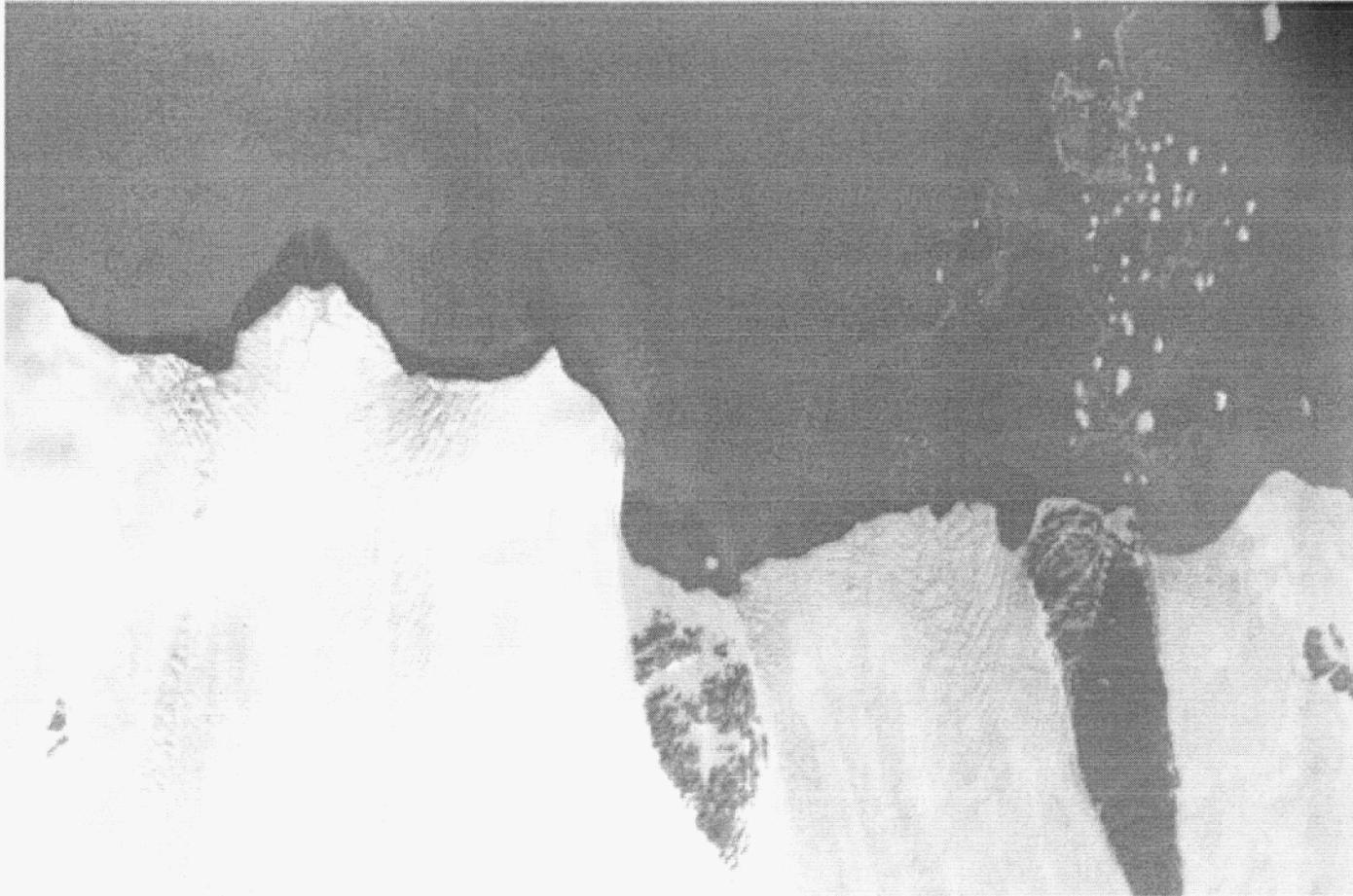
In general the DC-8 hit all the desired lines, including the low altitude lines, to within  $\pm 200$  m cross track and usually within  $\pm 10$  m vertically. Baselines as small as 1m, with many less than 50m.

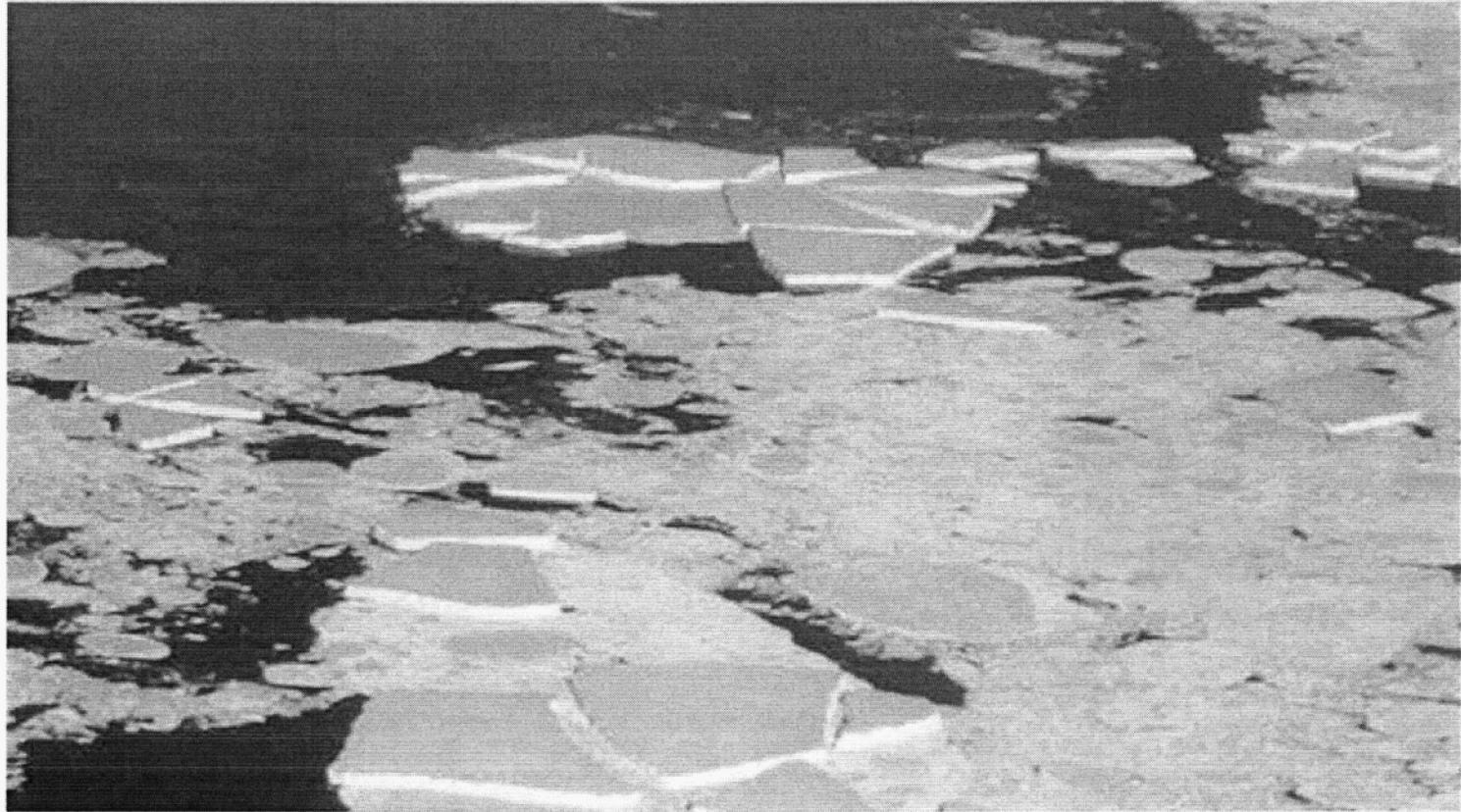
Scott Hensley, JPL

# Results

- All planned flight lines (for which permission was obtained) acquired
- Near full-res quick-looks processed during deployment to verify performance
- flight lines are now 'survey' processed.
- Fully processed Guatamala imagery taken to field in mid-April to evaluate discovery potential
- Standard processing to commence on July 1

## West Coast of Antarctic Peninsula





# AIRSAR Quicklook Polarimetric Imagery of Osorno Volcano, Chile



■ PHH    ■ PVV    ■ PHV

9 March, 2004

# AIRSAR Topographic Interferogram of North Antarctic Peninsula

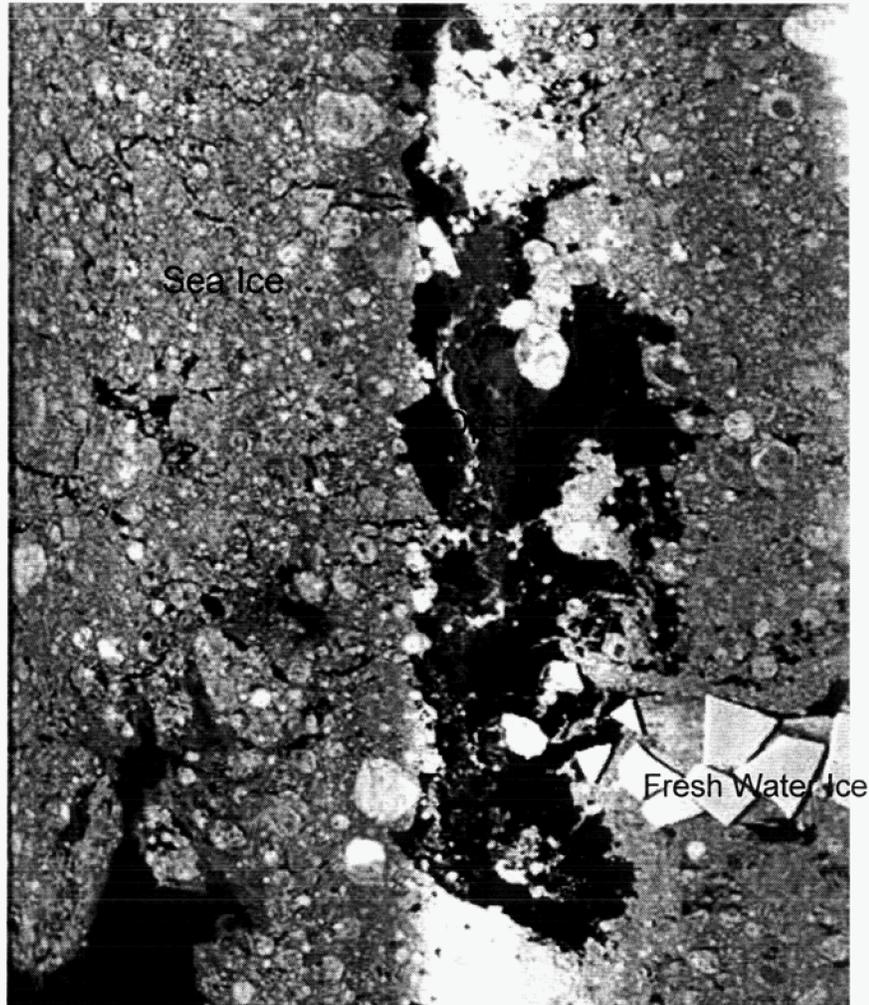


Color overlay of the topographic data and CVV amplitude image (NAntPen40-1)

13 March, 2004

# AIRSAR Quicklook Polarimetric Imagery of Antarctic Sea Ice

C-band Polarimetry



P-band Polarimetry



■ HH    □ HV    ■ VV

16 March, 2004