



The Canberra Deep Space Communication Complex



12/10/2008

Miriam Baltuck, Director
October 2008



Deep Space Network



12/10/2008



Canberra Deep Space Communication Complex

OVERVIEW	ANTENNAS	TRACKING TODAY	VISITOR CENTRE	EVENTS	EDUCATION	MULTIMEDIA
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TRACKING TODAY

Each day the antennas are directed to receive or transmit data to any number of robotic spacecraft exploring our Solar System and beyond. This schedule is worked out months and sometimes years in advance by the mission controllers at the Jet Propulsion Laboratory in Pasadena, California USA.

At various times in the schedule, time is set aside for antenna calibration, maintenance, or engineering development tasks. Time is also set aside for radio astronomy projects, and mission training simulations.

Below is the general antenna tracking schedule for this week, showing *some* of the spacecraft being tracked each day.



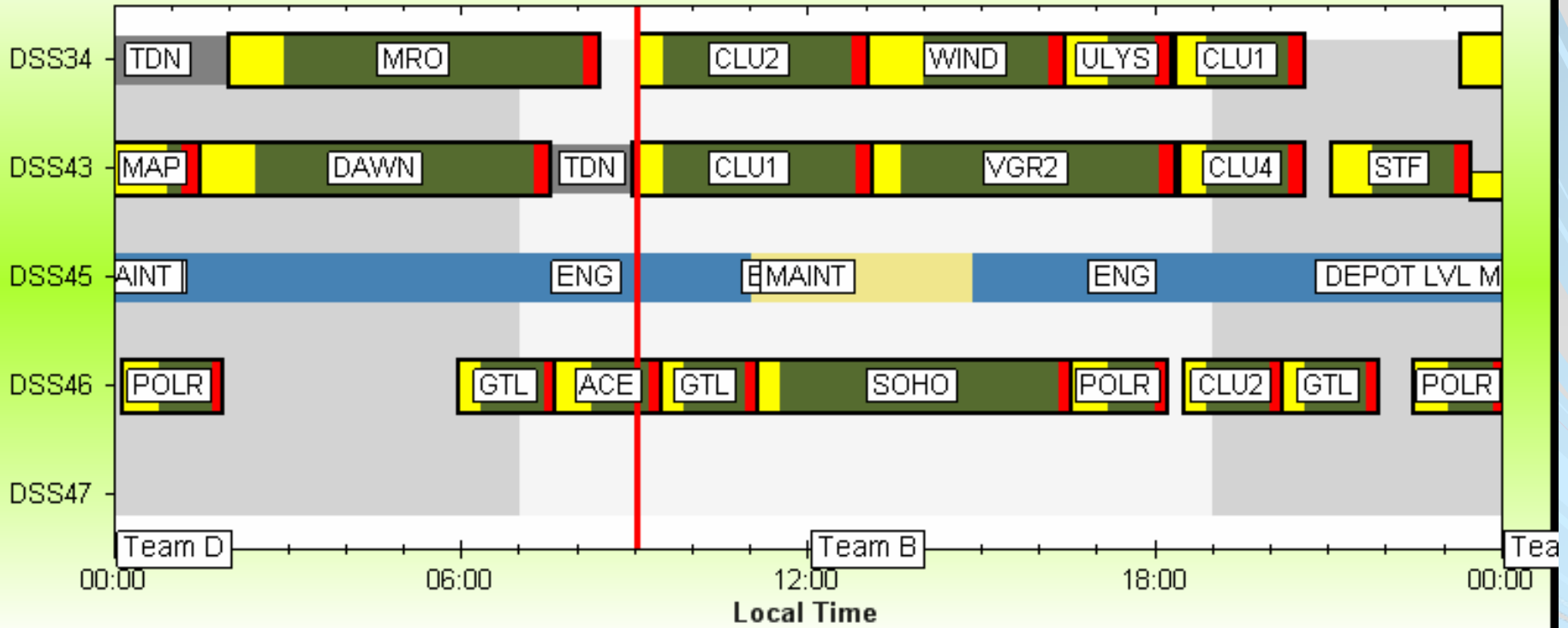
	DSS-34	DSS-43	DSS-45	DSS-46
JULY				
Mon 16	MarsO/MRO CLU1	MAP/ULYS CLU4/STF/MAP	VGR2/CLU3	CHDR/GTL/POLR SOHO/CLU2
Tue 17	ULYS/POLR VGR2	MarsO/MRO VGR2/STF	MRO/MER-Opp'ty MSGR/STB	POLR/ACE SOHO/CLU2
Wed 18	MRO/POLR SOHO/POLR	ULYS/VGR2 STF	POLR/STA/MRO VGR2	GTL/POLR GTL/POLR
Thu 19	ULYS/CAS	MAP/MRO/MarsO CAS/MSGR/STF	MRO/MSGR VGR2	GTL/POLR SOHO/GTL
Fri 20	VGR2/MRO CHDR	ULYS NHPC	MRO/MarsO VGR2	POLR/GTL/POLR ACE/SOHO/POLR
Sat 21	ULYS/CLU4	MAP/MRO/MarsO CLU1/NHPC	VGR2/CLU2 POLR	GTL/POLR/GTL ACE/CHDR/SOHO
Sun 22	ULYS/CLU4	MarsO/MRO STF/CLU2	VGR2/POLR VGR2/STB	POLR/SOHO GTL/CLU1
Mon 23	STA/CLU4 VGR2	ULYS/CLU3 STF/VGR2	VGR2/MRO CLU2	POLR/ACE SOHO/CLU1/GTL
Tue 24	ULYS/STB	MRO/MarsO STF/MAP	VGR2/MRO POLR/VGR2	POLR/ACE SOHO/POLR/GTL
Wed 25	MRO/WIND SOHO/CLU4/CLU3	ULYS/NHPC STF	MarsO/MRO MSGR/CLU4/CLU1	POLR/GTL/POLR
Thu 26	MRO/SDU CLU1/STB	ULYS/CLU2 VGR2/STF/MAP	VGR2/MarsO/MRO VGR2	GTL/POLR/GTL POLR/SOHO/POLR
Fri 27	ULYS/VGR2	MarsO/MRO GBRA/STF/MAP	POLR	POLR/ACE SOHO/GTL/POLR
Sat 28	ULYS.WIND/CLU3 VGR2	MarsO/MRO CLU4/STF	VGR2/MarsO POLR/CLU1/CLU2	POLR/ACE/SOHO CLU2/POLR/GTL
Sun 29	ULYS/SOHO	MarsO/MRO GBRA/STF	VGR2/MarsO VGR2	GTL/POLR CHDR/GTL
Mon 30	STA/CLU4	ULYS/STF CLU3/VGR2	MarsO/MRO POLR/CLU2	POLR/GTL/RSAT POLR/SOHO/POLR
Tue 31	ULYS/POLR ACE/STB	MRO/STF GBRA/MAP	SDU/MSGR VGR2	POLR/GTL/SOHO POLR/CHDR/POLR
AUG				
Wed 1	ULYS/SOHO GTL/NHPC	MarsO/MRO MER-Spirit/VGR2	MarsO/POLR STB	GTL/POLR

SPACECRAFT INDEX

- + **ACE** - Advanced Composition Explorer
- + **Cass** - Cassini
- + **CHDR** - Chandra X-ray Telescope
- + **clu** - Cluster 1-2-3-4
- + **DAWN** - Asteroid Mission
- + **DIF** - Deep Impact
- + **Gal** - Galileo(mission end)
- + **GBRA** - Ground-Based Radio Astronomy
- + **GTL** - Geotail
- + **Gen** - Genesis
- + **GOES** - Geostationary Operational Environmental Satellite
- + **GPB** - Gravity Probe B
- + **HST** - Hubble Telescope
- + **IMG** - IMAGE
- + **MAP** - Microwave Anisotropy Probe
- + **MarsO** - Mars Odyssey
- + **MER** - Mars Rovers
- + **MSGR** - MESSENGER
- + **MEX** - Mars Express
- + **MSG** - Mars Global Surveyor
- + **MRO** - Mars Reconnaissance Orbiter
- + **MSPA** - Multiple Spacecraft Per Aperture Testing
- + **MUSC** - Asteroid sample
- + **NHPC** - Pluto mission
- + **NOAA** - Earth observation
- + **PHX** - Phoenix Mars'08
- + **POLR** - Polar
- + **RFC** - Radio Frequency Cataloguing
- + **RSAT** - Radar Satellite
- + **ROSE** - Rosetta
- + **SDU** - Stardust
- + **SGP** - Space Geodesy Project
- + **SOHO** - Solar & Heliospheric Observatory
- + **ST A/B** - STEREO A & B 3D Sun Imaging
- + **STE** - Space Infrared Telescope Facility (Spitzer)
- + **IDRS** - Tracking & Data Relay Satellite
- + **TERRA** - Earth observation
- + **TEP** - Total Ozone Mapping Spectrometer
- + **ULYS** - Ulysses
- + **VEX** - Venus Express
- + **VGR1** - Voyager 1
- + **VGR2** - Voyager 2
- + **WIND** - Solar Wind



Thu 15 Nov



NASA in Australia- a Historical Perspective

Cooperation between US & Australia in space activities precedes NASA

-Radio Tracking experiments with NACA at Woomera South Australia were an element of International Geophysical Year (1957)

First Deep Space Tracking Treaty in 1960; renewed on ten year cycle.

-2010 will mark a half century of treaty-level cooperation!

-Initially three networks were supported: the Deep Space Network (DSN), the Manned Space Flight Network (MSFN), and the Space Tracking and Data Acquisition Network (STADAN)

-CSIRO radioastronomy facilities have been subcontracted to support NASA missions on case-by-case basis, e.g. Parkes for Voyager, Apollo, Galileo; and Narrabri Ka-band tracking capability

-NASA has paid for upgrades such additional support might require

CSIRO undertook responsibility for Australia's NASA Treaty obligations in 1996,

Space Tracking renewal in 2010; minor modification under current negotiation

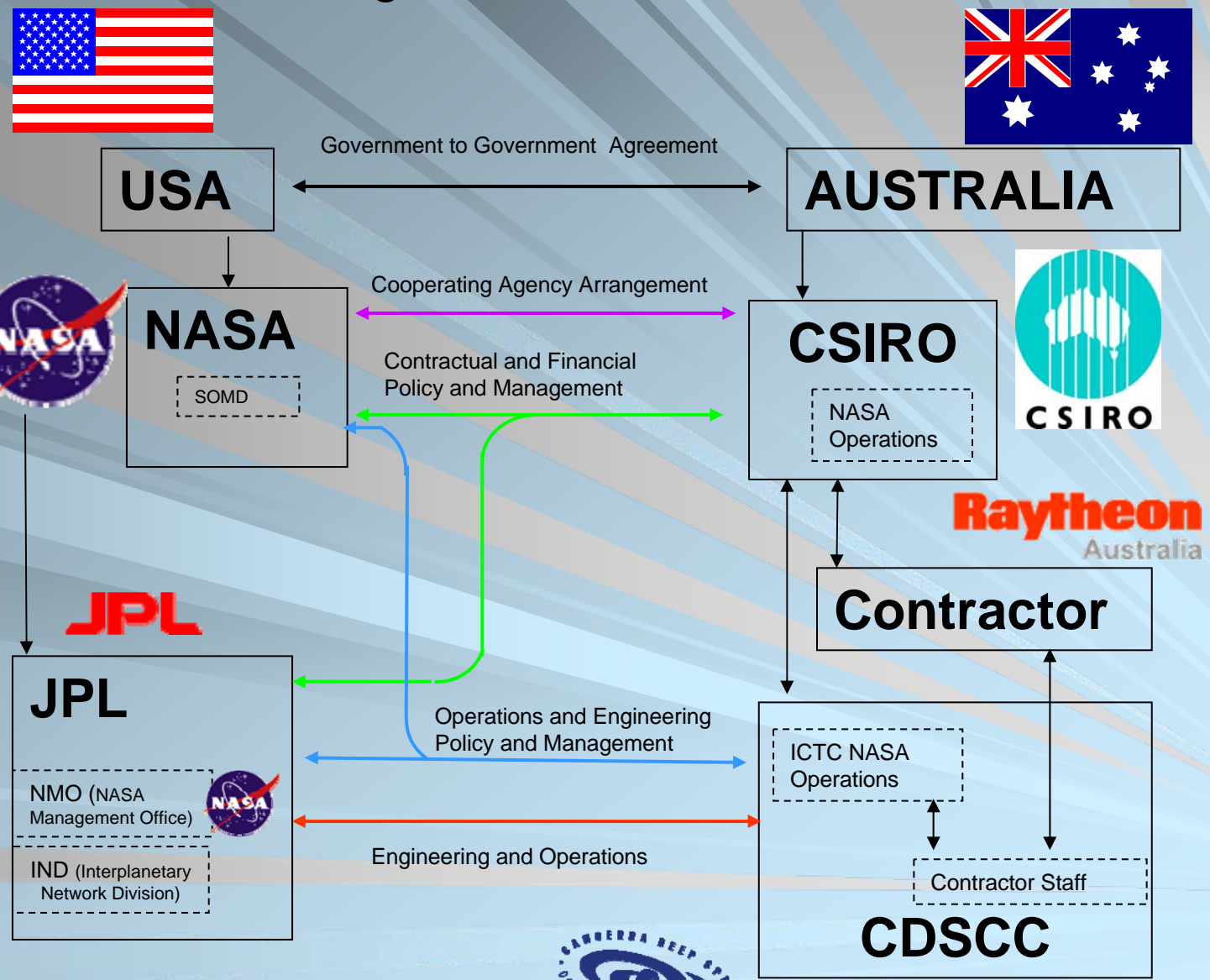
Balloon Science renewal in 2012

Many other areas of bilateral and multilateral cooperation, e.g.

FEDSAT (First Australian research satellite; NASA Earth Sciences provided onboard GPS receiver; launched 2002)

LANDSAT – Australia established a ground receiver in 1980

Canberra Deep Space Communication Complex Organisational Environment



New since this time last year

- Leadership Changes
- Voluntary Redundancy
- ITAR
- Most exhaustive OHS&E audit in CDSCC history
- Two major C of F projects underway
- Radiation Safety and Risk Management initiatives

Antenna and Site Facilities

■ FY08 Project Planning

- Planned Projects and Upgrades preliminary schedules on GANTT chart (see next slide)
- SMEC OH+S audit - access and isolations project to be continued & implemented across site in a multi-year task
- Update Facilities Master Plan and complete GIS access and usage
- Participate in Maximo expansion, training and upgrade plans and RCM implementation
- Risk Management (separate slide)

CDSCC RCM

Supporting AMMI working group

- Maintenance work flow process
- DSS 14 pilot RCM review
- Failure modes

Maximo Training

- Refresher training for existing users
- Basic introduction and familiarisation for non-users

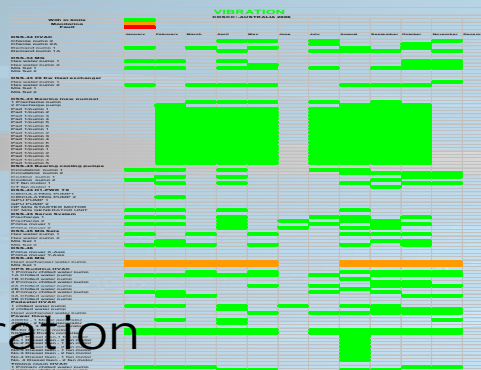
Condition Monitoring

- Training for group in thermography, oil analysis and vibration.
- Developed spreadsheets for condition monitoring to allow for improved management of equipment status.

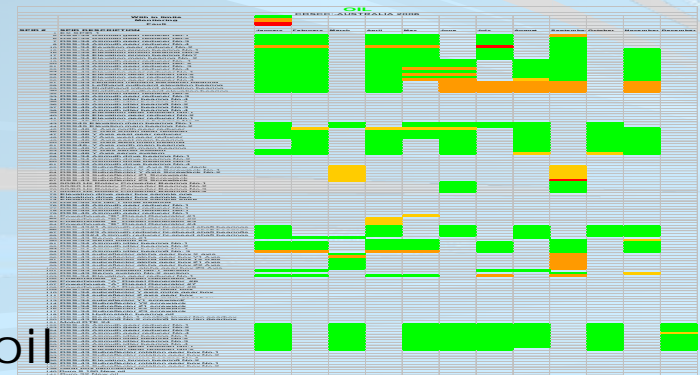
Green = within tolerance
Column = month

Orange = monitor
Row = sample point

Red = fault.



vibration



oil

Operations

What's Happened Since 2005

- Supported the successful launch of GOES-N
- Supported the successful launch of MRO, LEOP, Mars Orbit insertion and circularisation of orbit - transfer to science operations
- Supported the successful launch of STEREO A and B
- Successful delivery of new TDN and Elog to the network
 - Now being used at all sites
- Critical event support
 - STEREO A & B Moon flyby and orbit insertion
 - Messenger Earth and Venus flybys
 - NHPC Jupiter flyby

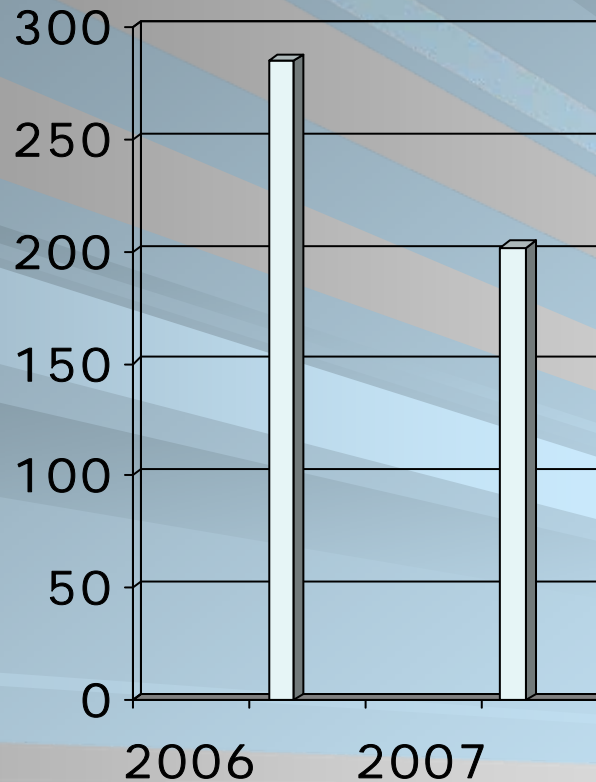
Challenges and Issues

- Regulatory
 - International Traffic in Arms Regulations
 - Radiation Safety
- Demographics
 - Succession planning in an ever shifting basis
 - Skills shortage across developed nations
 - Maintaining level of performance with ongoing pressure to reduce budget & staff numbers
- Meeting NASA's evolving plans & timelines
 - Exploration, LRO, etc
 - Arrays
 - Maintaining level of performance with ongoing pressure to reduce budget & staff numbers
- Developing opportunities for the Australian S&T community
- Making time, broadening vision, developing a culture to invest in & reward holistic thinking

What's Ahead in FY 08

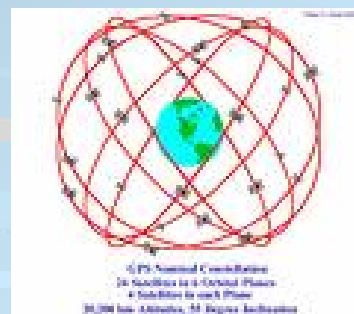
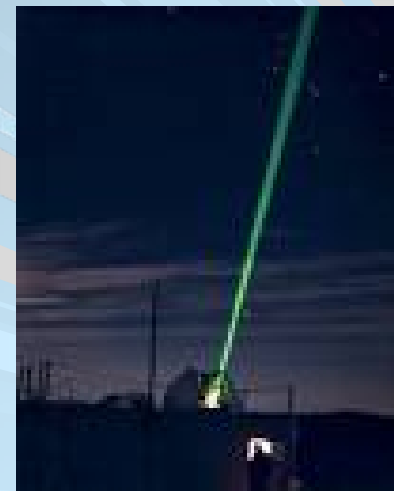
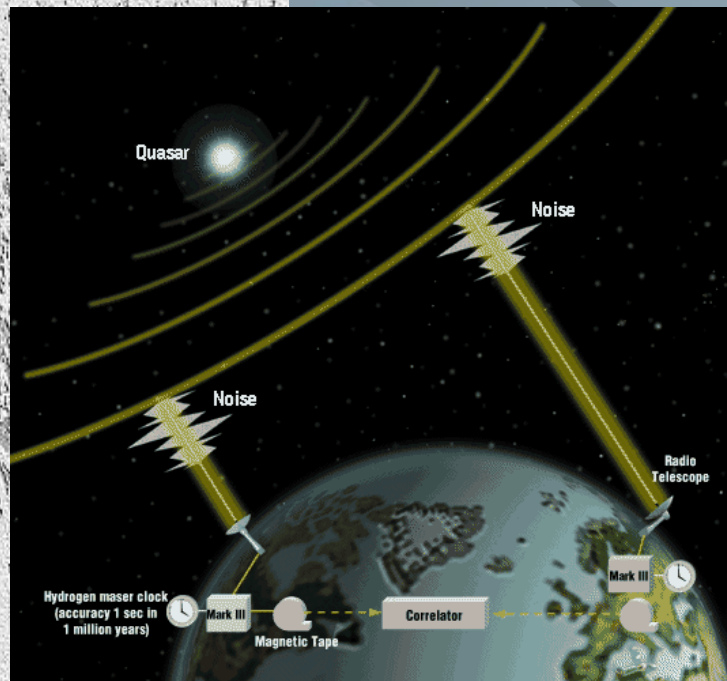
- Time to dust off the Treaty for renewal in 2010—half century mark
- Seek a loving home for DSS 46
- Ever-tightening belt
- After Dawn, Phoenix and Selene-Chandrayan & GOES-O
- Implementing DSS-34 26GHz
- Developing utilisation of height savings

Significant Savings in Leadership Height

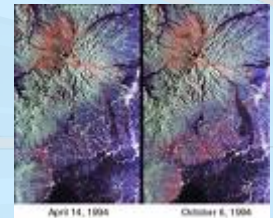
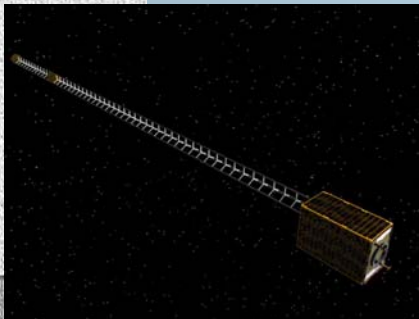
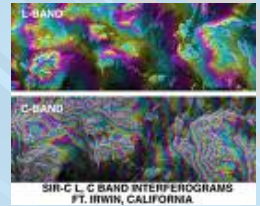
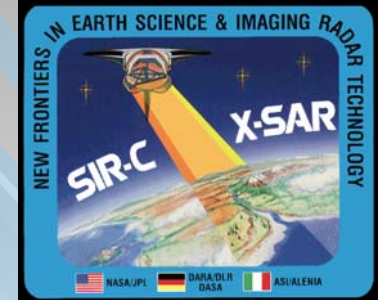
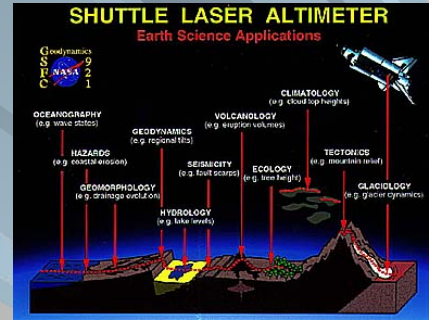
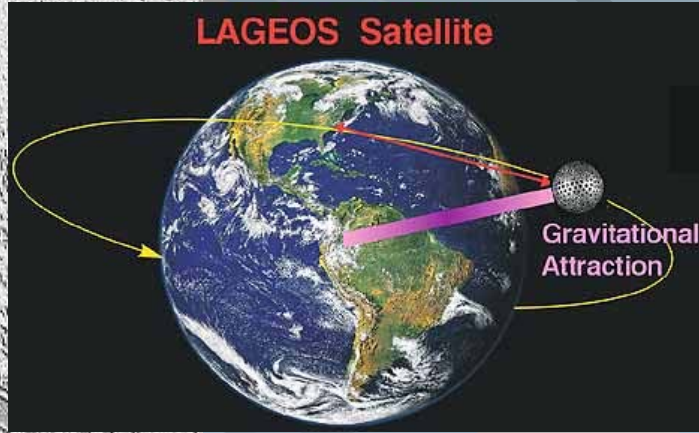


- Directors
Peter (5'9") + John (5'10") -> Miriam (5'4.5")
delta = 74"
- Site Managers
Des (6'3") -> Tony (5'8")
delta = 7"
- Systems Engineering Ed
(5'11") -> Kevin (5'9")
delta = 2"
- Total Savings = 82"
- Miriam & Tony are preparing a submission to IEEE

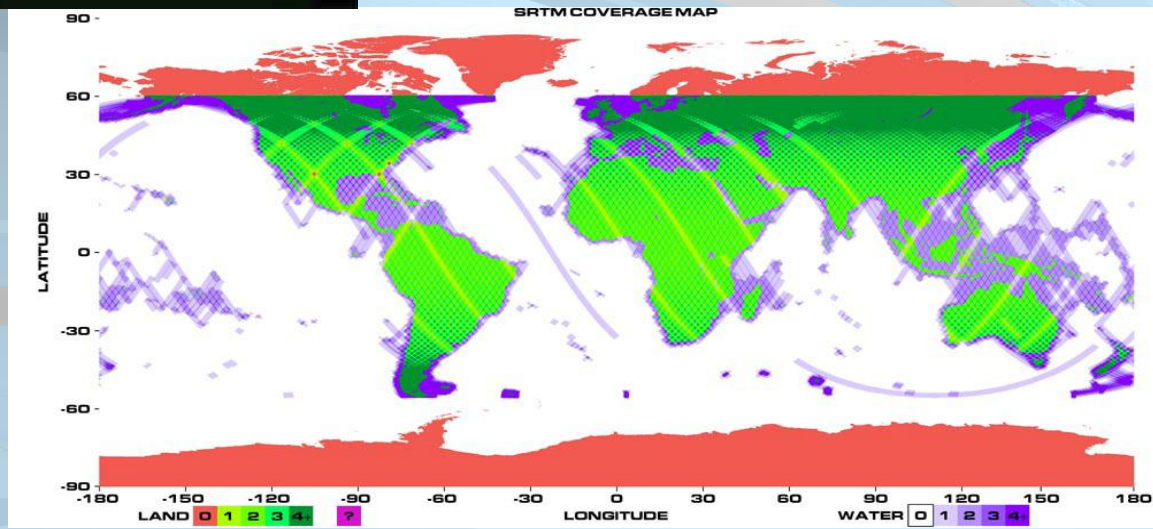
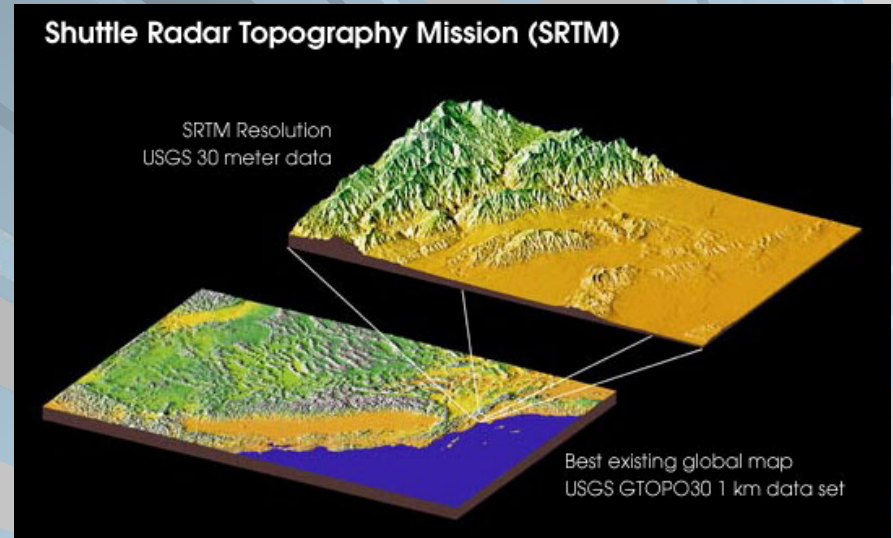
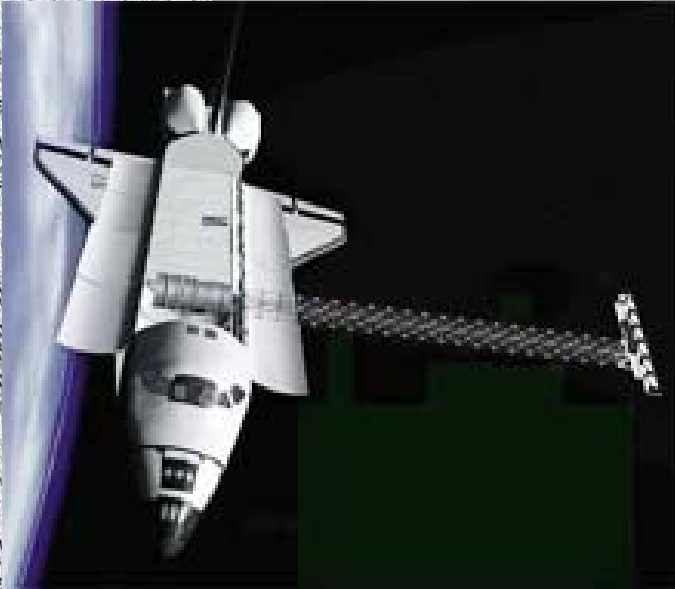
Space Geodesy



Other NASA Babies



Shuttle Radar Topography Mission





My Real Babies



Systems Engineering Section

Major Activities

- DSS-34 26GHz Downlink—initial install chez nous
- DSS-33 Decommissioning
- DSS-45 200W TXR—Aug-Sep downtime includes ACR
- NTR Communication Circuit transition
- Ongoing participation in JPL Reliability Working Group/Reliability Centered Maintenance
- Maximo upgrades
- Narrabri Ka-Band Upgrade
- Radiation Safety Compliance
- Flight LAN structured cabling upgrade
- Participation in Antenna Calibration Upgrades (ACME)
- DSN JumpStart rollout
- Improvements to previously delivered TSAF capability
- Rollout of new Email upgrade and Intranet infrastructure
- IMP-8 SNR reduction investigation
- Improvements to QA/WA practices

Antenna and Site Facilities

Current Major Project 2: Powerhouse A station upgrade

- CAT generators passed factory tests, due in May 2007 on site
- Installation design nearly finalised after JPL/ITT input
- Project completion early FY09.



CDSCC Regrout DSS 43

Scope of Work

- Replaced 56 degree continuous cement grout segment under azimuth track
- Work completed in 12 days including commissioning
- Utilised combined CDSCC staff and contractor resources, with assistance from JPL and MDSCC staff

Results

- Established between 10 and 12 thou minimum film height over the regrouted area
- Procedures better documented for next time
- Combined effort demonstrated good teamwork

Future

- Another regrout may be required during Green plan depot downtime
- Promised epoxy grout system, if it eventuates, will remove the requirement for regrouting in the longer term



Operations

Current Activities

- Preparations for Dawn launch and initial acquisition
- Preparations for Selene LEOP support
- Preparations for Phoenix LEOP support
- On-going support of Mars
- Continuing development of TDN and Elog for network

Operations

Challenges

- Developing Operations Link Control Operator Training packages
- DSS-43 Master Equatorial status
- NHPC safing recovery delays
- Transition to SPS
- Web page access to JPL/ITT sites
- Balancing TDN working with hands on ops working
- DSS-46 X Acq. Aid, aligning for Dawn launch support
- DSS-46 MFR receivers
- Adjusting to smaller teams post-Voluntary Redundancy

Coming up

- DAWN launch and Initial Acquisition (30 June 2007)
- Phoenix LEOP Support (launch 3 August 2007)
- Selene LEOP Support (launch 15 August 2007)
- Ops Shift personnel familiarisation with Narrabri (September 2007)