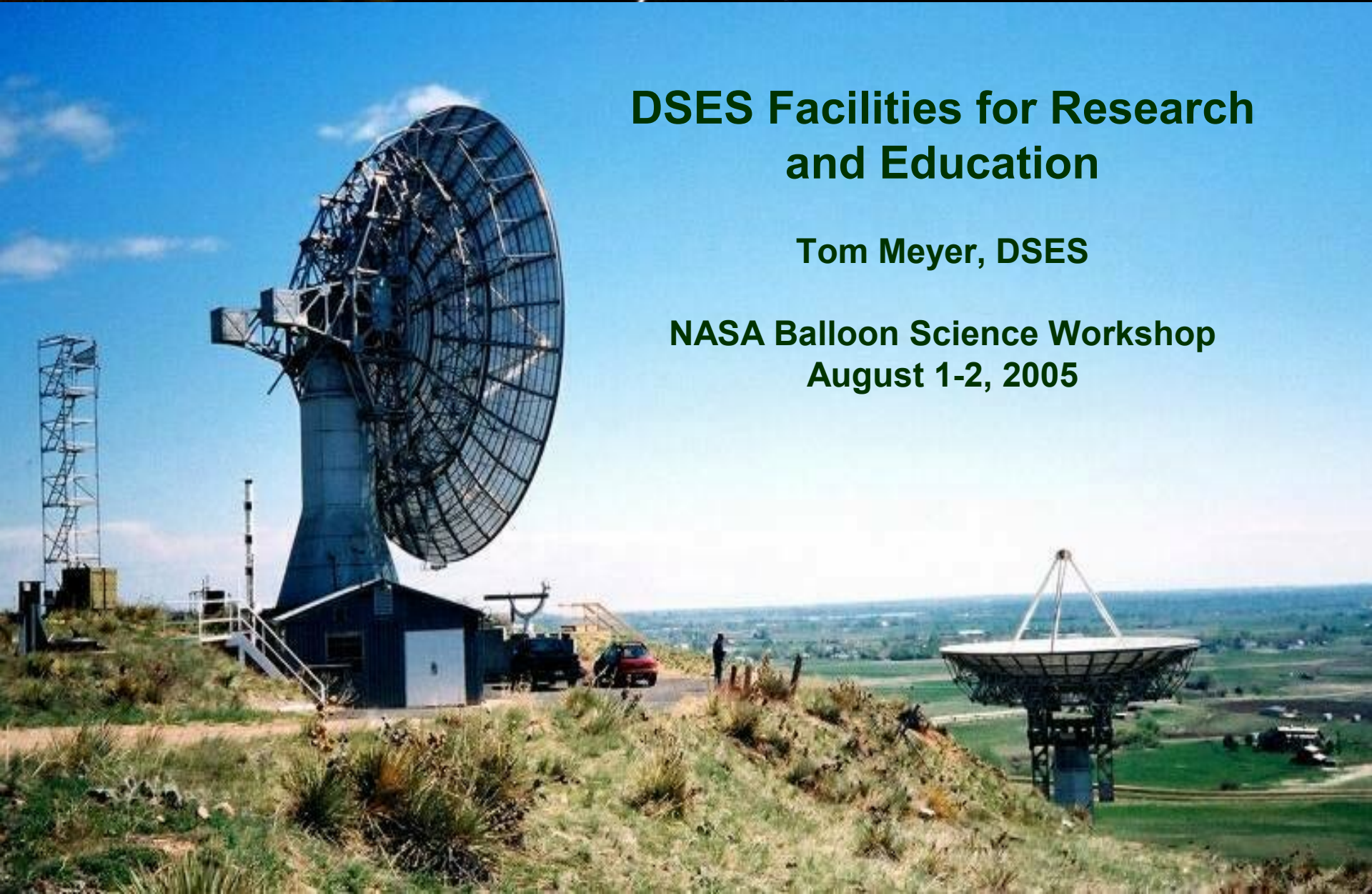


Deep Space Exploration Society

DSES Facilities for Research and Education

Tom Meyer, DSES

NASA Balloon Science Workshop
August 1-2, 2005



History

- After many years of dormancy
- Restoration of Table Mountain antenna facility
- Located in Federally Mandated Radio Quiet Zone
- Boulder County, CO



What is DSES?

- Colorado nonprofit corporation, 1991
- Formed by scientists, engineers, radio amateurs, educators
- Organized for research and education
- IRS 501(c)(3) (applied for)
- CRA with NTIA, Institute for Telecommunication Sciences



Applications

- Tracking and Downlinking
 - Satellites
 - Spacecraft
 - Balloons
- Radio Astronomy
 - Spectroscopy
 - Velocities
 - Interferometry



Antenna Specifications

- Two 60 ft. parabolic dish antennas
- Frequencies: 100 MHz - 10 GHz
- Gain: 42.6 dB at 1 GHz
- Noise Temperature: 75°-170°K, 400 MHz
- Coverage: Full Hemisphere / 340° - 190°
- Slew Rate Az/EI: 40/40 deg/min
- Beam Width:
 - 2.6°/400 MHz
 - 0.7°/2 GHz



Antenna Feeds

- Feed horn
- Dipole
- Patch
- Helix
- Log cone
- Polarization
 - Linear
 - Circular
- LNA



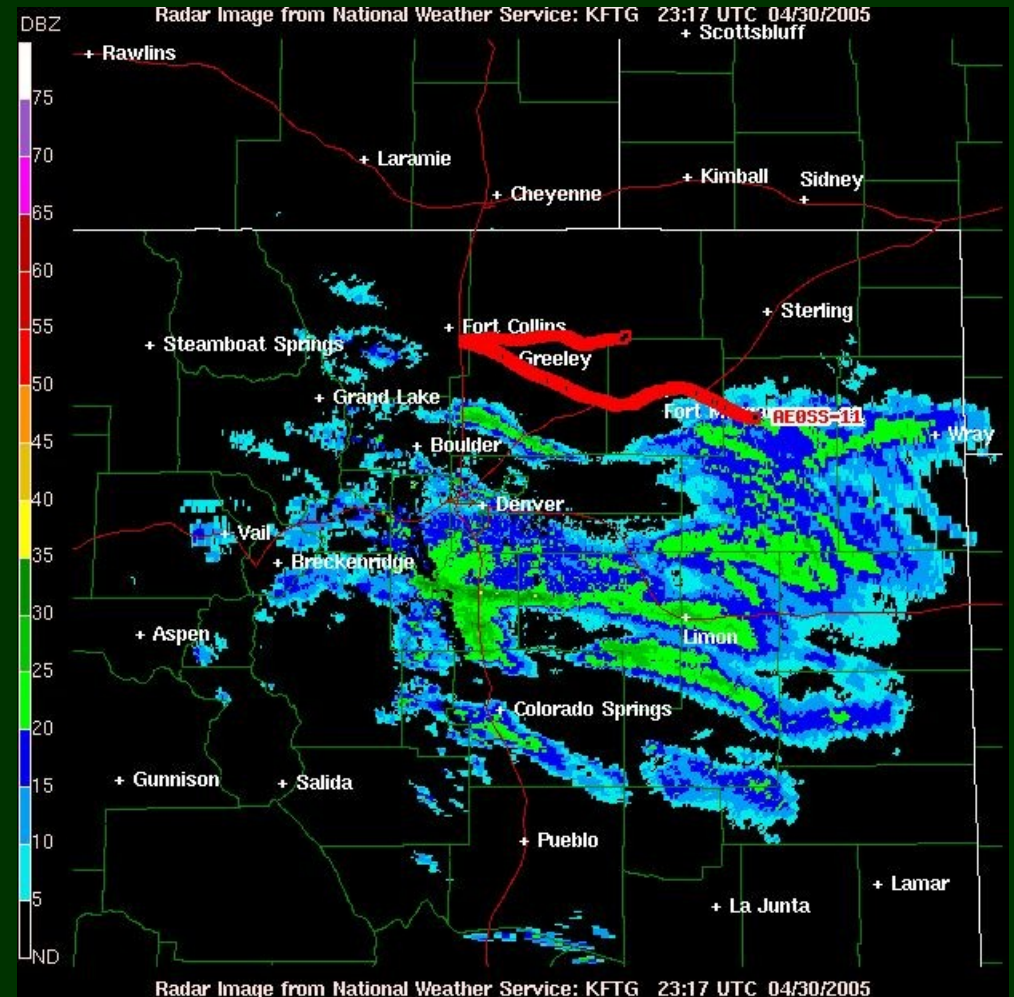
Receiving Equipment

- ICOM R8500 and others
- SpectraCyber Spectrometers
- SDR-14 Software Defined Radio
- ATV Video
- APRS
- VLF



Tracking and Control

- Ephemeris
- Orbital Elements
- Manual Steering
- APRS

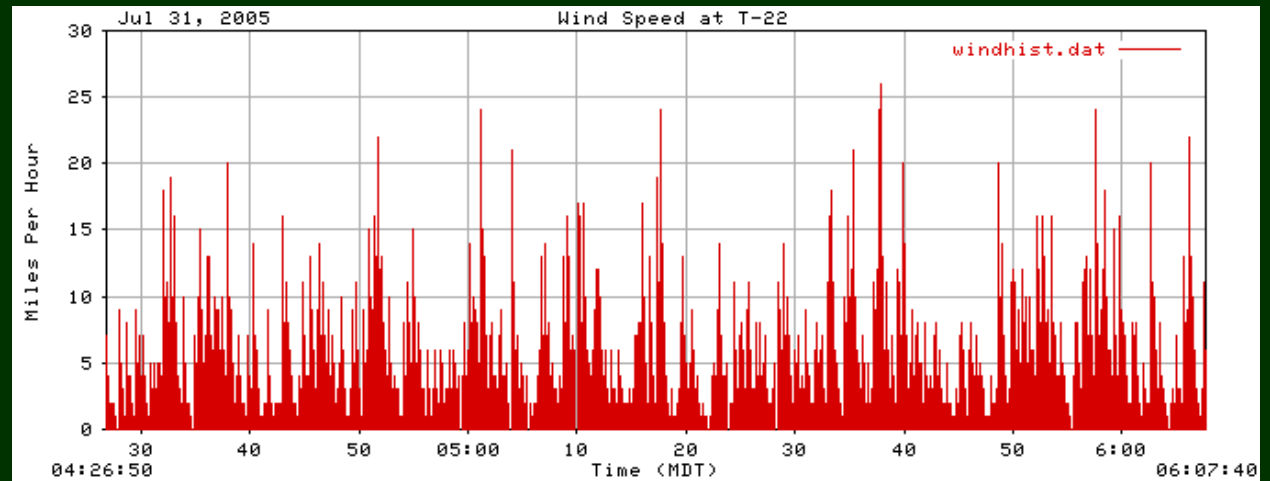


Balloon Launch

- Balloon Launch Services in Colorado
 - EOSS
 - Global Western
- Balloon Launch Sites in Colorado
 - Air Force Academy
 - Calhan Launch Site
 - Chatfield Reservoir
 - Circle 8 Ranch
 - Deer Trail
 - Gene Fatton's Ranch in Windsor, Colorado.
 - Peaceful Valley Scout Ranch
 - Meadow Lake Airport
 - Pikes Peak Model Airplane Airport

Connectivity

- Internet
- Fiber Optic
- Real-time Access
- Archived data
- Operations and Environmental data
- Remote Steering (future)



Radio Astronomy

- Targets
 - Radio stars
 - Radio galaxies
 - Pulsars
 - Masers
- Frequencies
 - OH radicals (1.6 GHz)
 - Neutral Hydrogen (1.4 GHz)
 - Methanol masers (6.7 GHz) (future)
- Measurements
 - Spectra
 - Velocities



Spectroscopy Data

40FOOT.1

Galactic Center 07-15-2001 12:05:42 EST

10

Site : NRAO - Greenbank, WV
Telescope: 40' Educational Radio Telescope
Feed : Hydrogen
Backend : SpectraCyber I Spectrometer
Target : The Galactic Center in Sagattarius
Time : July 15, 2001 at 17h 05m 42s UTC

V
o
l
t
s

NRAO Support

Sue Ann Heatherly, Education

SpectraCyber Equipment Provided by
Radio Astronomy Supplies

Observers

Carl Lyster and SARA Conference Participants

Data Movie Animation

Jupiter Space Station Radio Observatory

0

-211

-106

0

106

211

Doppler Shift - Km/sec

Recent Projects

- Deep Impact
 - Tracking
 - OH radical observations
- Drift Scans
 - HI Spectroscopy
- Big Blue, U of KY
 - Tracking
 - Video downlink
- VLF, 24/7



Research and Education

- Opportunities for Hands on Space Exploration
- DSES Mentors Students in Radio Astronomy
- Internships
- Collaboration
 - Students
 - Researchers
 - Companies
- Outreach
 - Schools
 - Clubs
 - General Public



Deep Space Exploration Society Webpage

dses.org

deep-space.org