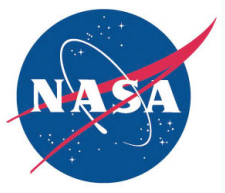


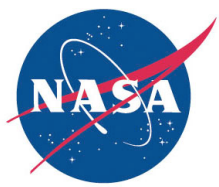
ECOSTRESS Coverage Analysis

Ernesto Diaz
October 15, 2014



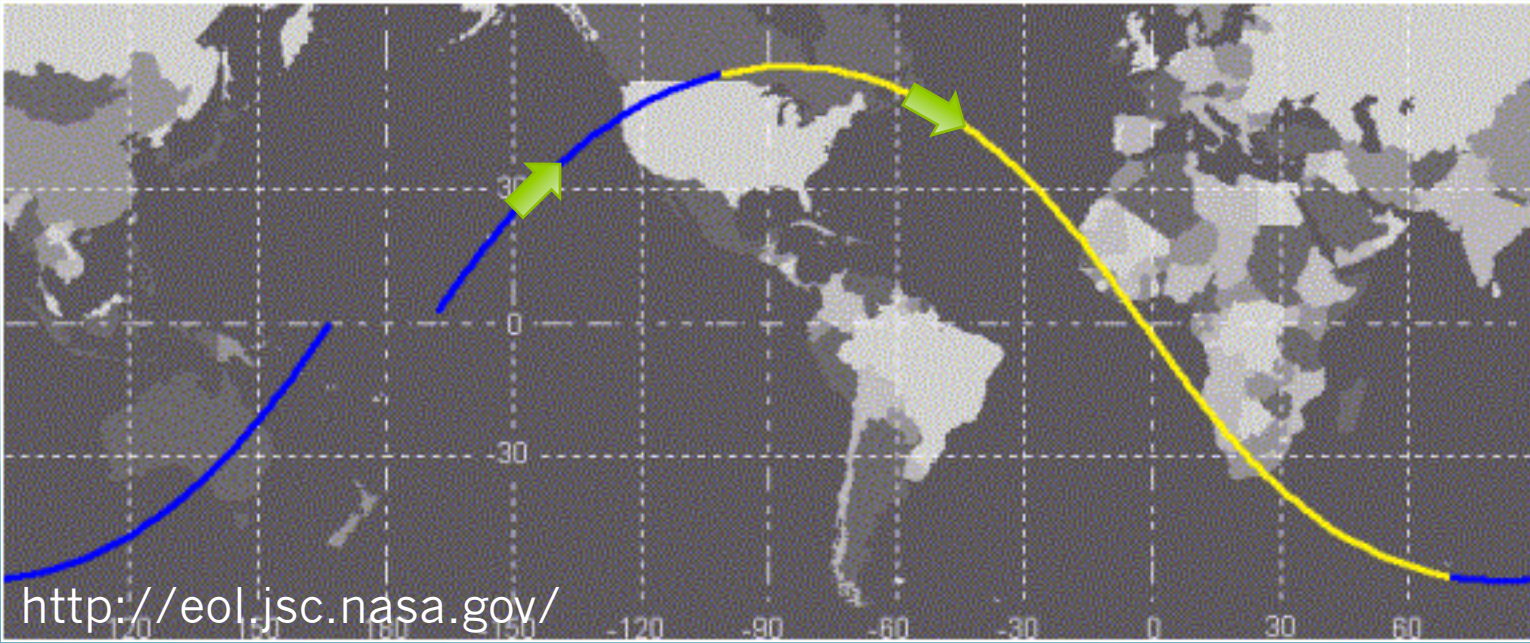
Overview

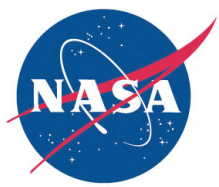
- ISS orbit
- Key ECOSTRESS parameters
- ECOSTRESS CONUS coverage



ISS Orbit characteristics

- The ISS orbits from west to east at an inclination of 51.6 degrees and nominal altitude of 400 km.
- Each orbit takes 90-93 minutes (altitude dependent)
 - ~16 orbits per day
- During an orbit, part of the Earth is viewed in daylight and part is viewed at nighttime.

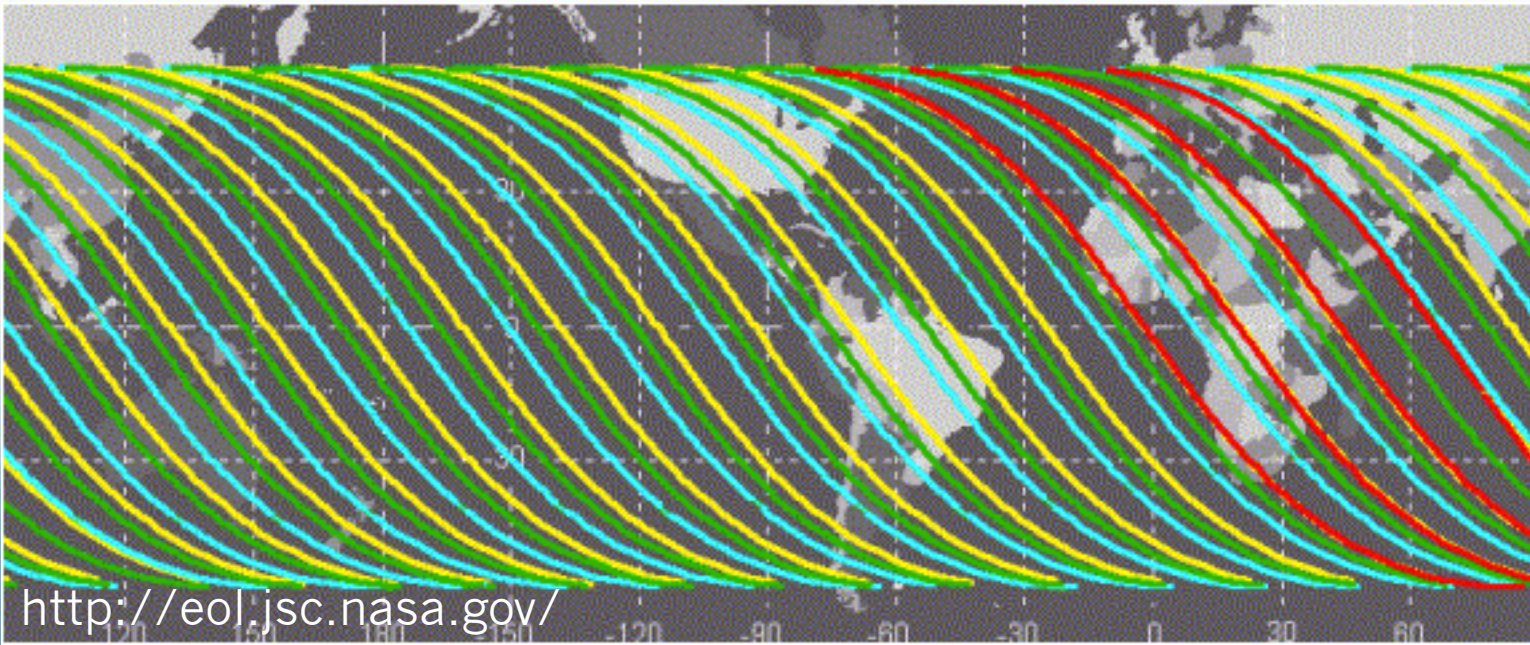




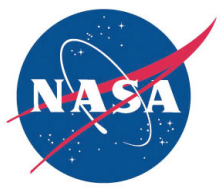
ISS Orbit characteristics

- There is an approximate repeat of orbit tracks over the same area on the ground every 3 days.
- The ISS orbital altitude drops gradually over time due to the Earth's gravitational pull and atmospheric drag.
 - Periodic reboosts adjust the ISS orbit.
 - As the ISS orbital altitude decays, the orbit tracks on Earth change slightly.

Day 1
Day 2
Day 3
Day 4

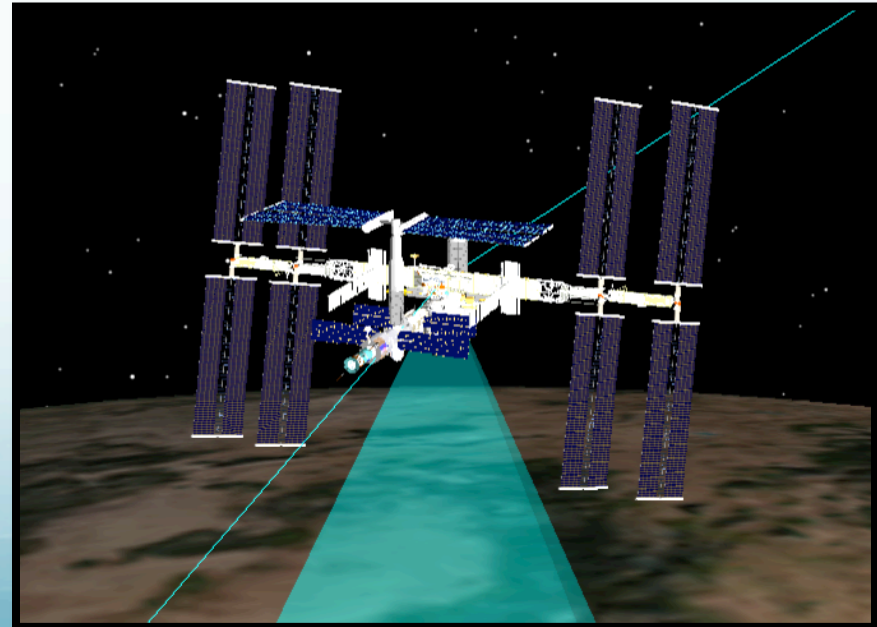


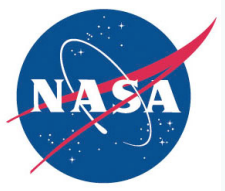
<http://eol.jsc.nasa.gov/>



Key ECOSTRESS parameters

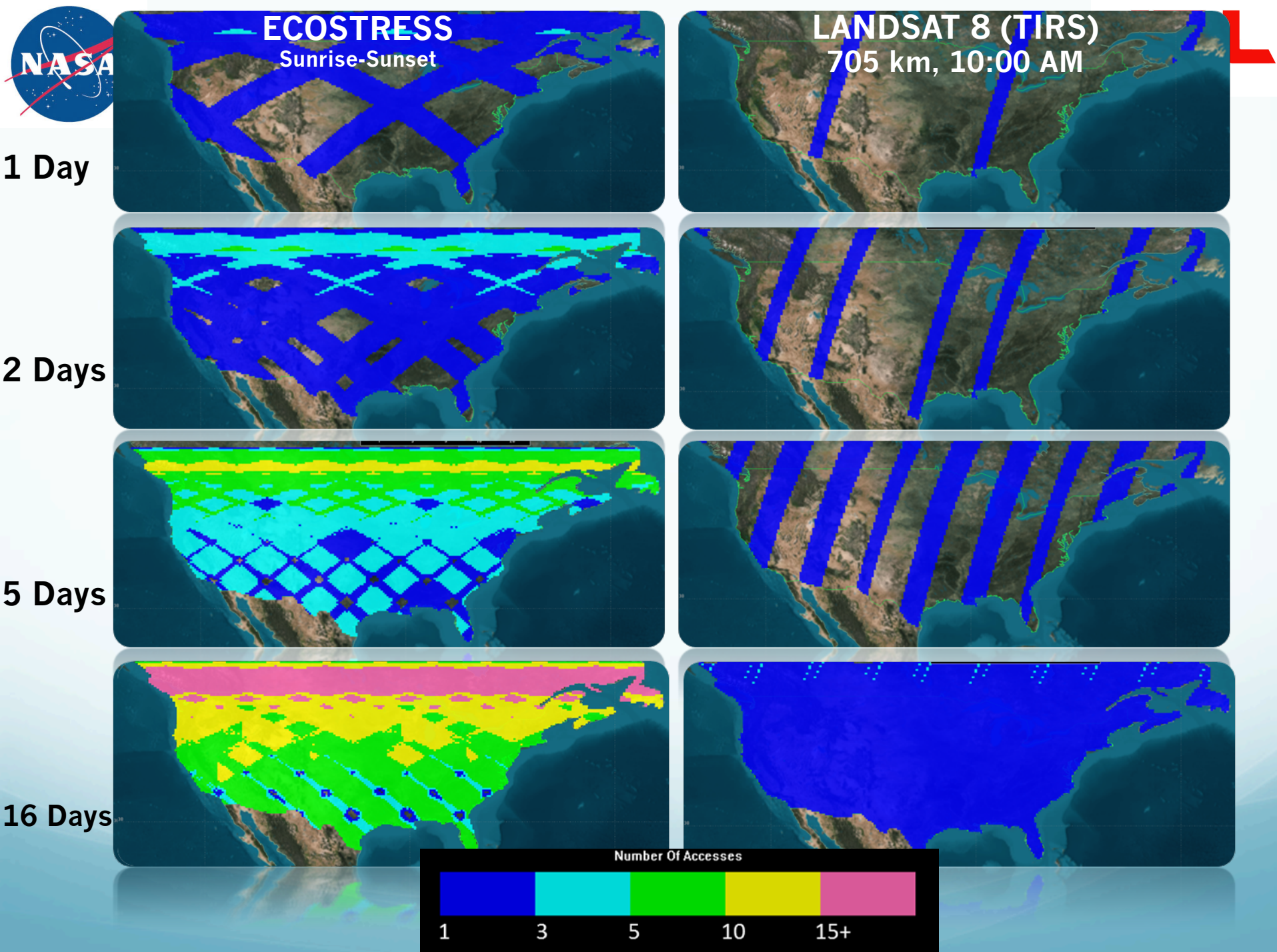
- Orbital Altitude (on ISS) 400 ± 25 km
- Field of view: 51° vertical angle (cross-track)
- Swath width: 384 km
- Nadir Spatial Resolution at 400-km altitude
 - 38 m (in-track) x 57 m (cross-track)
- JEM location

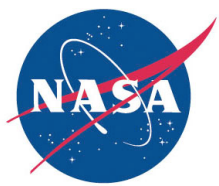




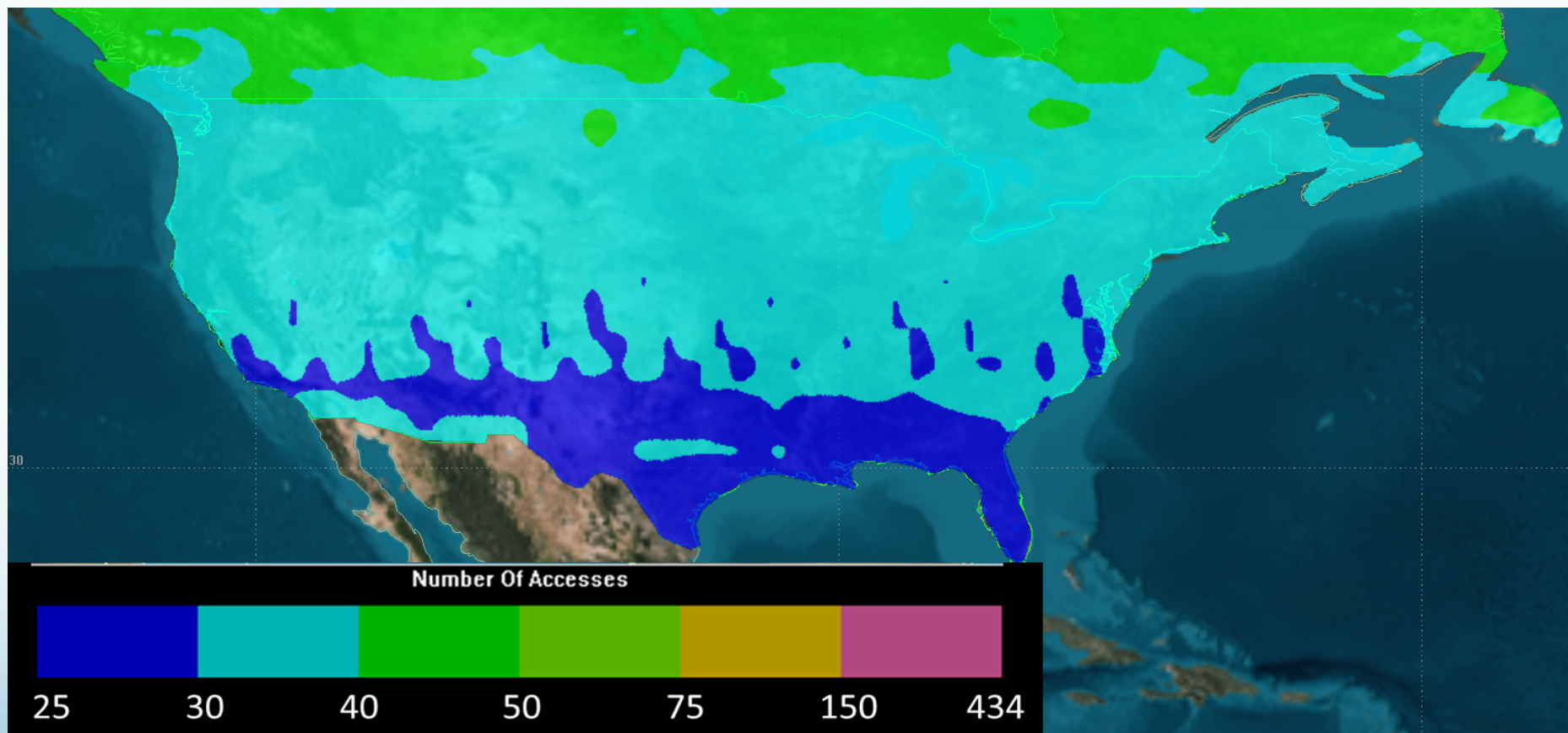
Coverage Analysis

- Systems Tool Kit (STK)
- Created grid points on CONUS
- Installed ECOSTRESS in JEM location
- Applied coverage constraints

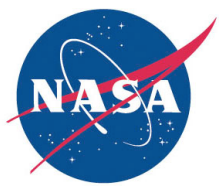




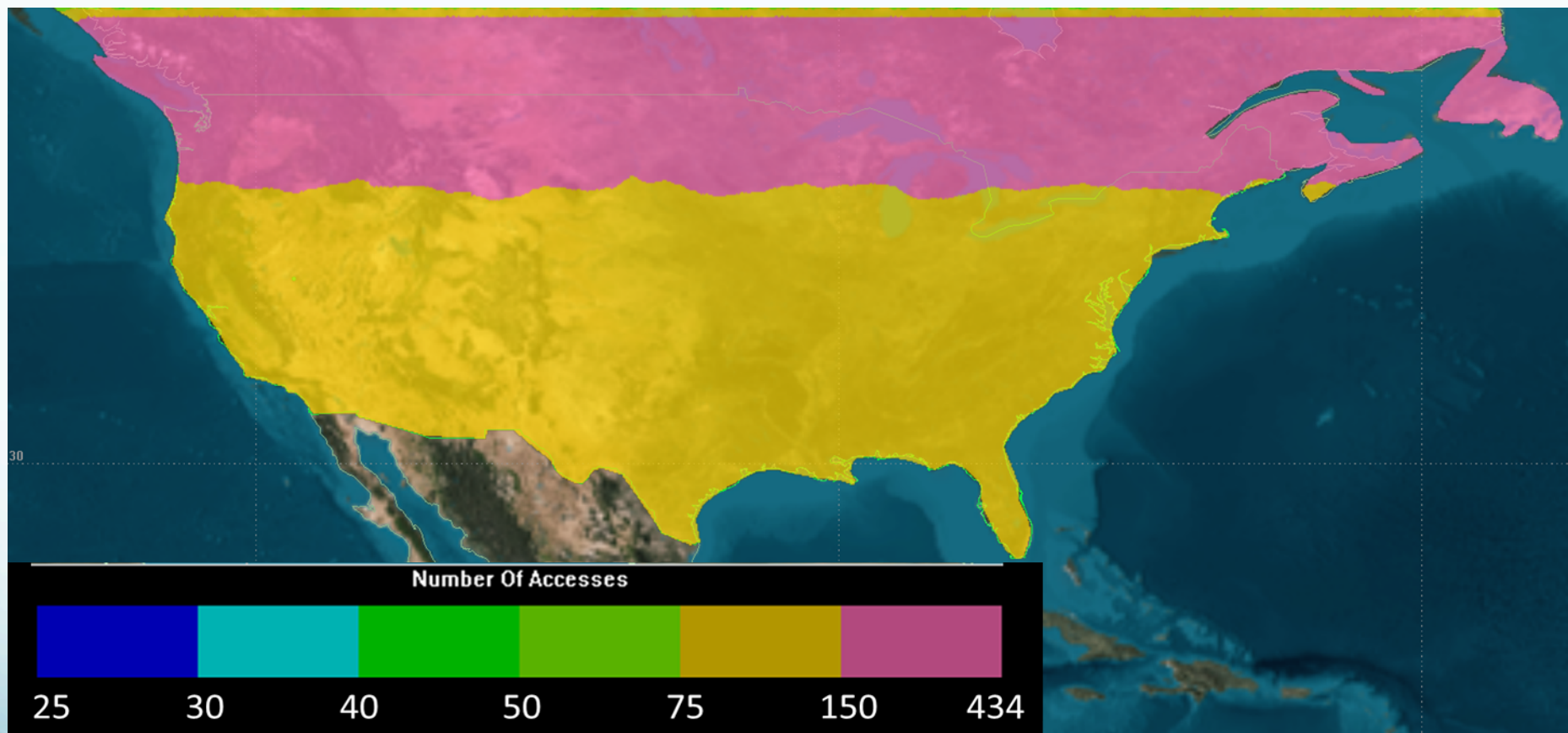
Landsat 8 TIRS Number of Views 1 Year Simulation - Sunrise to Sunset



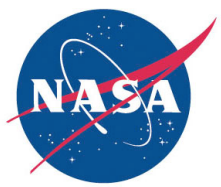
Swath is ~187 km (15 deg
FOV)



ECOSTRESS CONUS Number of Views 1 Year Simulation - Sunrise to Sunset



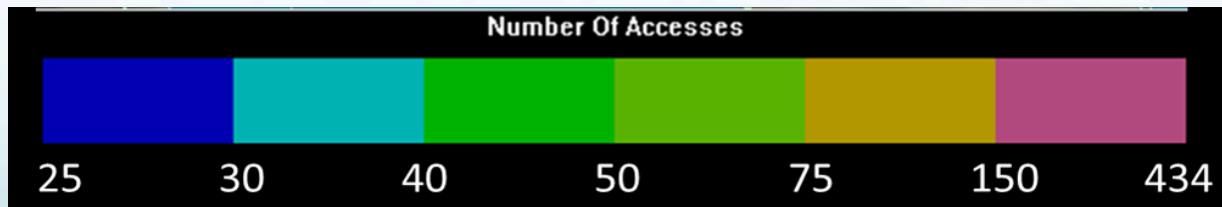
Swath is ~384 km (51 deg
FOV)

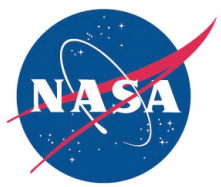


Landsat 8 TIRS Number of Views
1 Year Simulation
Sunrise to Sunset

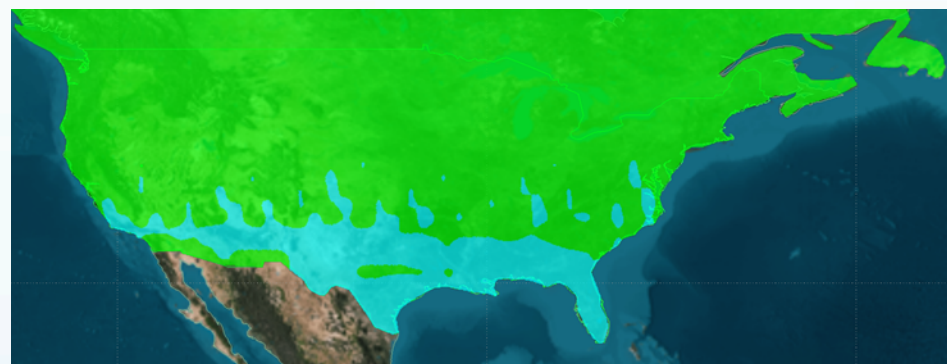


ECOSTRESS Number of Views
1 Year Simulation
Sunrise to Sunset

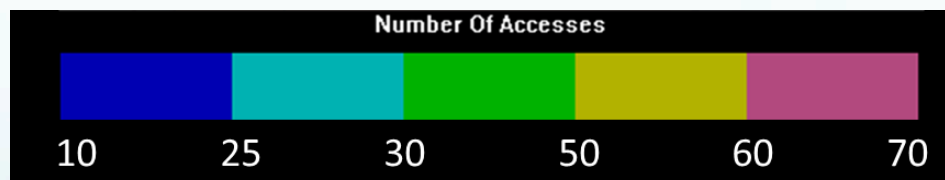
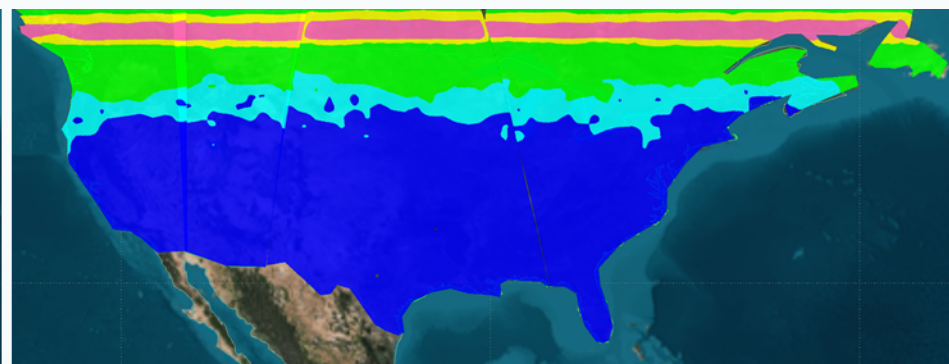


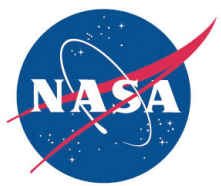


Landsat 8 TIRS Number of Views
1 Year Simulation
Daytime-only



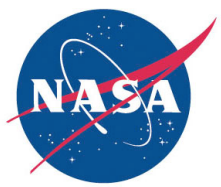
ISS ECOSTRESS Number of Views
1 Year simulation
9:30-11:30 AM





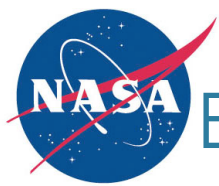
ECOSTRESS CONUS Summary

- Daytime overpasses (sunrise to sunset)
 - It takes ~3-5 days to achieve >90% coverage of CONUS
- 9:30-11:30 AM Overpass (1 Year)
 - It takes 11 to ~45 days to achieve >90% coverage of CONUS if coverage is limited to an overpass time of 10:30 AM \pm 1 hr
 - On average CONUS is covered every ~20 days with this constraint.



Number of Views at 0° , 25° , 50° latitudes

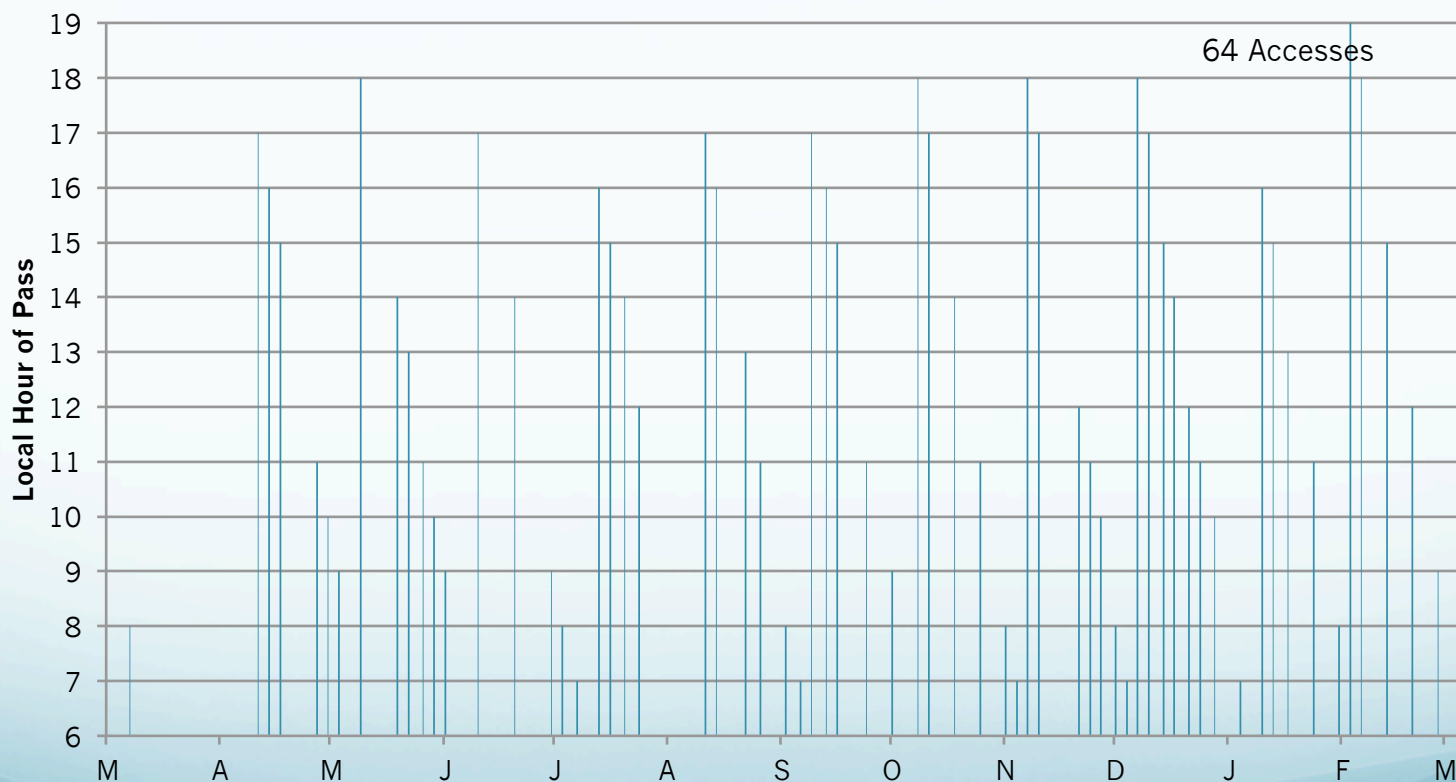


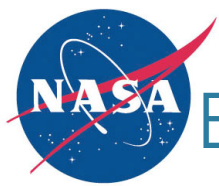


ECOSTRESS Local Access Time over 1 Year

0° Lat, -120° Lon

1 Year Accesses - Sunrise to Sunset 0°, -120°

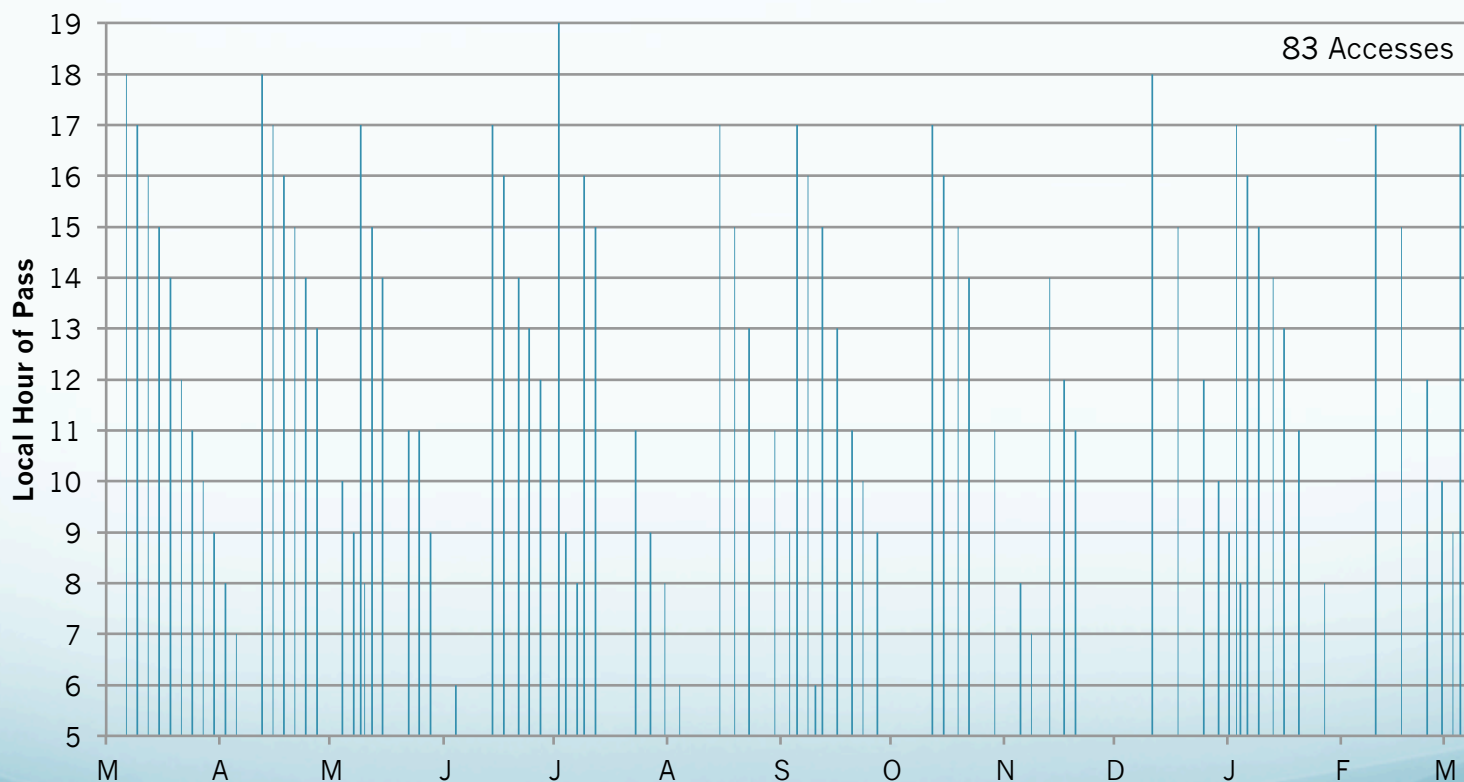


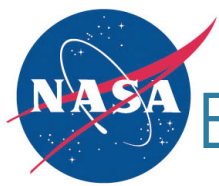


ECOSTRESS Local Access Time over 1 Year

25° Lat, -120° Lon

1 Year Accesses - Sunrise to Sunset 25°, -120°





ECOSTRESS Local Access Time over 1 Year

50° Lat, 240° Lon

1 Year Accesses - Sunrise to Sunset 50°, -120°

