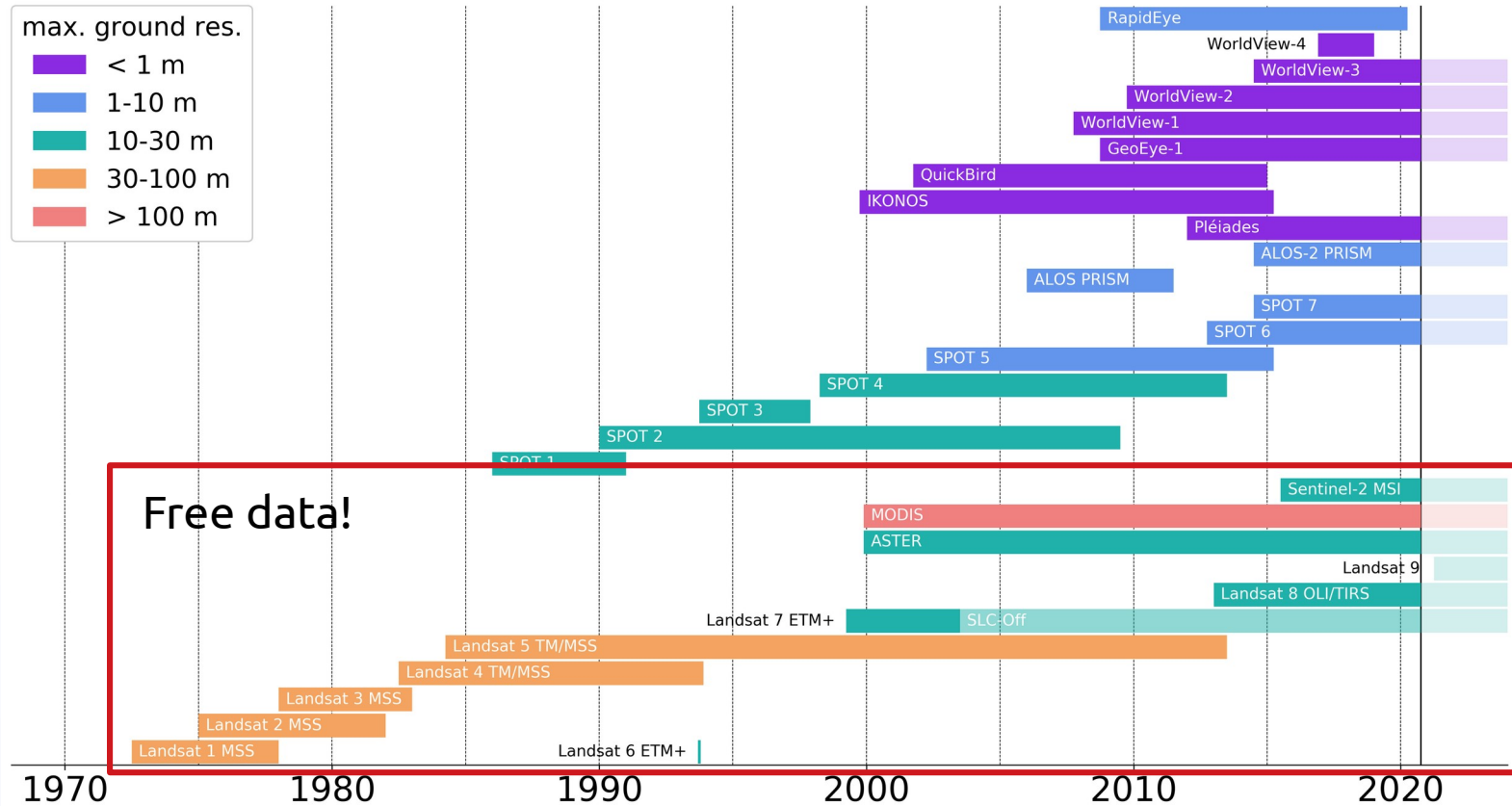


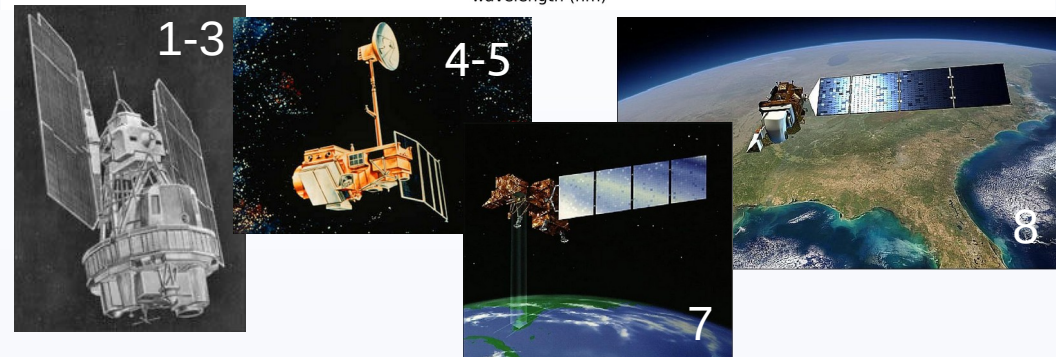
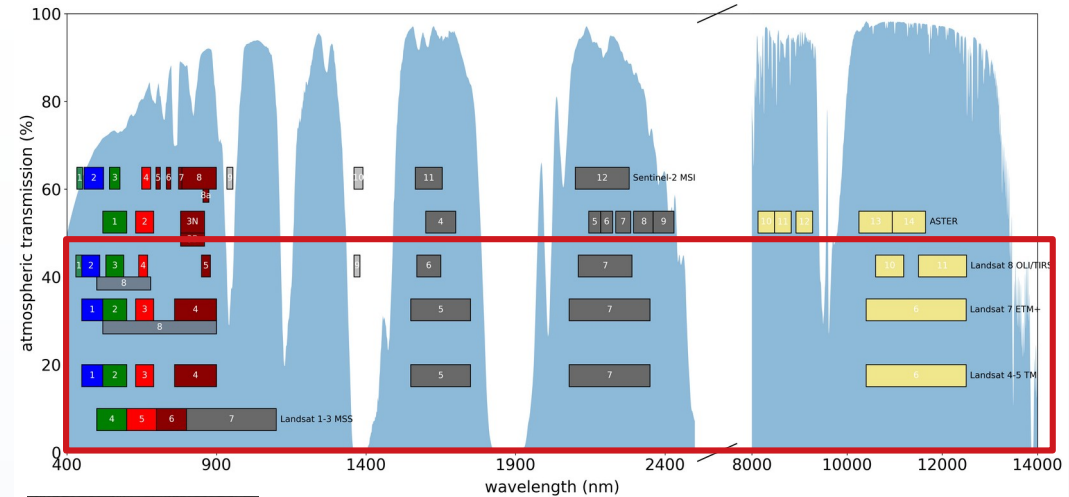
EGM310: GIS and Remote Sensing

Week 10, Part 5: Satellite data



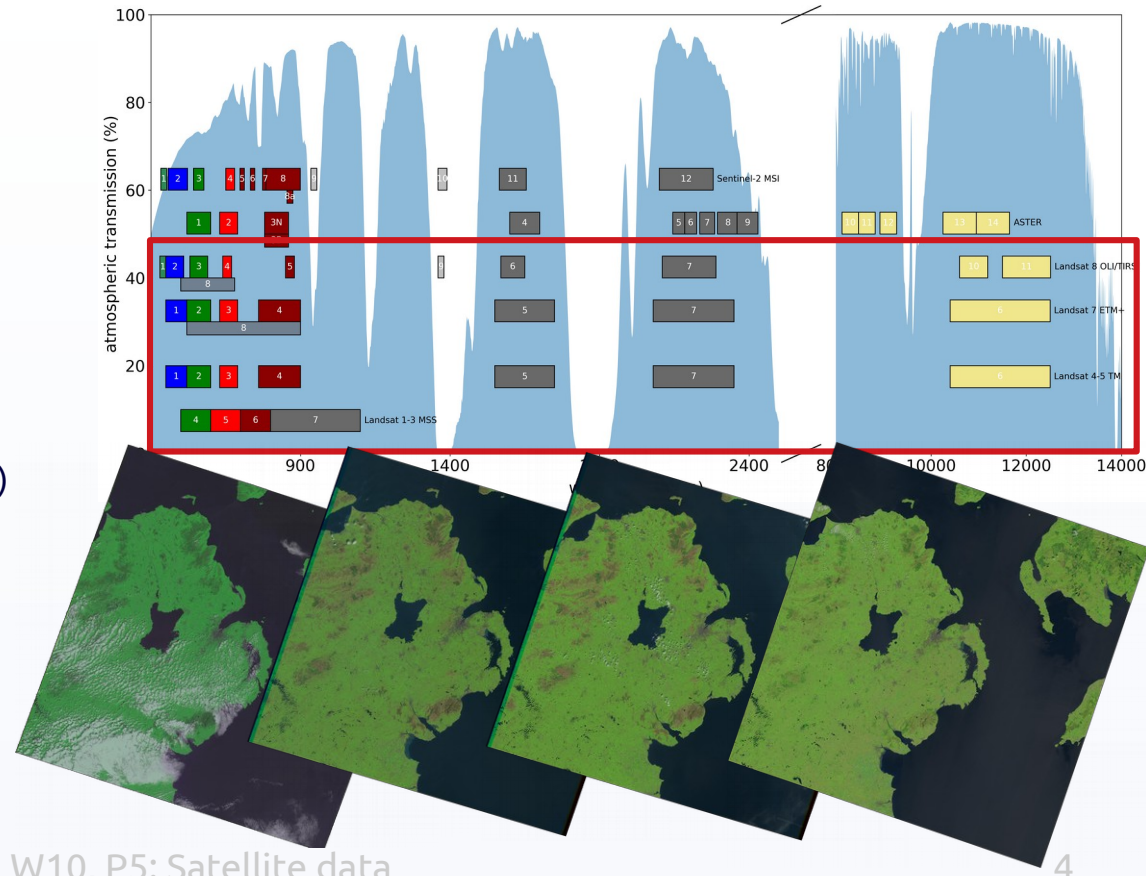
The Landsat program

- Began in 1972 as Earth Resources Technology Satellite 1 (ERTS-1)
- NASA/US Geological Survey (USGS)
- Sensors:
 - Multispectral Scanner (MSS) – Landsat 1-5
 - Thematic Mapper (TM) – Landsat 4-5
 - Enhanced Thematic Mapper Plus (ETM+) – Landsat 7
 - Operational Land Imager (OLI)
 - Thermal InfraRed Sensor (TIRS)
- From 2008, entire Landsat archive freely available (!)
 - Nearly 50 years (and counting) of observations

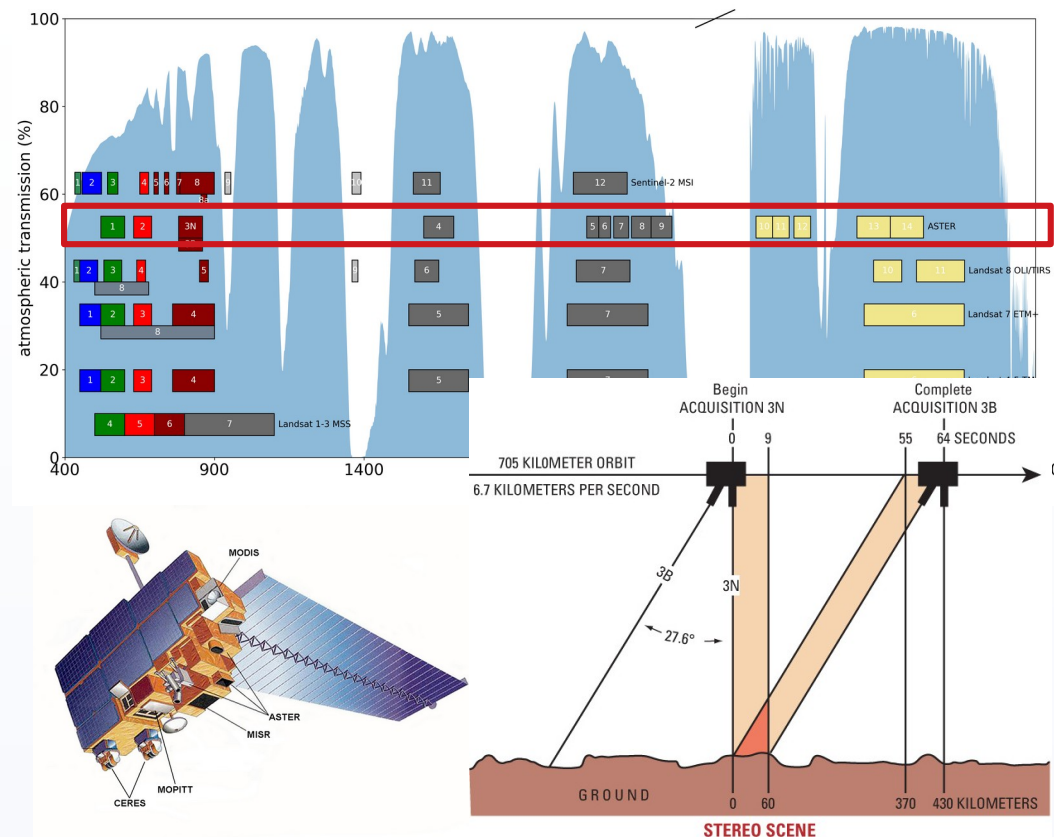


The Landsat program

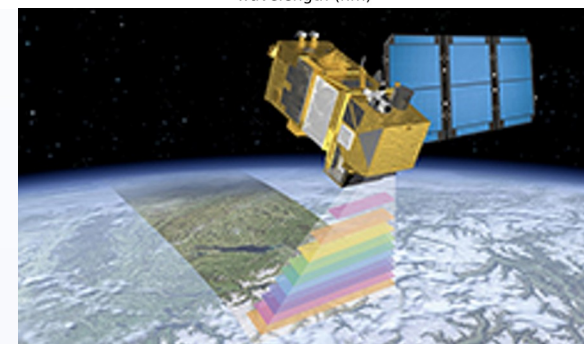
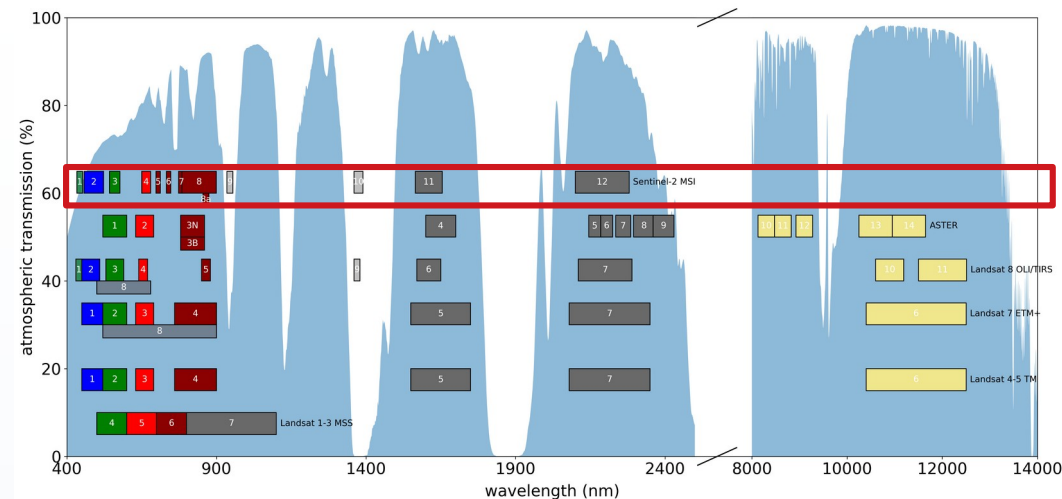
- 16-day repeat coverage (Landsat 4-8)
- MSS:
 - ~60m spatial resolution (all bands)
 - 185 km swath
- TM:
 - 30 m spatial resolution (Vis/NIR/SWIR)
 - 120 m spatial resolution (TIR)
- ETM+:
 - Same as TM, with added panchromatic band (15 m)
- OLI/TIRS:
 - Pushbroom sensor
 - Similar to ETM+
 - Addition of “Coastal/Aerosol” and “Cirrus” bands



- Joint NASA/Japanese Space Agency (JAXA)
- Launched December 1999 aboard *Terra* satellite
- Three systems:
 - Visible/NIR: 15m resolution
 - Shortwave IR: 30m resolution (pre-2008)
 - Thermal IR: 90m resolution
- **Stereo** images allow topography extraction:
 - Nadir (Band 3N)
 - Backwards-looking (Band 3B)
- From April 2016, entire ASTER archive freely available (!)
 - >20 year time series of **global** elevation (and change!)



- Copernicus Programme/European Space Agency (ESA)
- First launched mid-2015
- Part of a tandem (2A/2B)
- Provides ~5 day repeat coverage of globe since 2017
- Multispectral Instrument (MSI):
 - 10m resolution (Vis/NIR)
 - 20m resolution (Red Edge/SWIR)
 - 60m resolution (Coastal/Water Vapour/Cirrus)
- Data freely available



- Unprecedented amount of global, **freely-available** data (with more coming in daily)
- Archives stretch back to 1972, with decent coverage from ~1985 onward
- After 2000, multiple sensors available near-simultaneously

- Landsat Missions [[USGS](#)]
- ASTER Mission [[NASA JPL](#)]
- Sentinel-2 Mission [[ESA](#)]