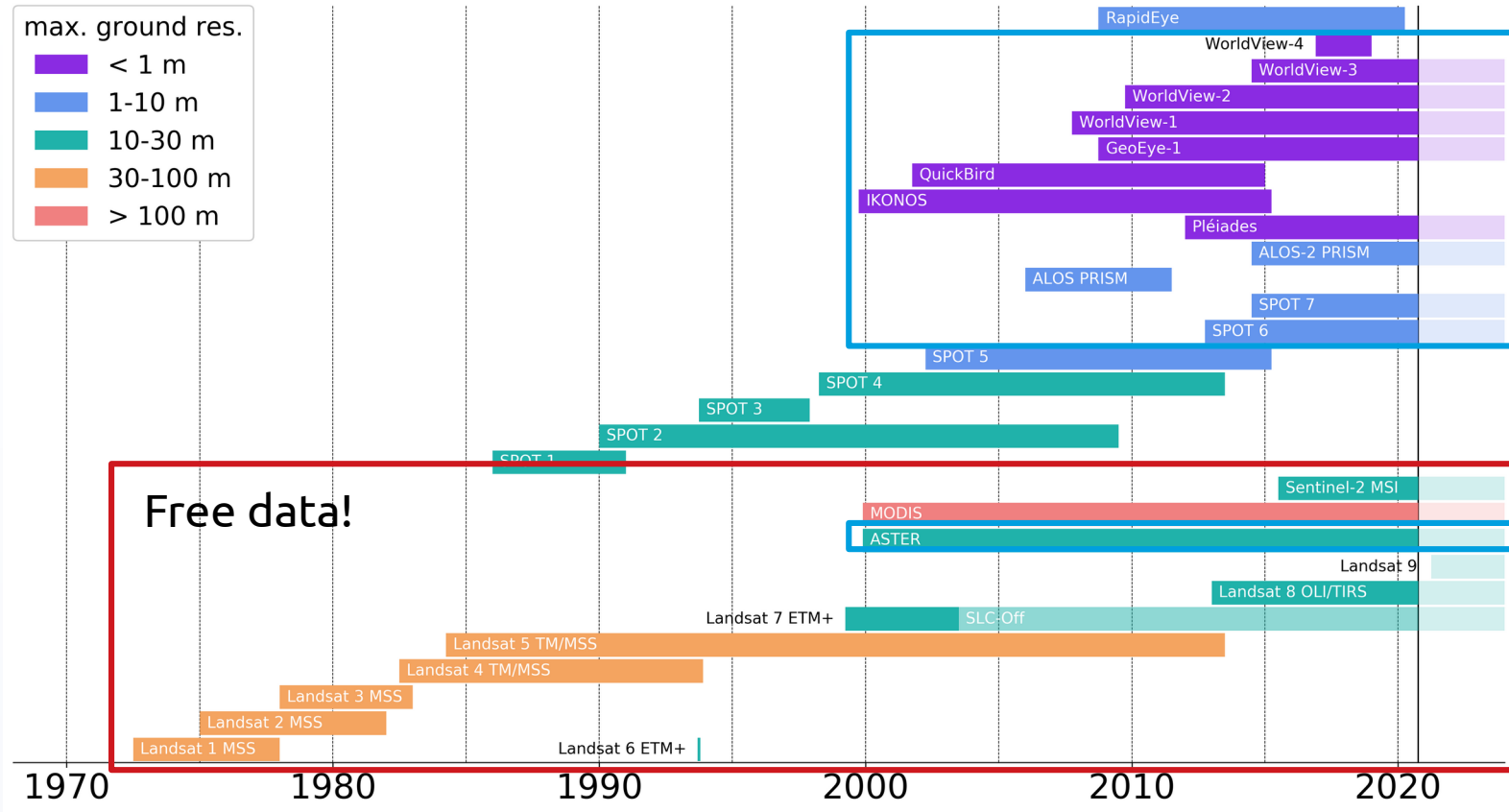


EGM702 – Photogrammetry and Advanced Image Analysis

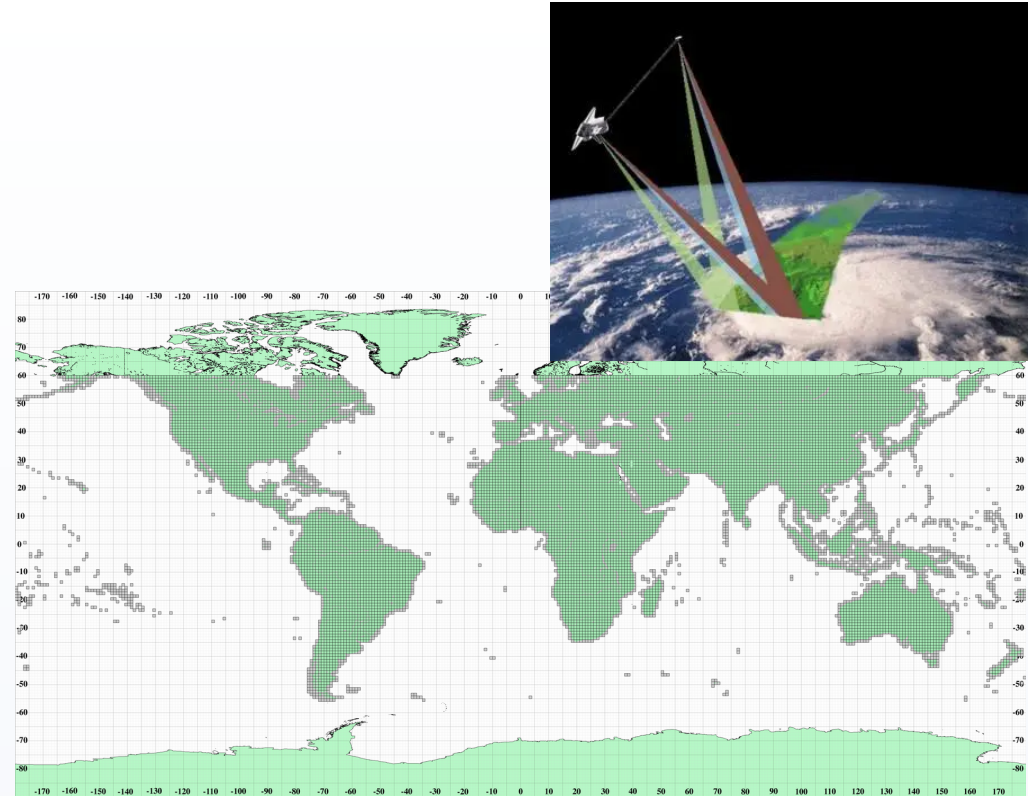
Week 2, Part 5: Where to find DEMs

A golden age of satellite data

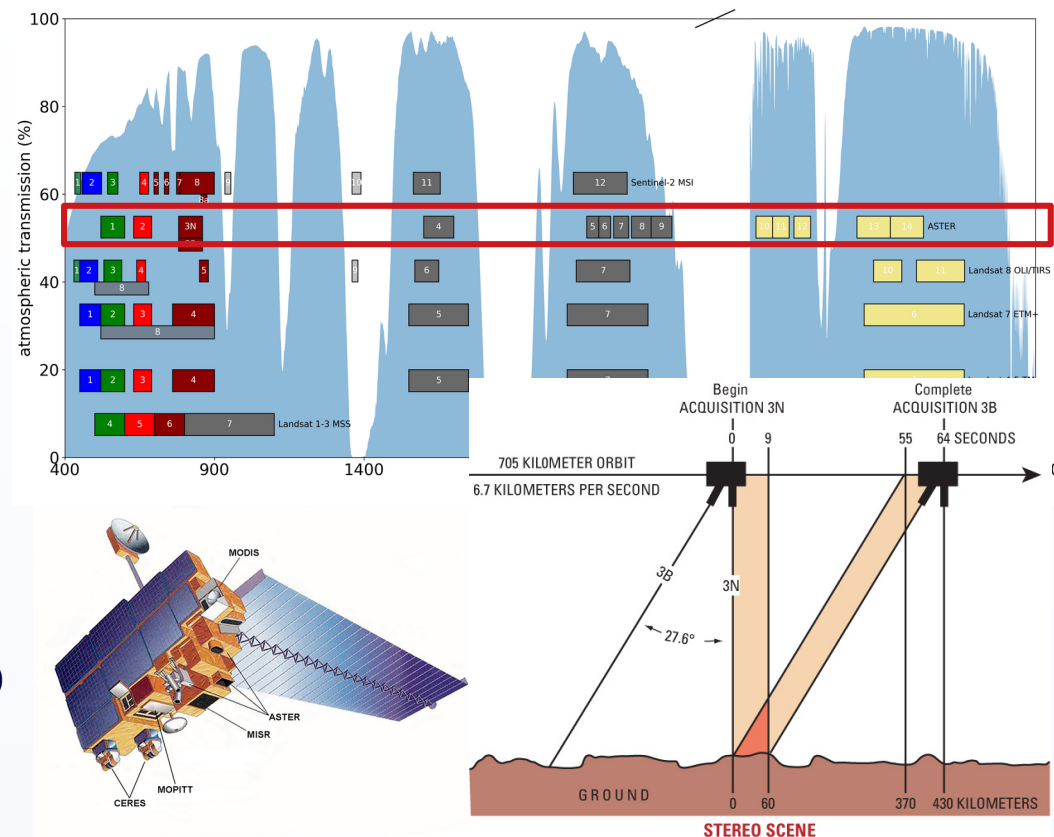


Shuttle Radar Topography Mission (SRTM)

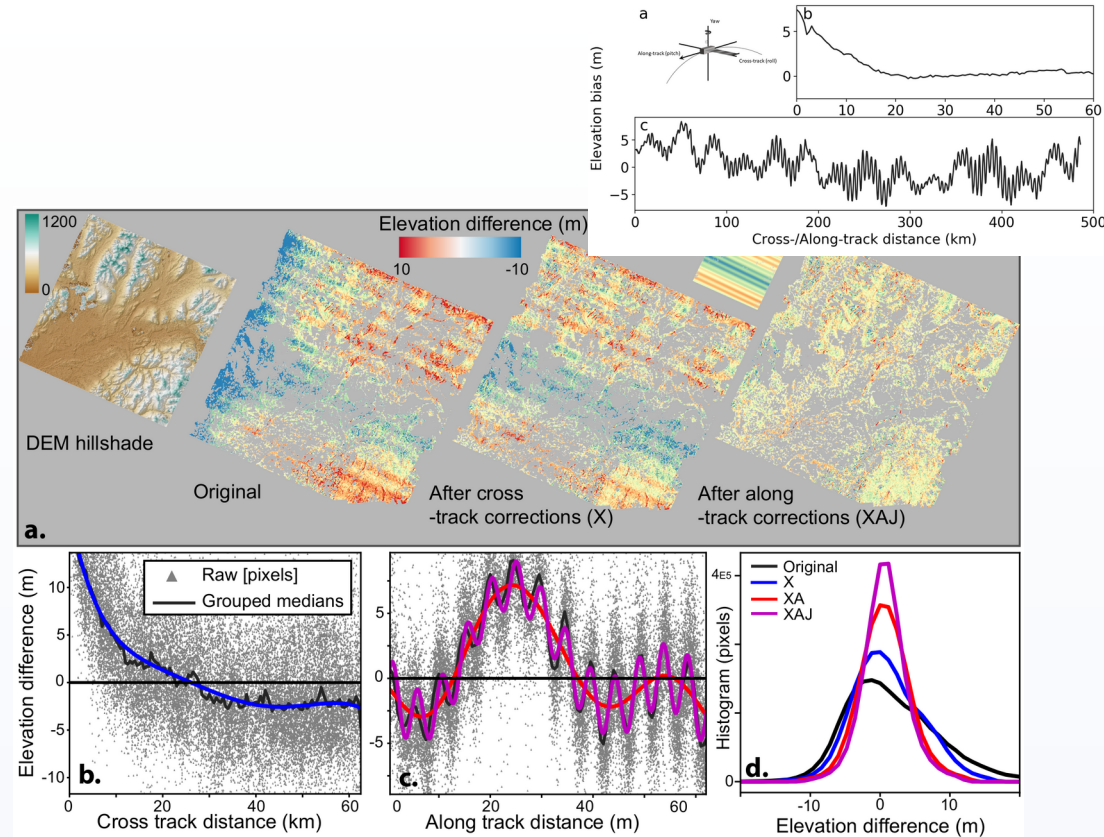
- C-band and X-band radar
 - Some penetration of signal into snow, vegetation, other surfaces
- Acquired aboard Space Shuttle Endeavour, February 2000
- Covers landmasses between $\sim 54^{\circ}\text{S}$, 60°N
- Available at 30m global resolution
- [EarthExplorer](#), Google Earth Engine



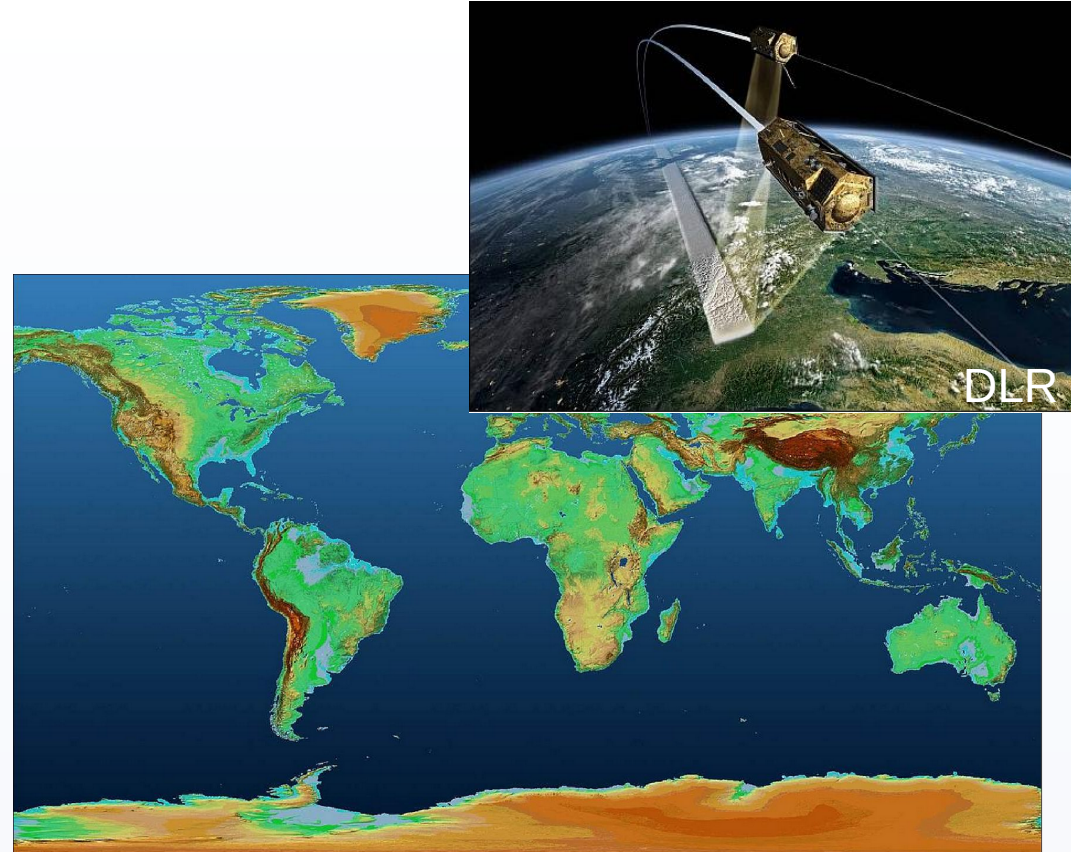
- Joint NASA/Japanese Space Agency (JAXA)
- Launched December 1999 aboard *Terra* satellite
- Three systems:
 - Visible/NIR: 15m resolution
 - Shortwave IR: 30m resolution (pre-2008)
 - Thermal IR: 90m resolution
- **Stereo** images: topography extraction (B/H: 0.6):
 - Nadir (Band 3N)
 - Backwards-looking (Band 3B)
- From April 2016, entire ASTER archive freely available (!)
 - >20 year time series of **global** elevation (and change!)



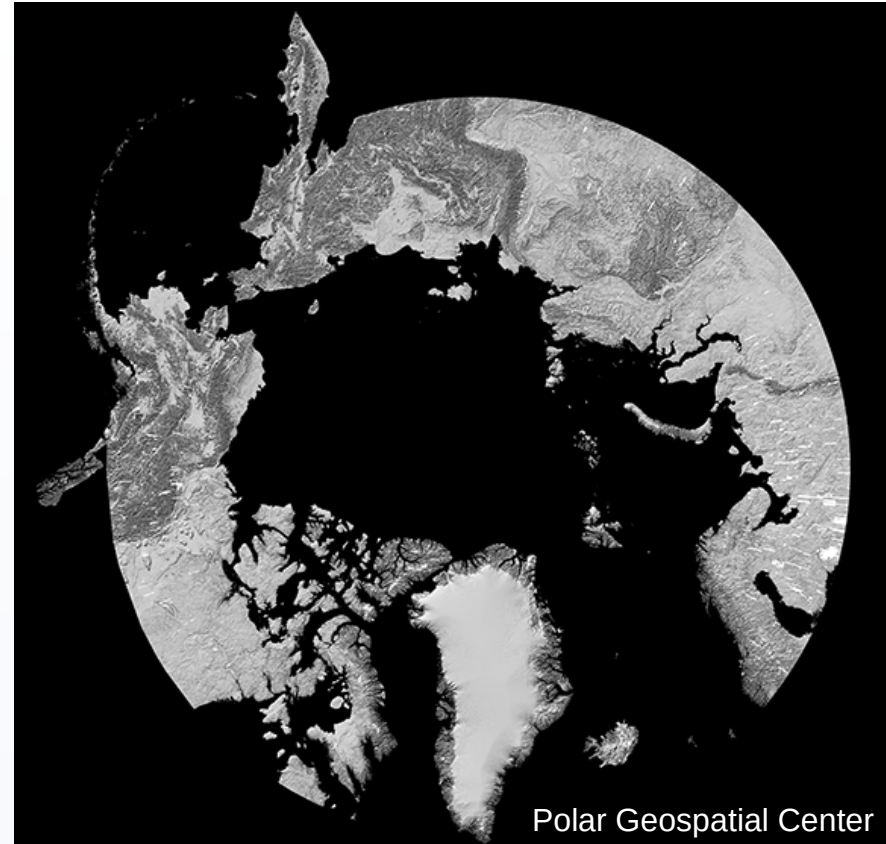
- Sensor pointing errors lead to bias
 - Along, cross-track
- Results in errors up to 20 m
- With comparison to external data, can model and correct



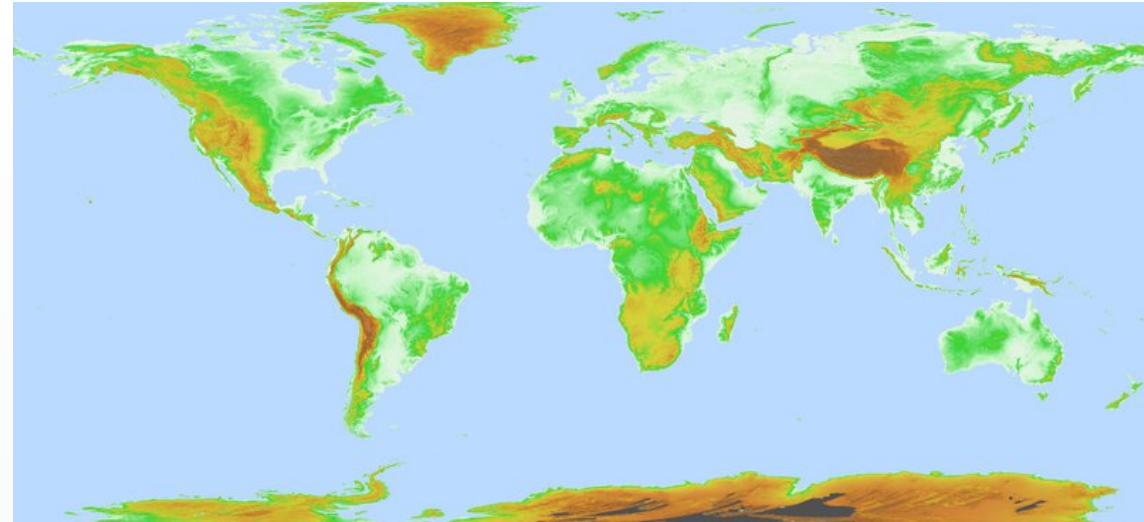
- TanDEM-X: twin X-band SAR instruments
- Flown in “tandem” orbit to generate DEMs
- Global DEM product:
 - 90m horizontal spacing
 - ~1 m global absolute height error
- Available via German Space Agency ([DLR](#))



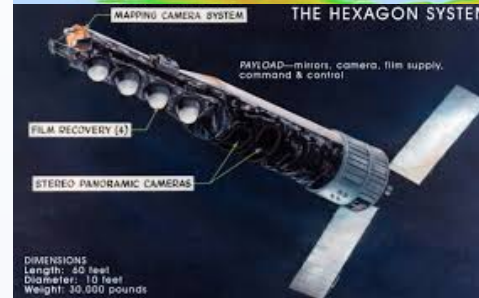
- First released in 2016
 - Release 7: >159M km², >260k DEMs
 - Thanks, Obama!
- Covers Earth north of ~60°N
- 2m DEMs, primarily WorldView/Digital Globe
- Mosaic, individual ‘strips’
- [Polar Geospatial Center](#), Google Earth Engine



- ASTER Global DEM*
- NASADEM*
- Archived air photos*
- Declassified spy photos*
- National-level DEMs*
- Fieldwork
- ...and many more



ASTER GDEM v3



*free/mostly free

- An unbelievable wealth of freely-available data
- Seriously, you kids don't realize how lucky you are
- Can find (or process) high-resolution, highly accurate elevation models for almost anywhere on Earth
- Archived images provide potential for even more