Future of Land Remote Sensing: What is needed

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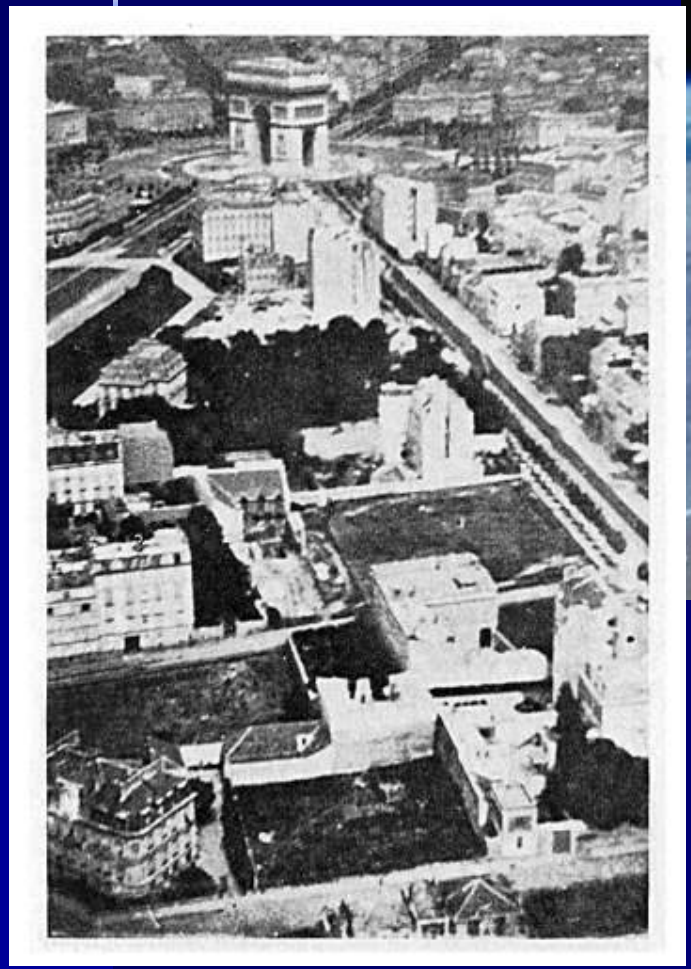
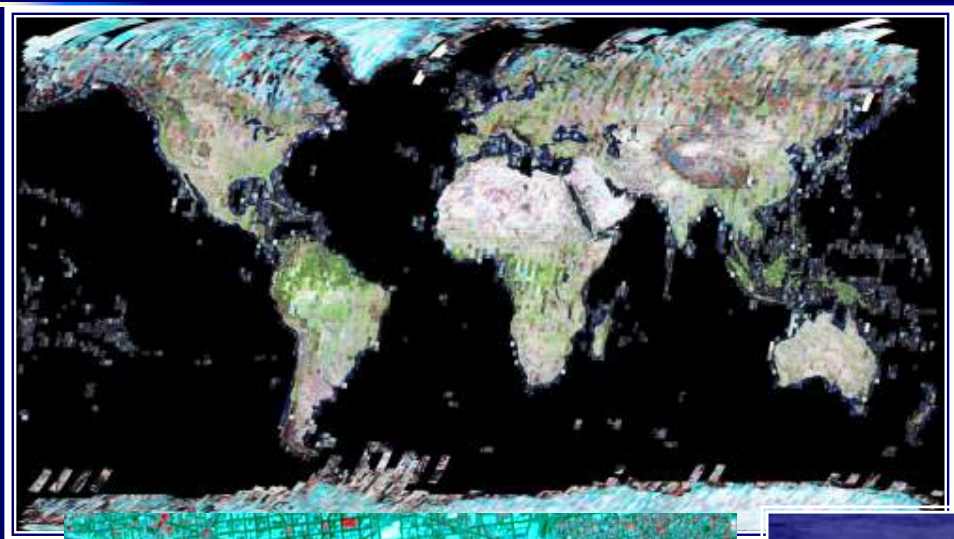
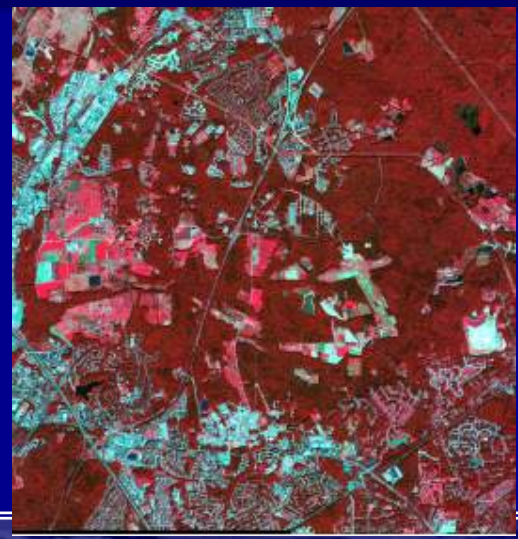
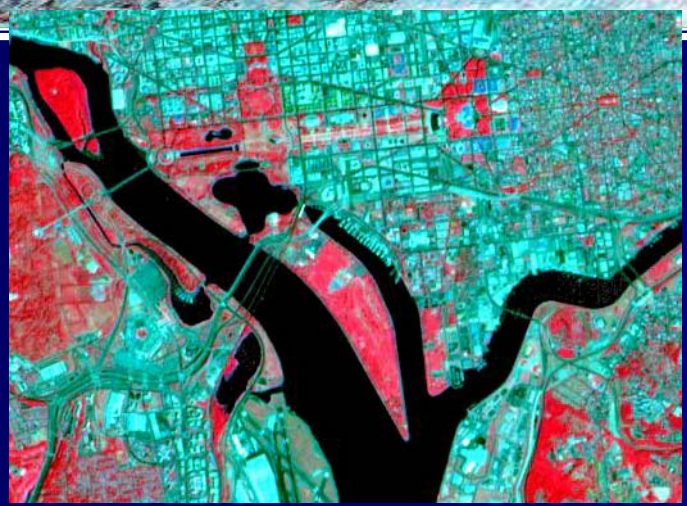
Viewing the Earth



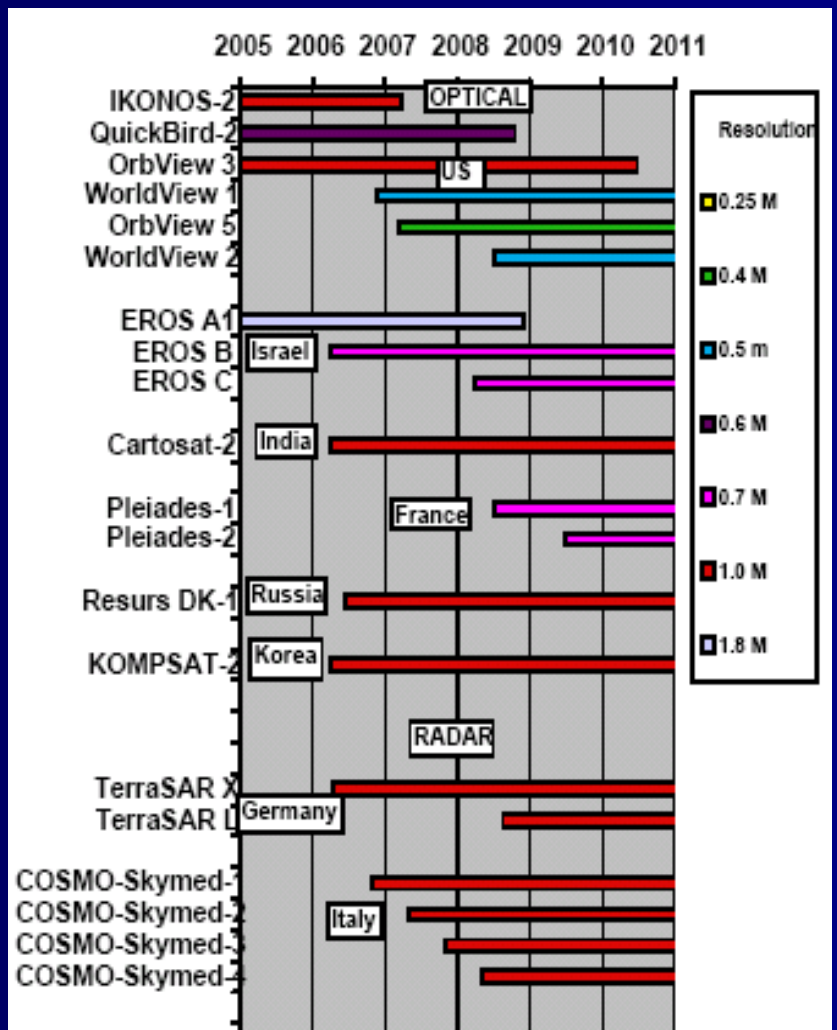
Multi-Imagery

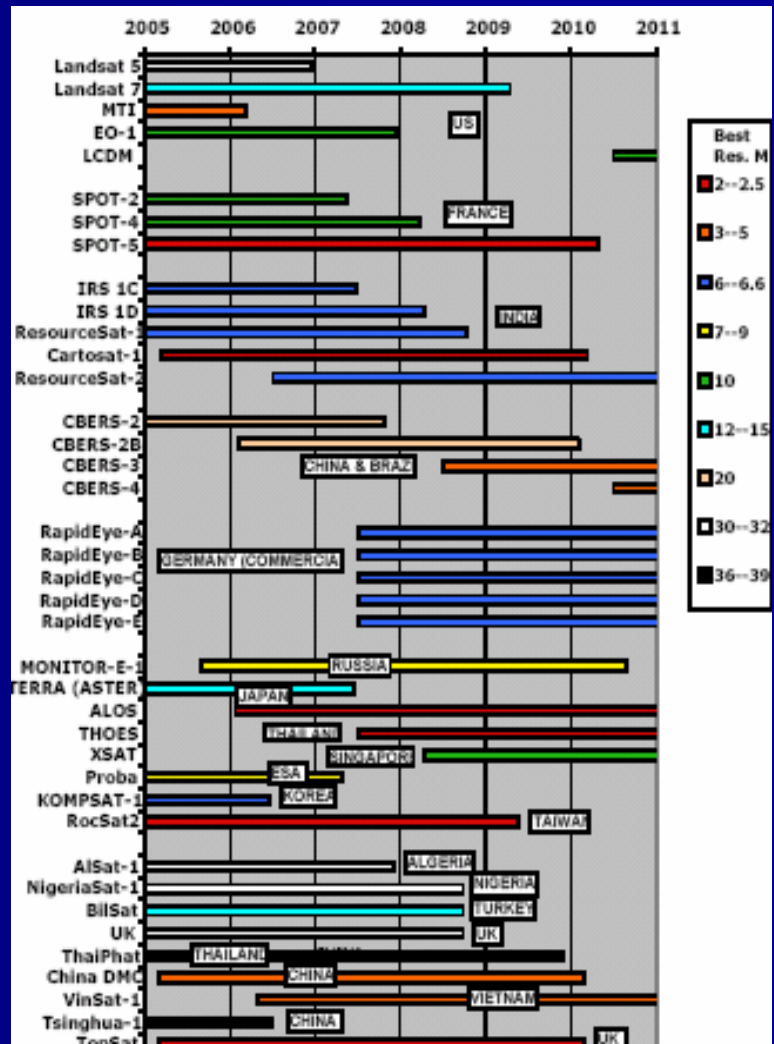






Many Missions and Sensors





What is Needed

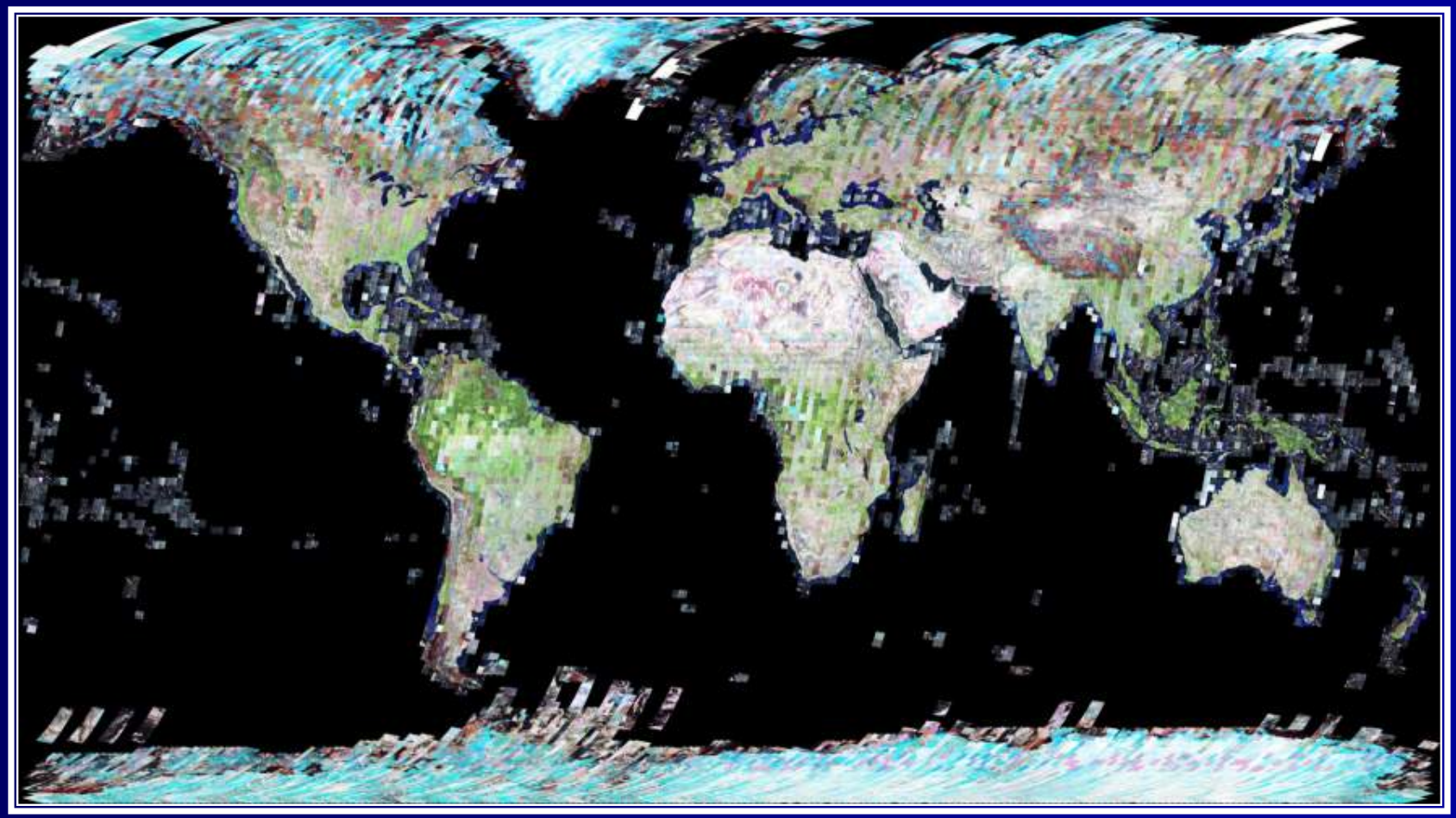
IRU

IMAGERY READY TO USE

Things to Think About

- **WHAT? – Clear Views (aka: surface reflectance)**
  - Calibration - radiance
  - Detection – clouds & shadows
  - Avoidance – water vapor
  - Characterization, adjustments – aerosols & cirrus
- **WHERE? – Navigational Accuracy (subpixel)**
  - Knowledge of pointing
  - Ortho-rectification
  - Geographic repeatability
- **WHEN? – Revisit Time (seasonal clear views)**
  - Orbits
  - Temporal Frequency
  - Number of Platforms and sensor configuration
- **HOW? – New Technologies (reduced cost, increased coverage)**
  - Sensors – radiometry and spectroscopy
  - Platforms – temporal repeat and illumination

Global Land Remote Sensing in Landsat 7 Era



Year 2000 L7 “low-cloud” Coverage – USGS EROS

Seasonality

Example: GeoCover p18/r26, N. Georgia
(RGB = 321 composite)

"Seasonality" includes variable…

- Solar geometry (BRDF)
- Canopy structure (leaf area, understory, etc)
- Leaf pigments

Cloud Contamination

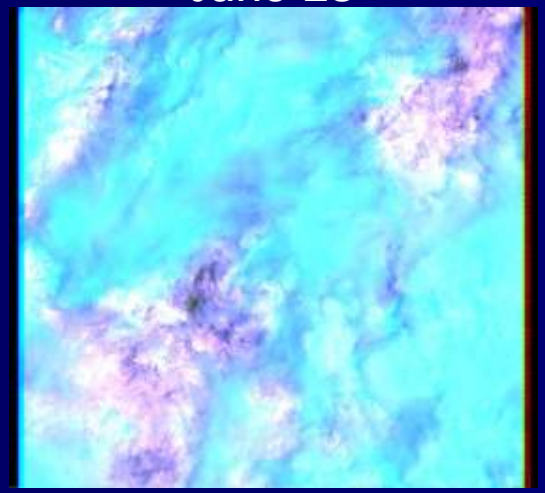
(L7 16-Day Temporal Repeat – Washington DC region, 2000)

May 11

May 27

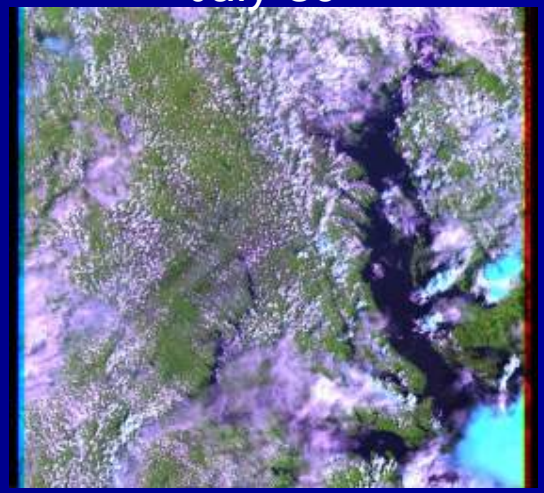
June 12

June 28



July 14

July 30



NRC Decadal Study

Hansen, M, T. Loveland, B. Quirk, G. Stensaas, J Christopherson, A Constellation of Mixed-Orbit Micro-Satellites for Monitoring Global Land Change and Ecosystem Dynamics, SDSU& USGS EROS

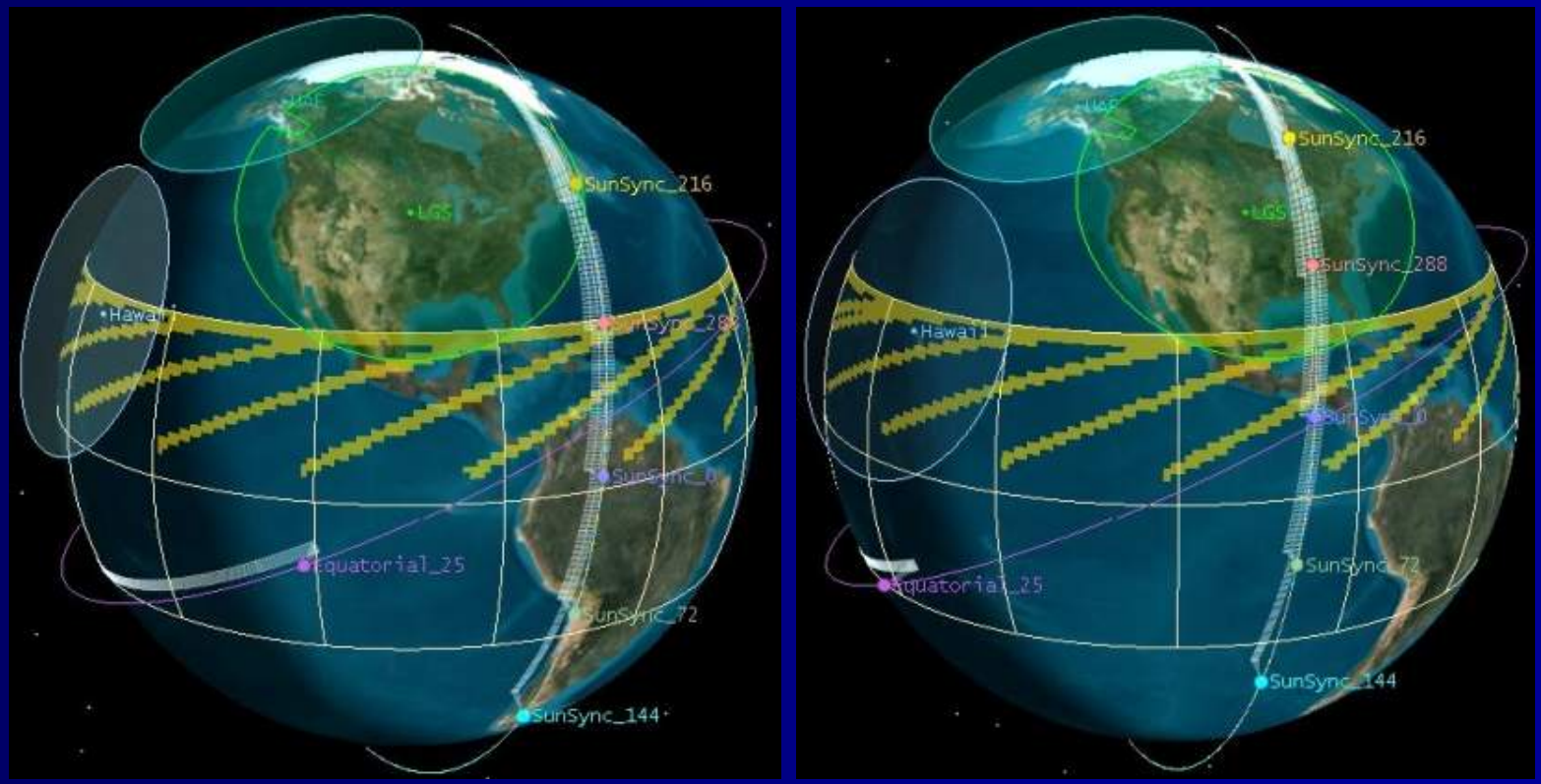


Figure 1. Conceptual Ground Imaging tracks from a Constellation of Polar and Equatorial Satellites.

Atmospheric Attenuation
R21 Science Advisory Board Recommendations

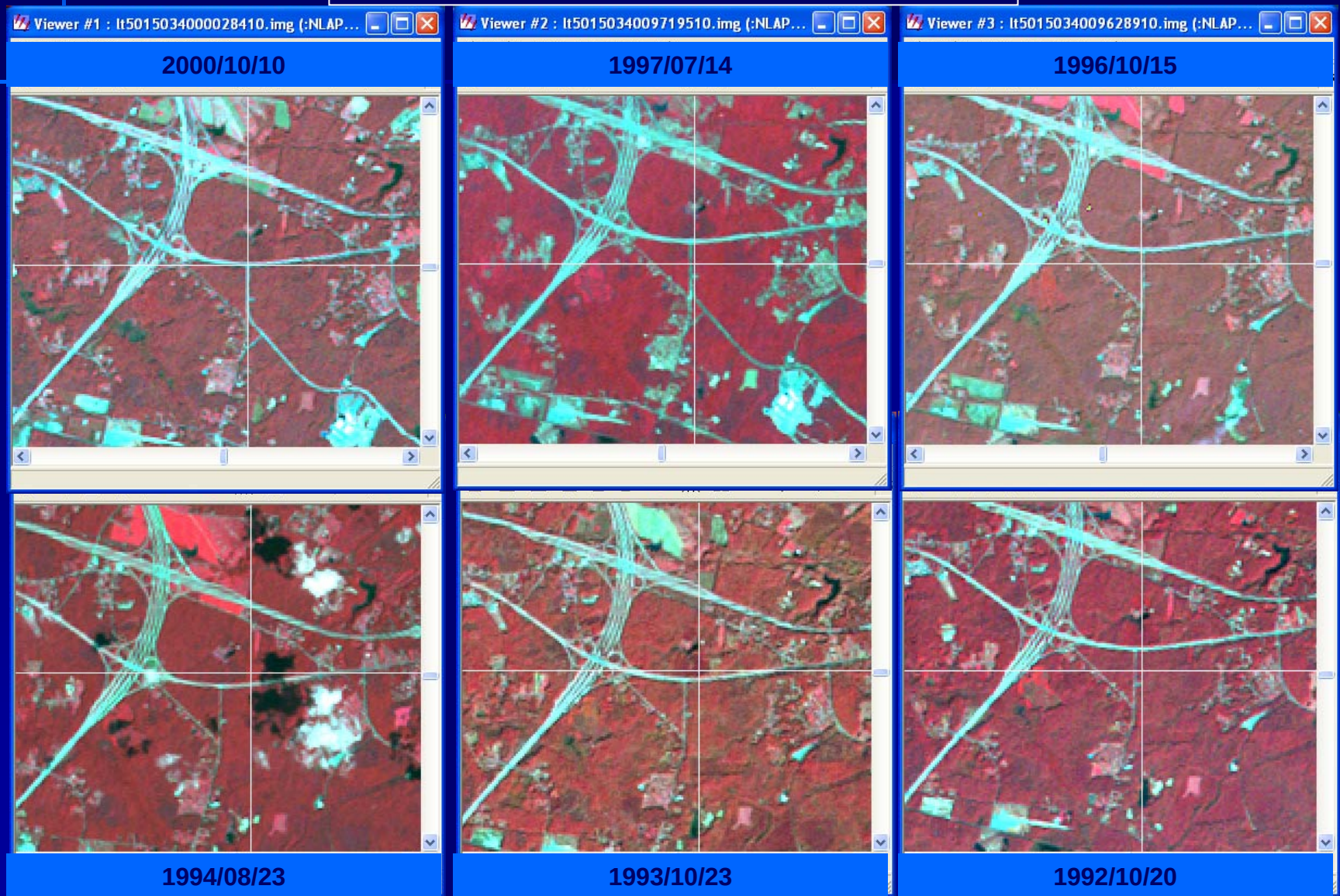
#	Band	R21 SAB April 01 Recommendations	Science Priority	Use
1	Dark Blue	433 – 453	3	Scattering/Coastal
2	Blue	450 – 515	1	Pigments/Scatter/Coastal
3	Green	*525*[a] – 600	1	Pigments/Coastal
4	Red	630 – *680*	1	Pigments/Coastal
5	NIR	845 – *880*	1	Foliage/Coastal
6	SWIR 1	1200[b] – 1300[b]	4	Experimental
7	SWIR 2	*1560 – 1660*	1	Foliage
8	SWIR 3	*2100 – 2300* *or 2020*[c] *– 2150*[c]	1	Minerals/Litter/No Scatter
9	Sharpening	*a. - 680*	3.5	Edges/Low Science Value
10	Thermal	10400[d] – 12500[d] 10400 – 11500 & 11500 – 12500	2.5	Clouds/land cover/fluxes Technical Problem
11	Cirrus	1360 – 1390	1	Cirrus Clouds
12	Water Vapor	910 – 970	4	Not Needed

Essential, Secondary, Not Needed, *Italic s – Differs from LDCM Specs*

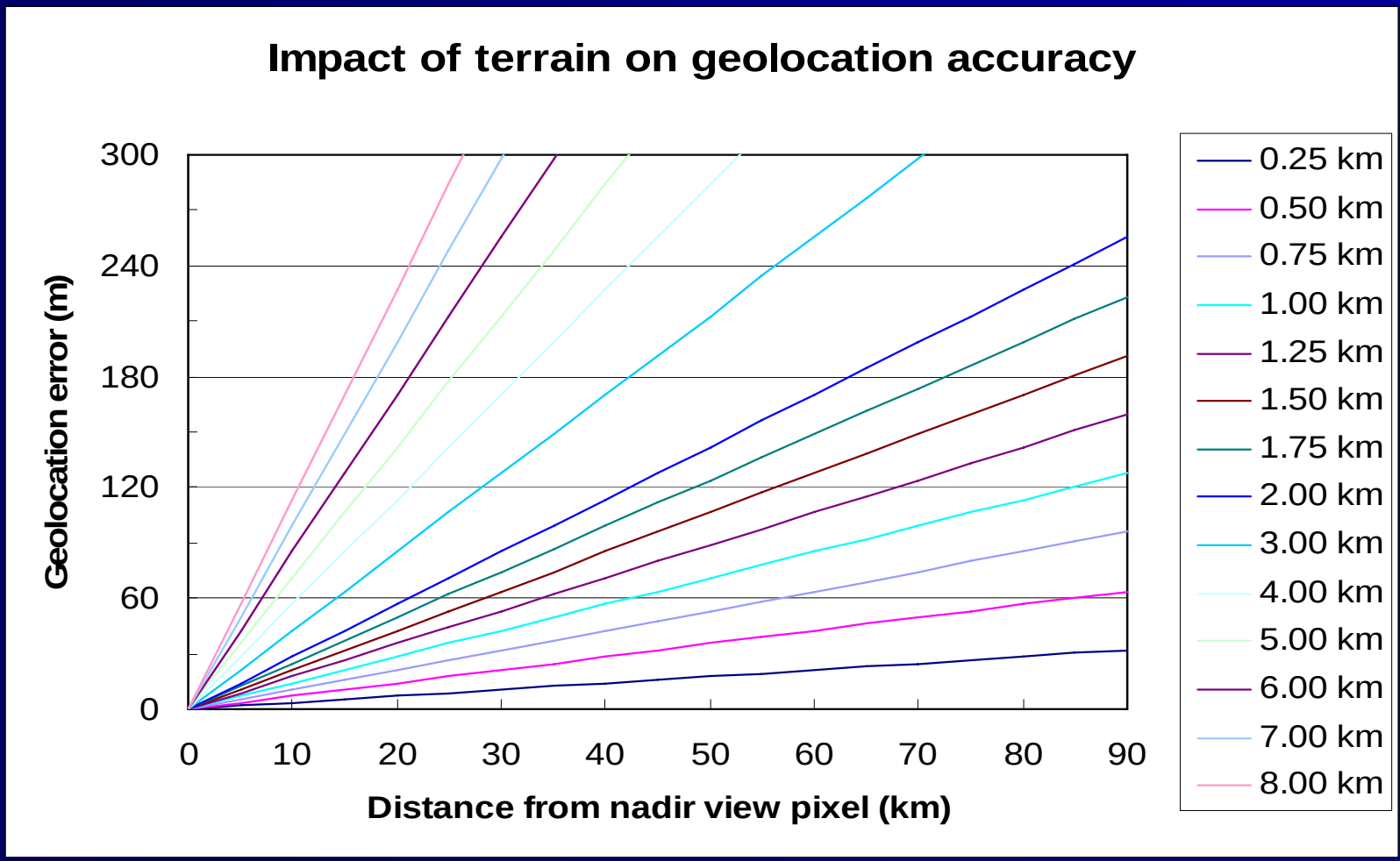
GEO-REGISTRATION

TM images Geo-location errors up to 400 m

WRS2 path 15 / row 34, East of Richmond, VA



Orthorectification Required



Band Registration with OLI

NASA EO-1 ALI image of Oahu

Things to Do

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