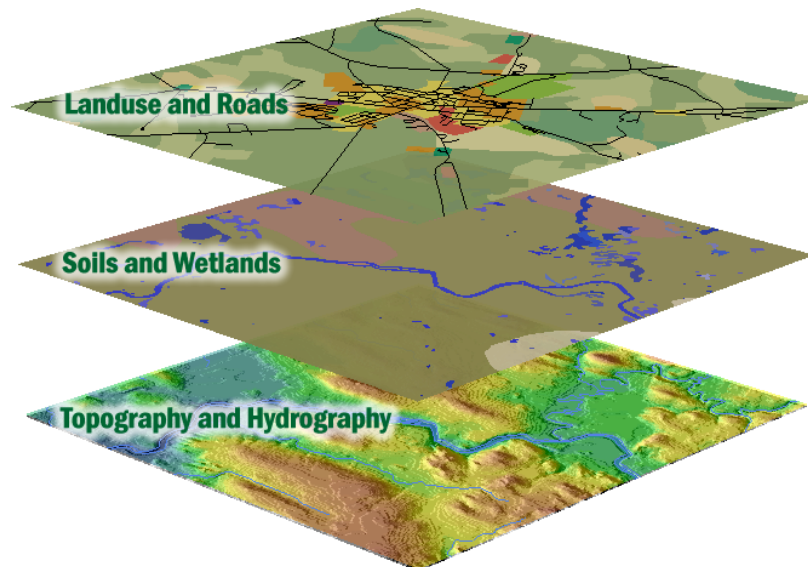


GIS, Remote Sensing & GNSS

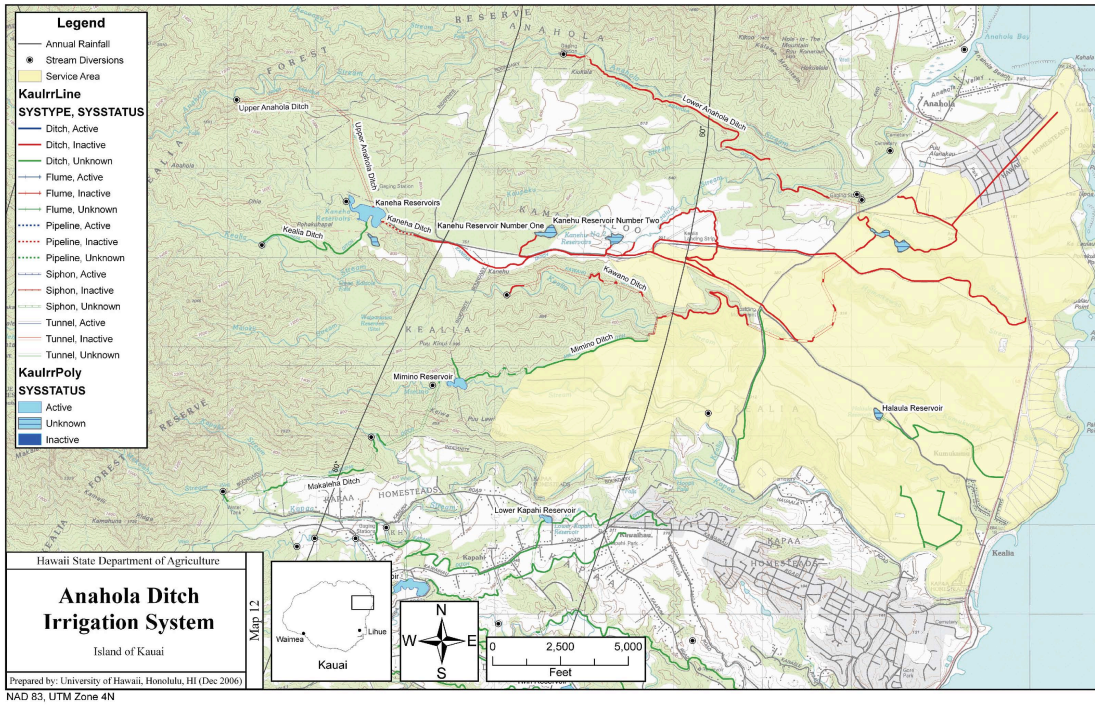
NREM 301, Spring 2014
Tomoaki Miura, Guest Lecturer



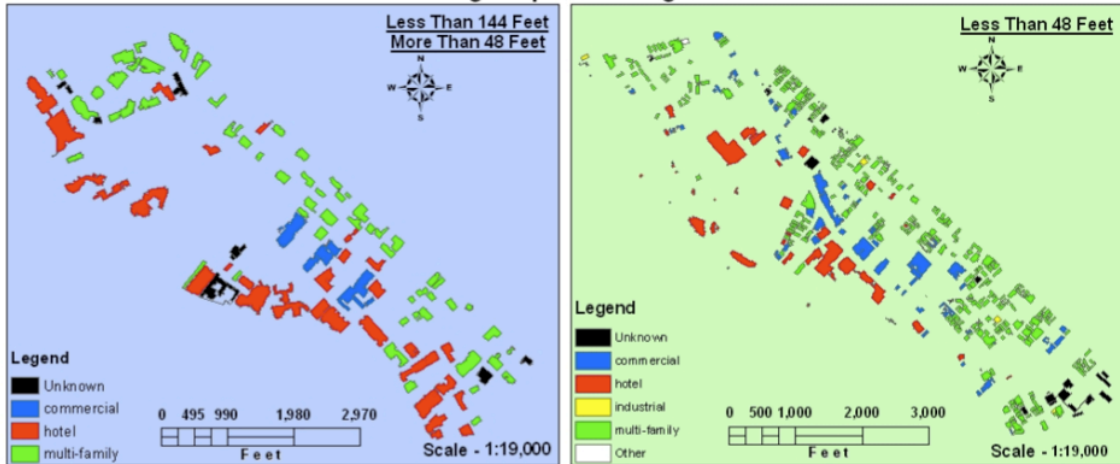
GIS Overlay for Analysis and Map Creation



Comprehending Existing Information into a Geodatabase



Waikiki Building Footprint with Height Restrictions



Total Roof Area of Buildings			
Type	Square Feet	Number	
Unknown	227883	8	
Commercial	340776	4	
Hotel	1743958	29	
Industrial			
Multi-Family	1346848	56	
Other			
Total Area	3659465		
Total Buildings		97	



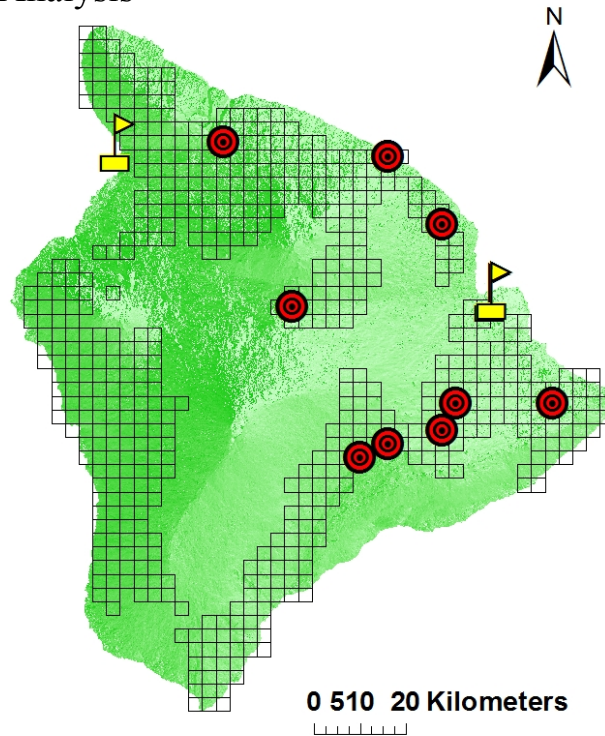
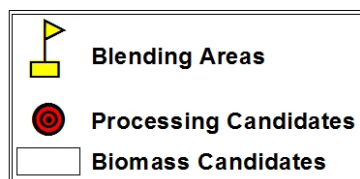
Total Roof Area of Buildings			
Type	Square Feet	Number	
Unknown	187377	31	
Commercial	589673	64	
Hotel	701525	69	
Industrial	24274	4	
Multi-Family	1337847	344	
Other	7680	2	
Total Area	2848376		
Total Buildings		514	

Map projects the same data as the WAIKIKI BUILDING FOOTPRINT CLASS LEDGEND except that this map displays only those buildings between the indicated height restrictions

Produced by: Geospatial Analysis and Remote Sensing Laboratory
Data Source: City & County of Honolulu as of January 2004
Datum: Hawaii State Plane Zone 3
Date of Production: 2006 November 17

Cost Distance / Network Analysis

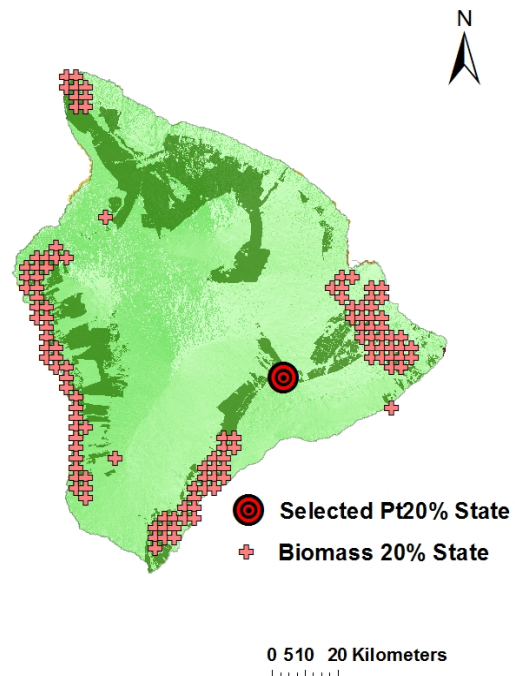
Biofuels Production Candidate Sites



(Mochizuki et al., 2014)

Results: 20% of State Demand

	20% of State Demand
Ethanol Production	83.23MGY
Cultivated Land Area	279.3 km ²
Average Yield	20.66 dry tons/acre
Ethanol Production Cost (2011 \$/gallon)	3.32
Feedstock Production (2011 \$/gallon)	0.97
Ethanol Processing (2011 \$/gallon)	1.89
Transport/Distribution (2011 \$/gallon)	0.46

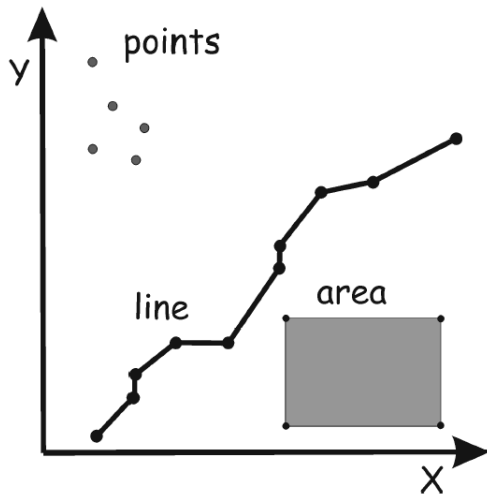


(Mochizuki et al., 2014)

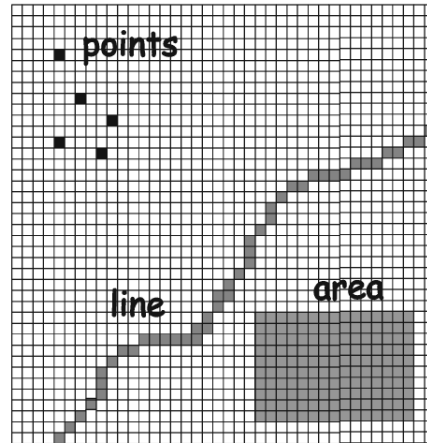
What Types of Data Are Available/Used?



Vector



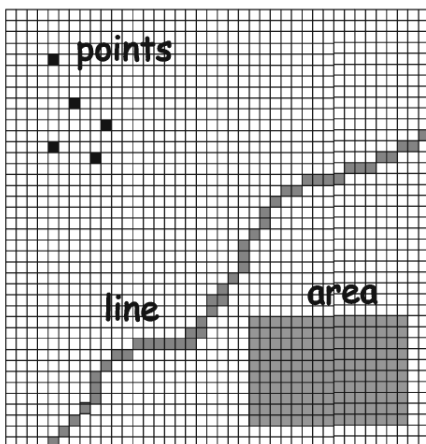
Raster



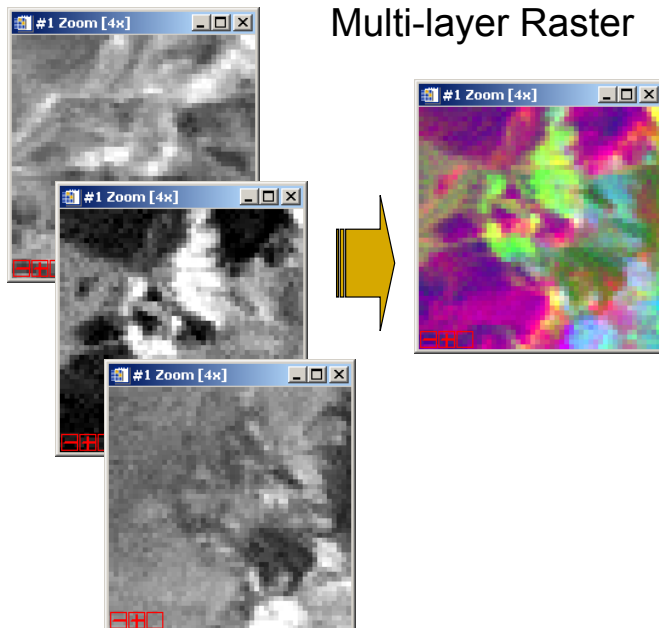
What Types of Data Are Available/Used? (cont.)




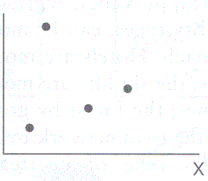
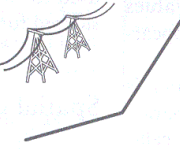
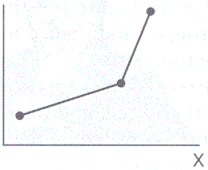

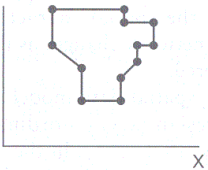
Single-layer Raster



Multi-layer Raster



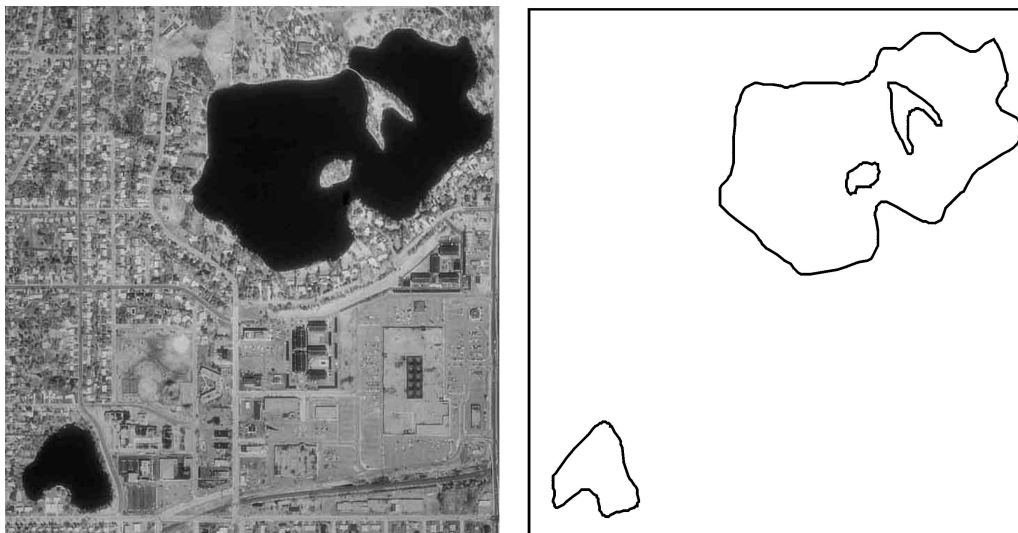
Vector Representation of Geographic Features / Objects

Happy Valley spatial entities	The vector view of the world
 Points: hotels	
 Lines: ski lifts	
 Areas: forest	

3 geometry types

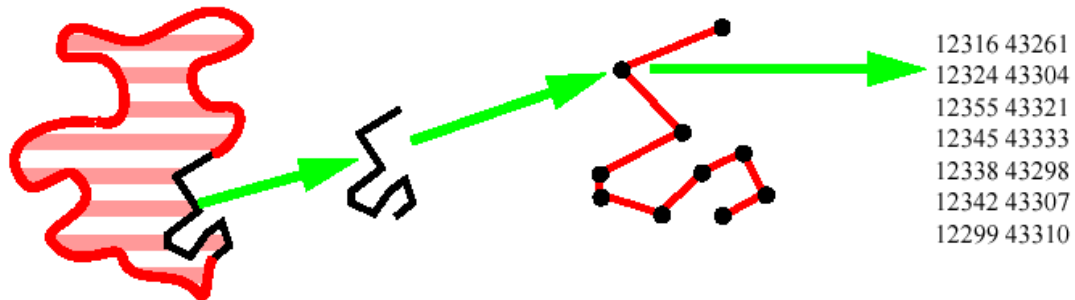
- Point vector
- Line (arc) vector
- Polygon vector

Vector Representation



A physical entity is represented by a spatial object in a GIS. Here, the physical boundaries of lakes are represented by lines.

Areas are lines are points are coordinates



An AREA consists of...

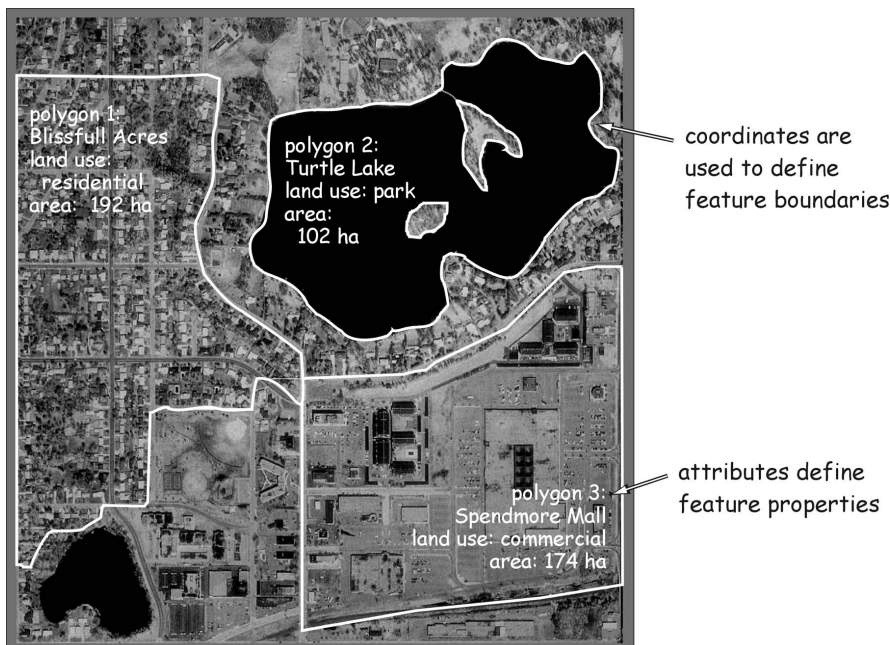
LINES, which consist of...

POINTS, which consist of...

COORDINATES

Figure 2.19 Geographic information has *dimension*. Areas are two-dimensional and consist of lines, which are one-dimensional and consist of points, which are zero-dimensional and consist of a coordinate pair.

Attributes

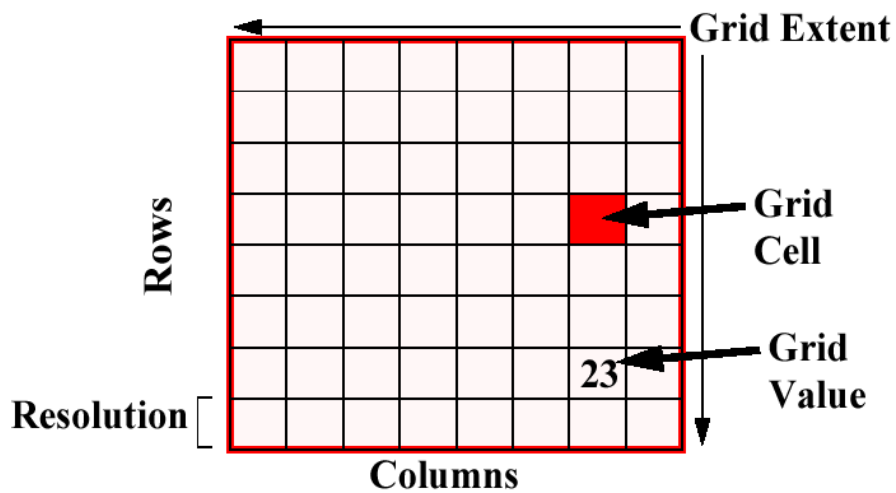


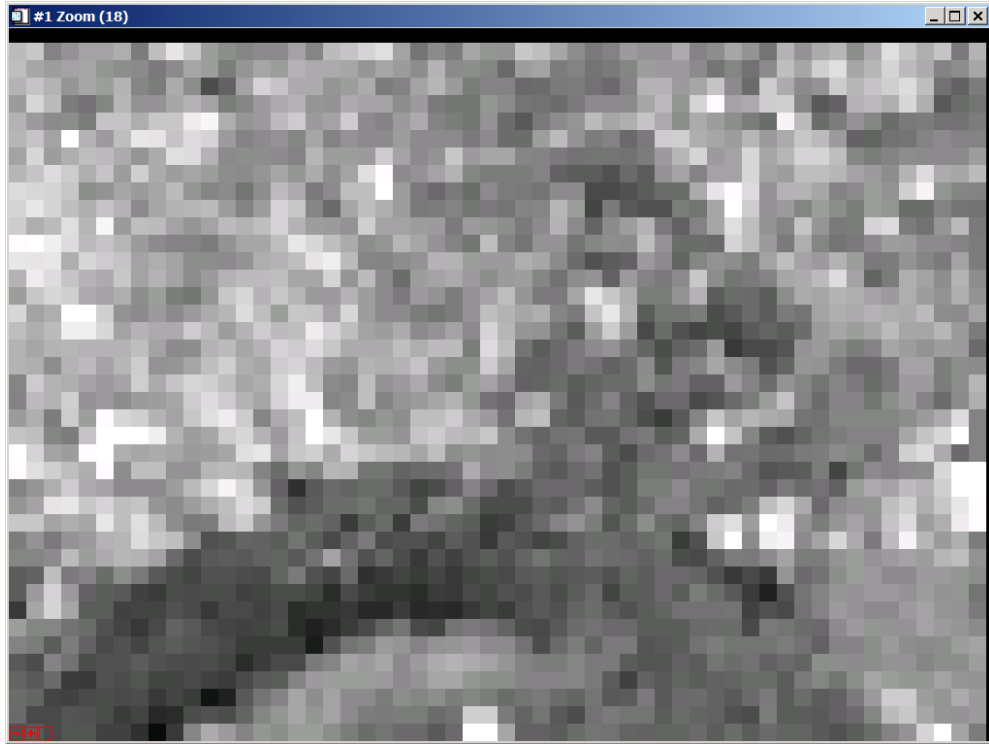
Vector Data Structure

The screenshot shows the 'Attributes of HI Polygon' table in ArcMap. The table contains the following data:

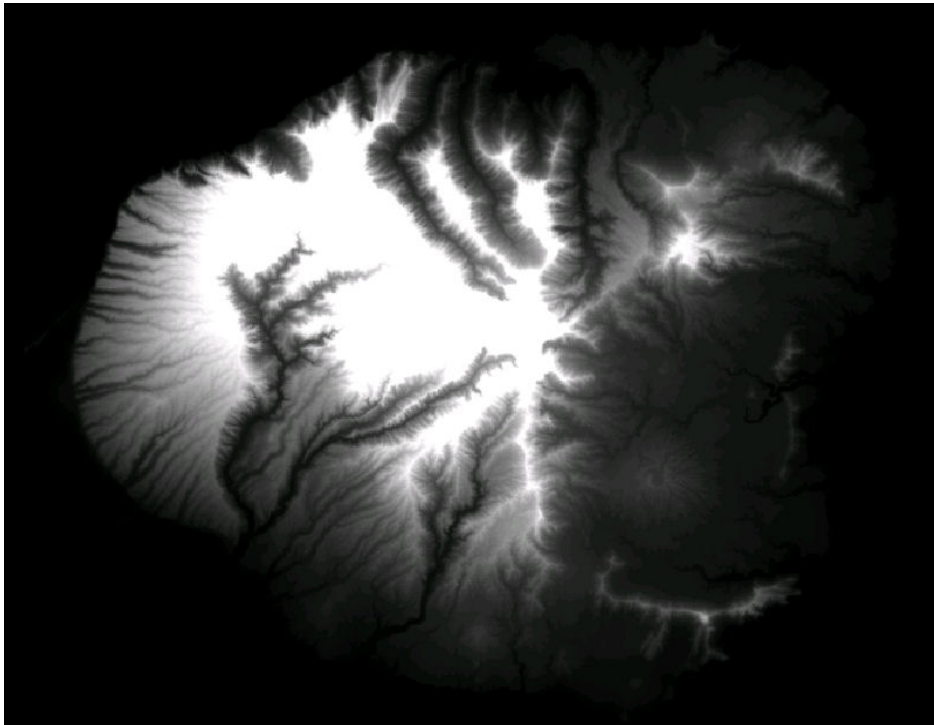
	COMP.DRAINAGE	COMP.HYDRIC	COMP.CORCON	COMP.CORSTEEL	COMP.CLNIRR	COMP.CLIRR	COMP.SCLNII
W	N		MODERATE	MODERATE	4		4E
W	N		MODERATE	MODERATE	4		4E
E	N		LOW	MODERATE	7		7S
W.MW	N		HIGH	HIGH	8		8E
W.MW	N		HIGH	HIGH	8		8E
SP.P	N		MODERATE	HIGH	2	2	2W
SP.P	N		MODERATE	HIGH	2	2	2W
W	N		MODERATE	MODERATE	4	4	4E
W	N		MODERATE	MODERATE	4		4E
	N				8		8S
VP	Y		HIGH	HIGH	7		7W
VP	Y		HIGH	HIGH	7		7W
VP	Y		HIGH	HIGH	7		7W
VP	Y		HIGH	HIGH	7		7W
W	N		LOW	HIGH	6	6	6E
SP.P	N		MODERATE	HIGH	2	2	2W
W	N		MODERATE	MODERATE	4		4E
VP	Y		HIGH	HIGH	7		7W
SP.P	N		MODERATE	HIGH	2	2	2W

Generic Structure for a Raster

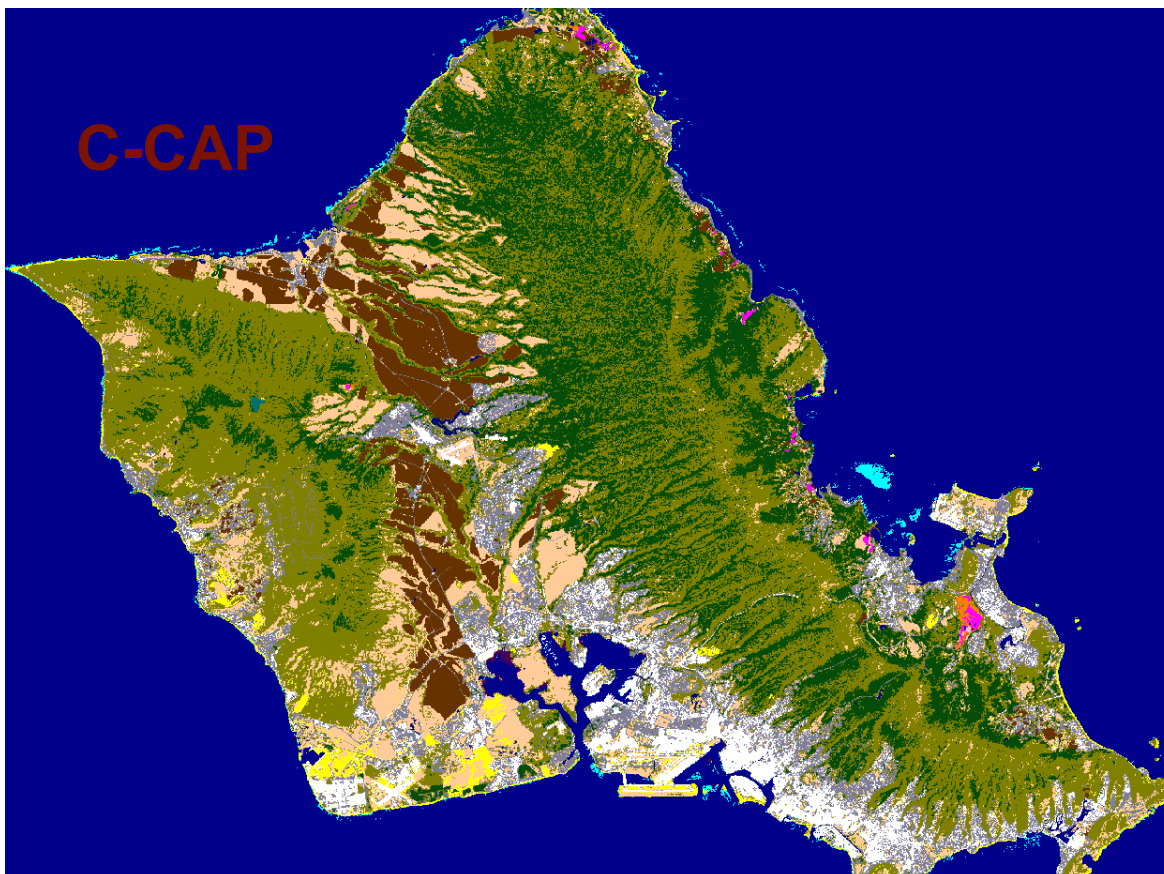
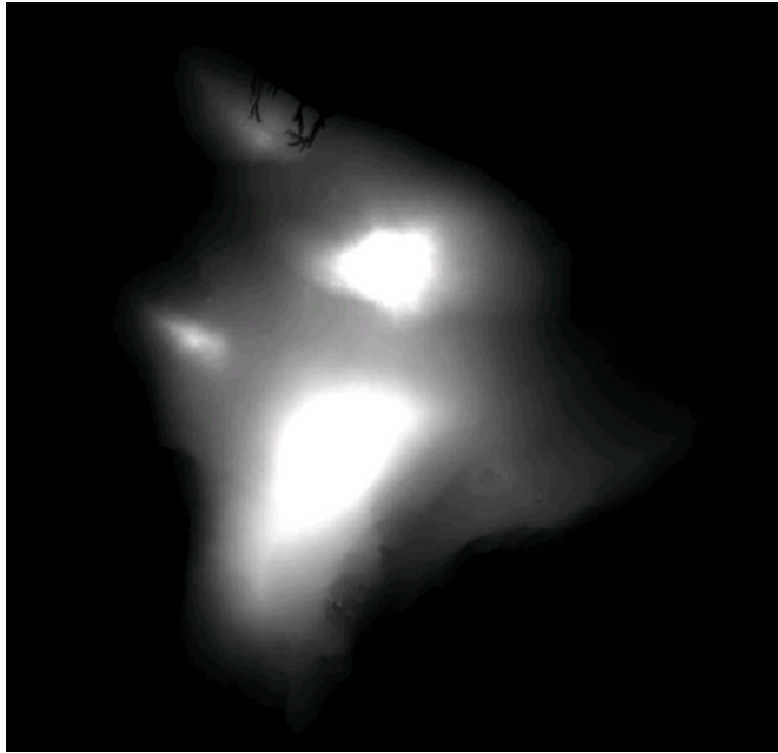


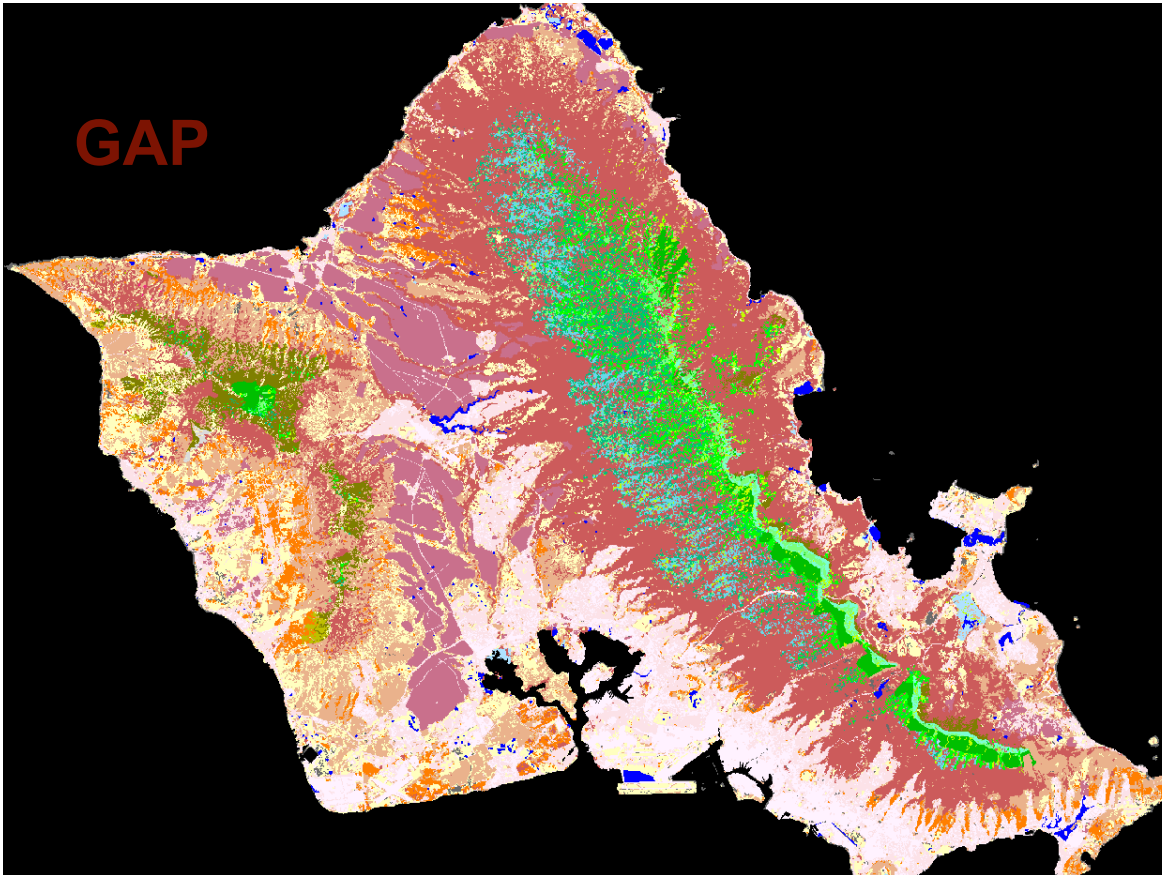


Digital Elevation Model (DEM)

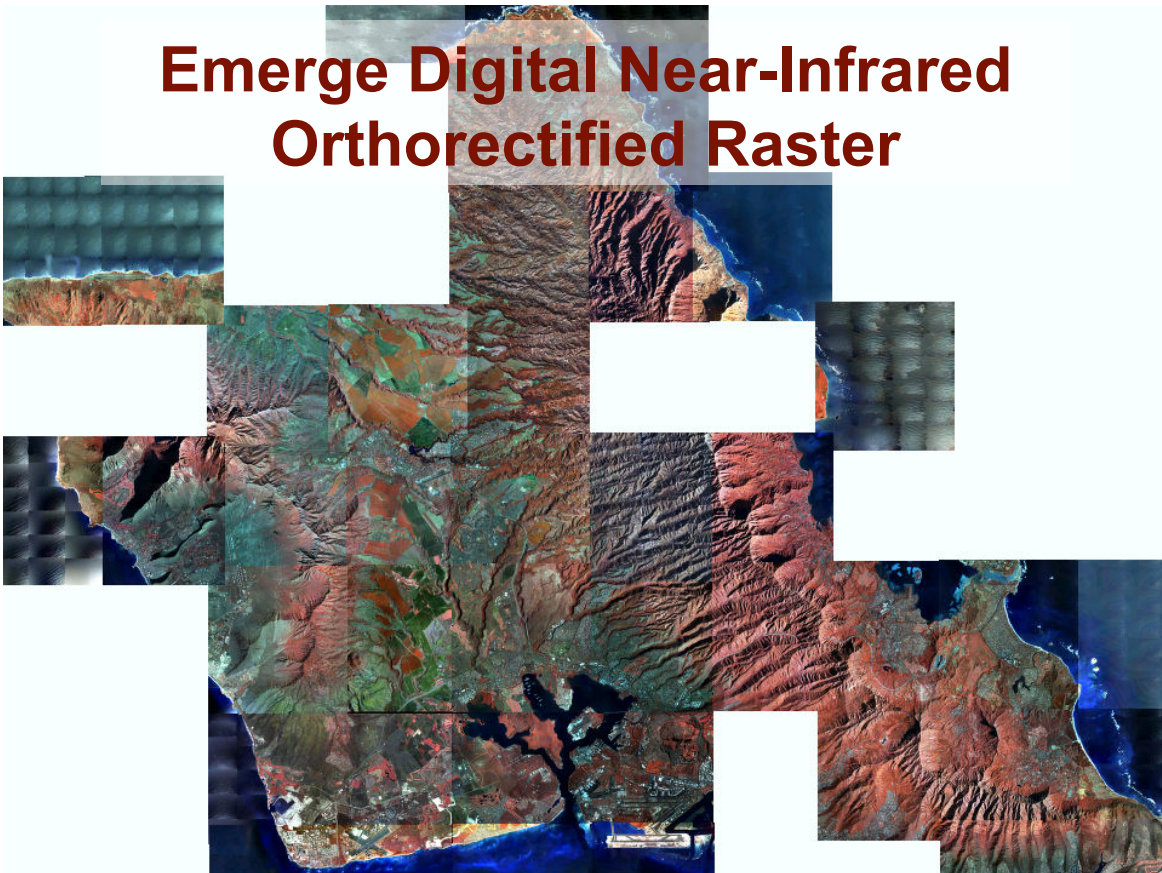


DEM of the Big Island of Hawaii

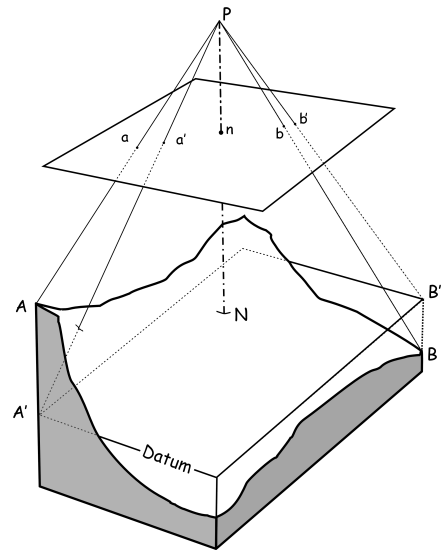
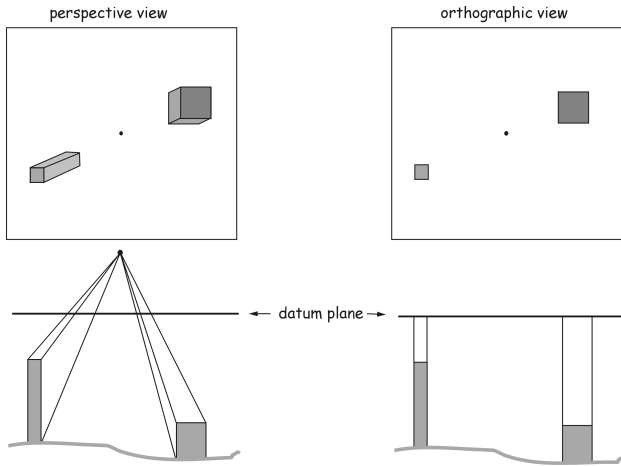




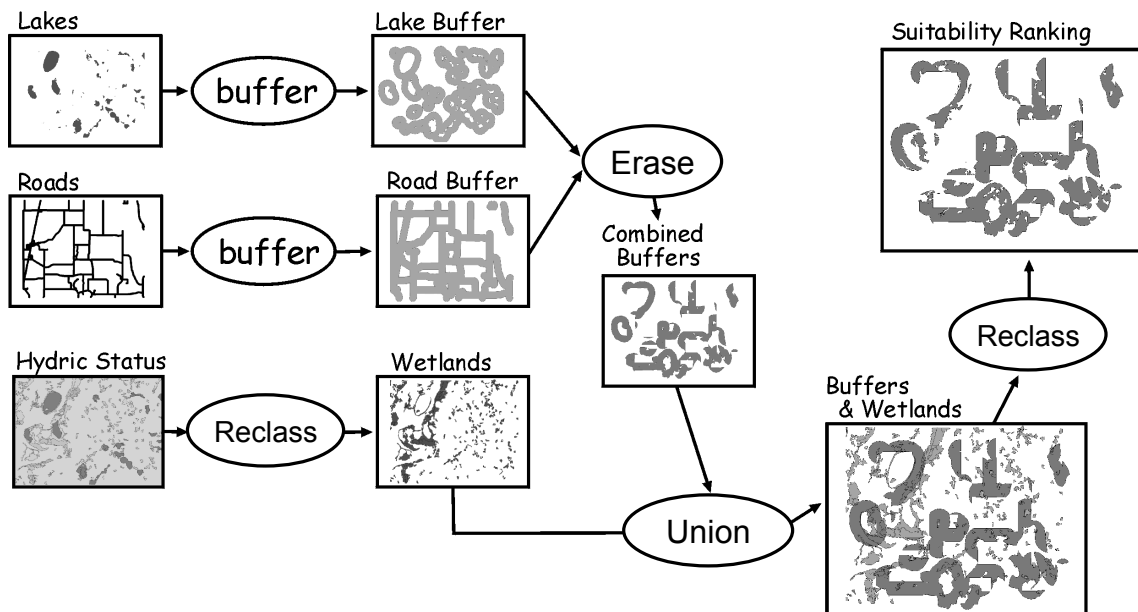
Emergent Digital Near-Infrared Orthorectified Raster



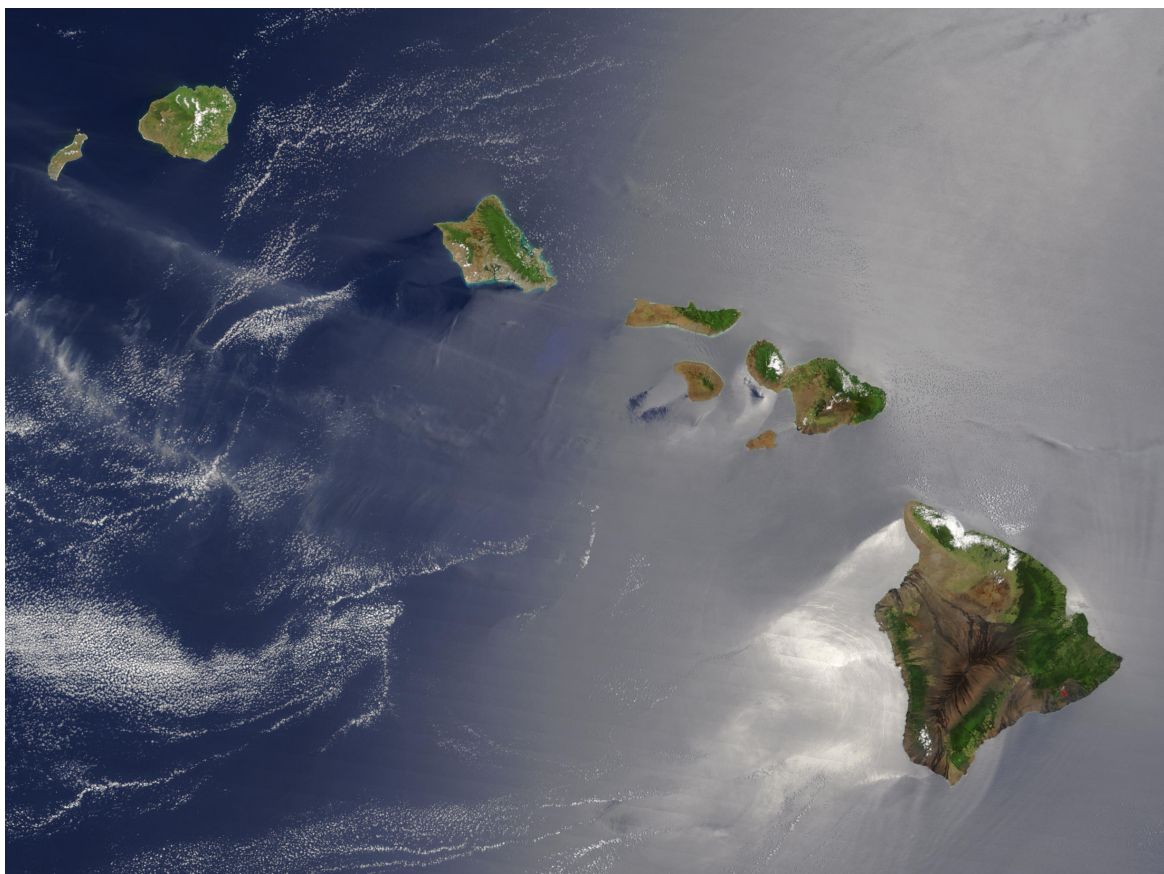
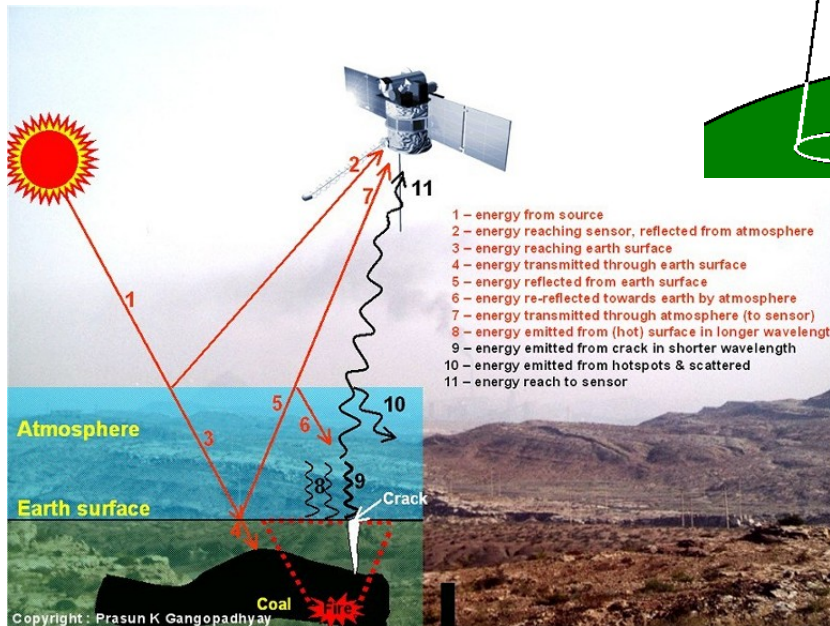
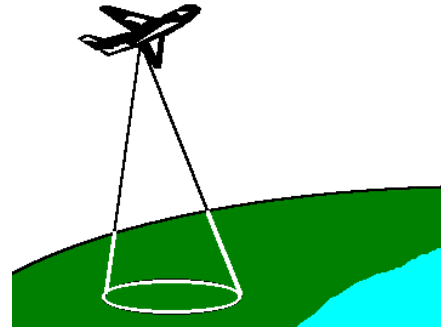
Ortho-rectification

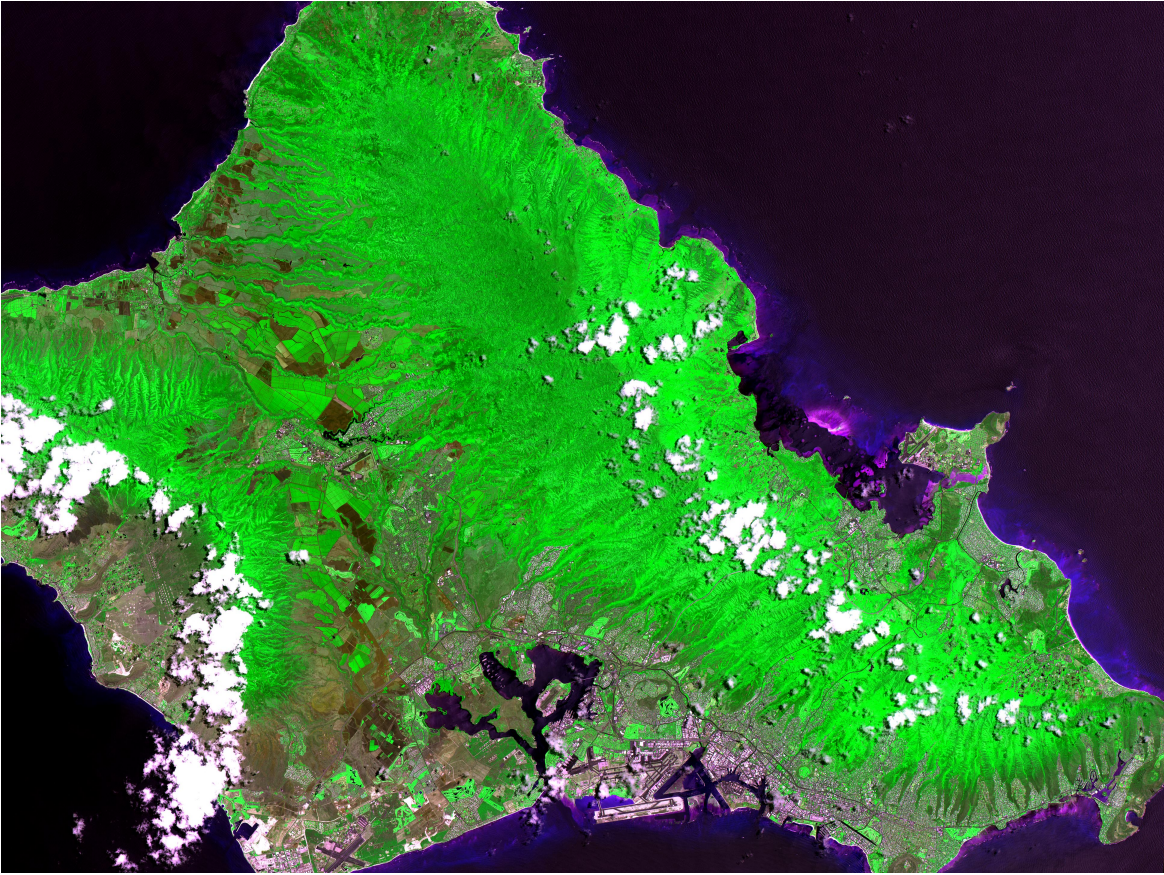


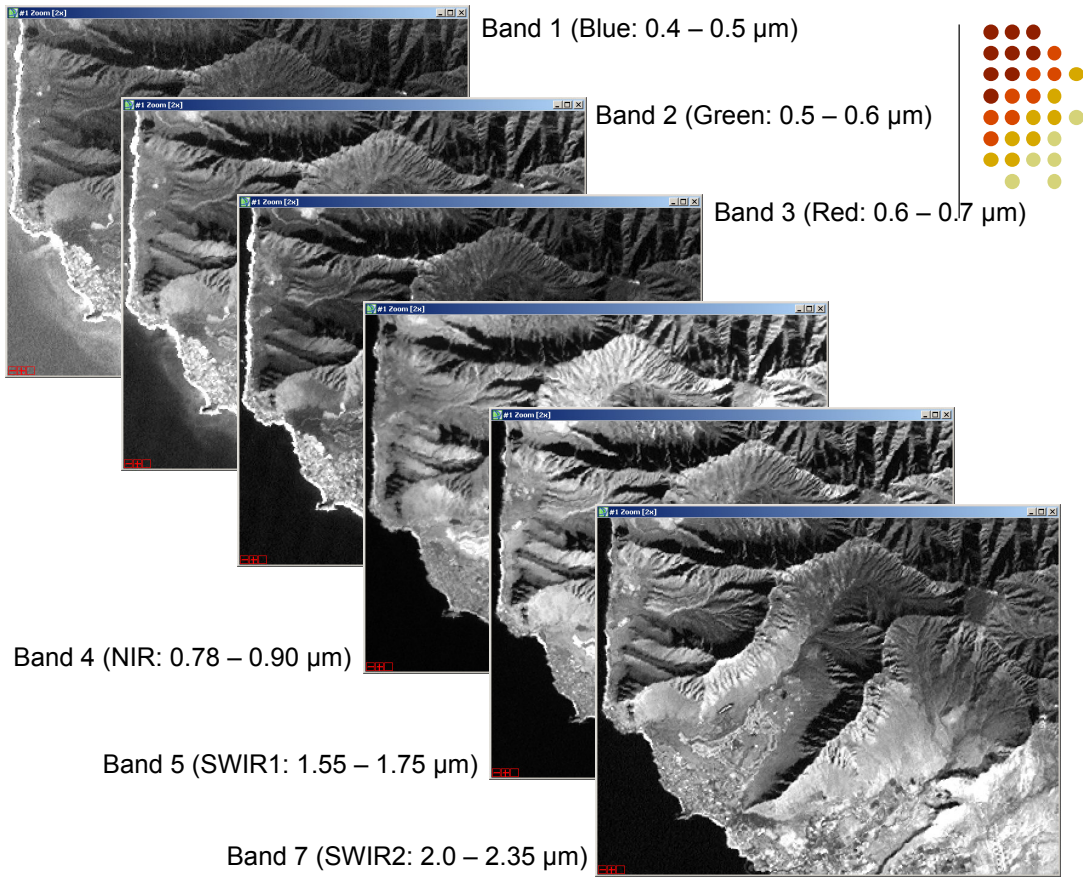
Geoprocessing (Flowchart)



Remote Sensing



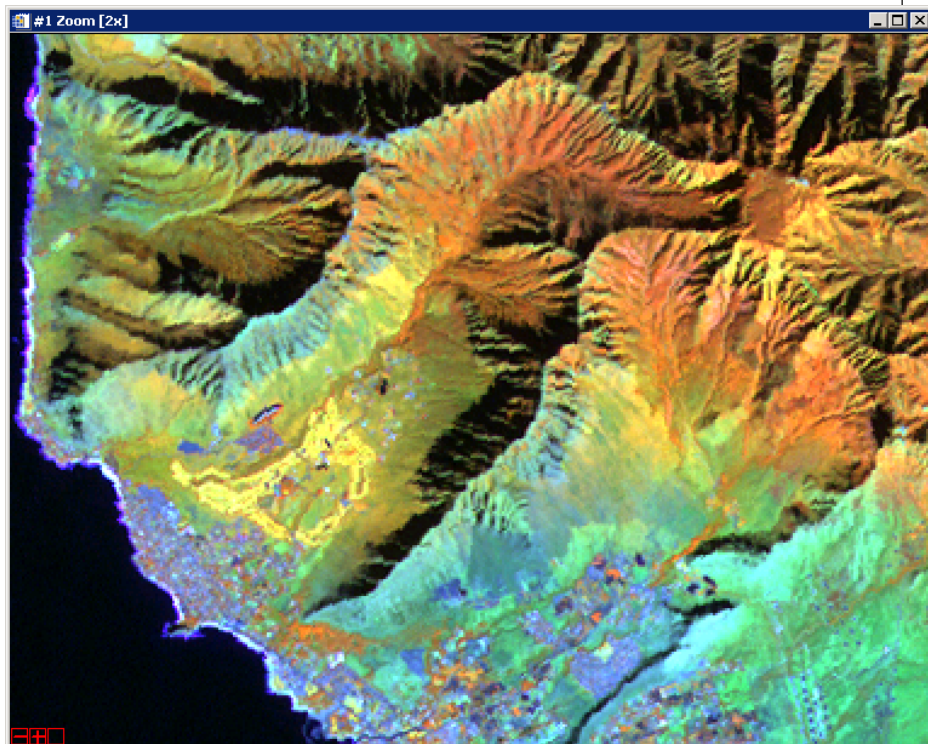




True Color Composite



False Color Composite (4,3,2)



False Color Composite (4,5,3)

<http://planning.hawaii.gov/gis/>



Hawaii Statewide GIS Program | Office of Planning

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HAWAII STATEWIDE GIS PROGRAM

Hawaii Statewide GIS Program

What is the GIS Program?

The Office of Planning GIS Program leads a multi-agency effort to establish, promote, and coordinate the use of geographic information systems (GIS) technology among Hawaii State Government agencies. The State Office of Planning is responsible for the planning and coordination of activities that are critical to the State's enterprise GIS. The primary goal of the Statewide GIS Program is to improve overall efficiency and effectiveness in government decision-making.

Purpose:
To plan, coordinate and maintain a comprehensive, shared statewide planning and geographic information system and associated geospatial database. [See HRS §225M-2\(b\)\(4\)\(B\).](#)

GIS LINKS

- GIS Data
- Maps, Tools, and Applications
- Other Resources
- GIS REST Services
- HBGN
- Who's Your Legislator?