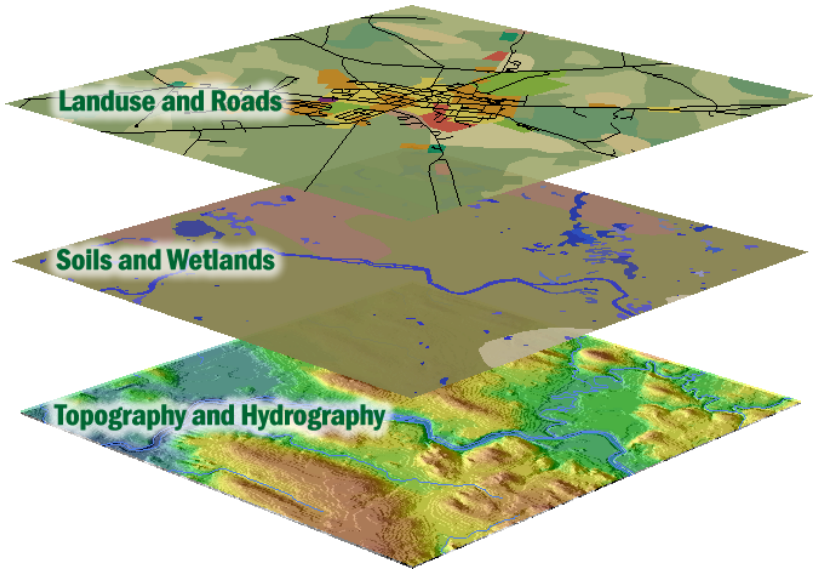
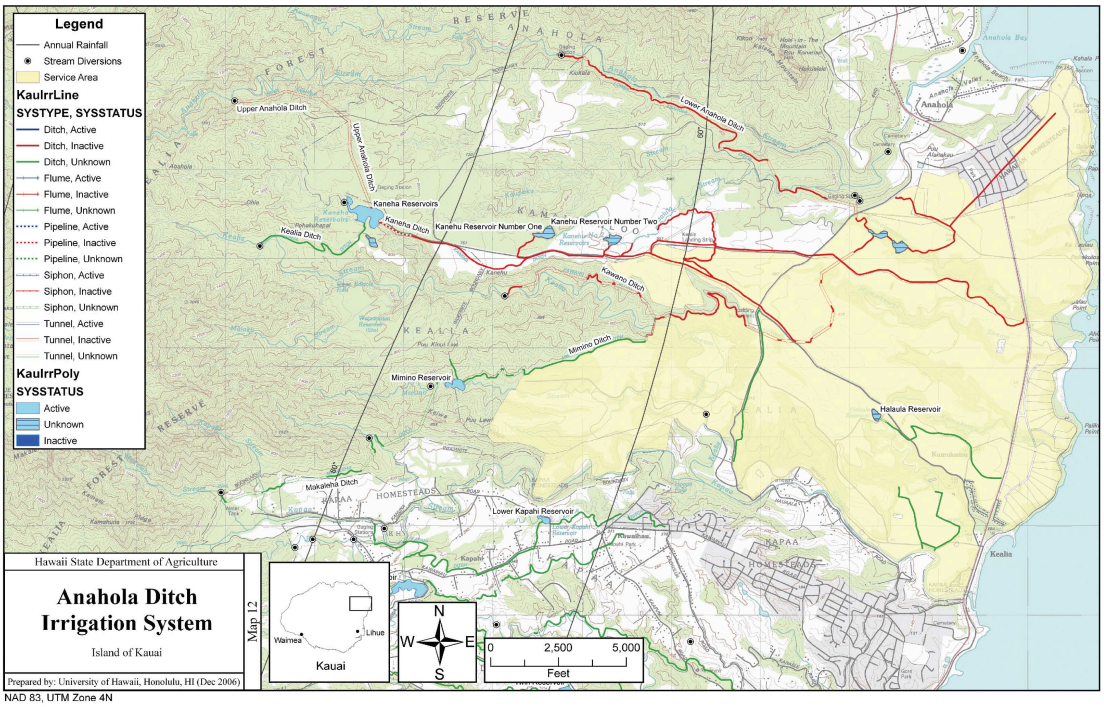
GIS, Remote Sensing & GNSS

NREM 301, Spring 2014
Tomoaki Miura, Guest Lecturer

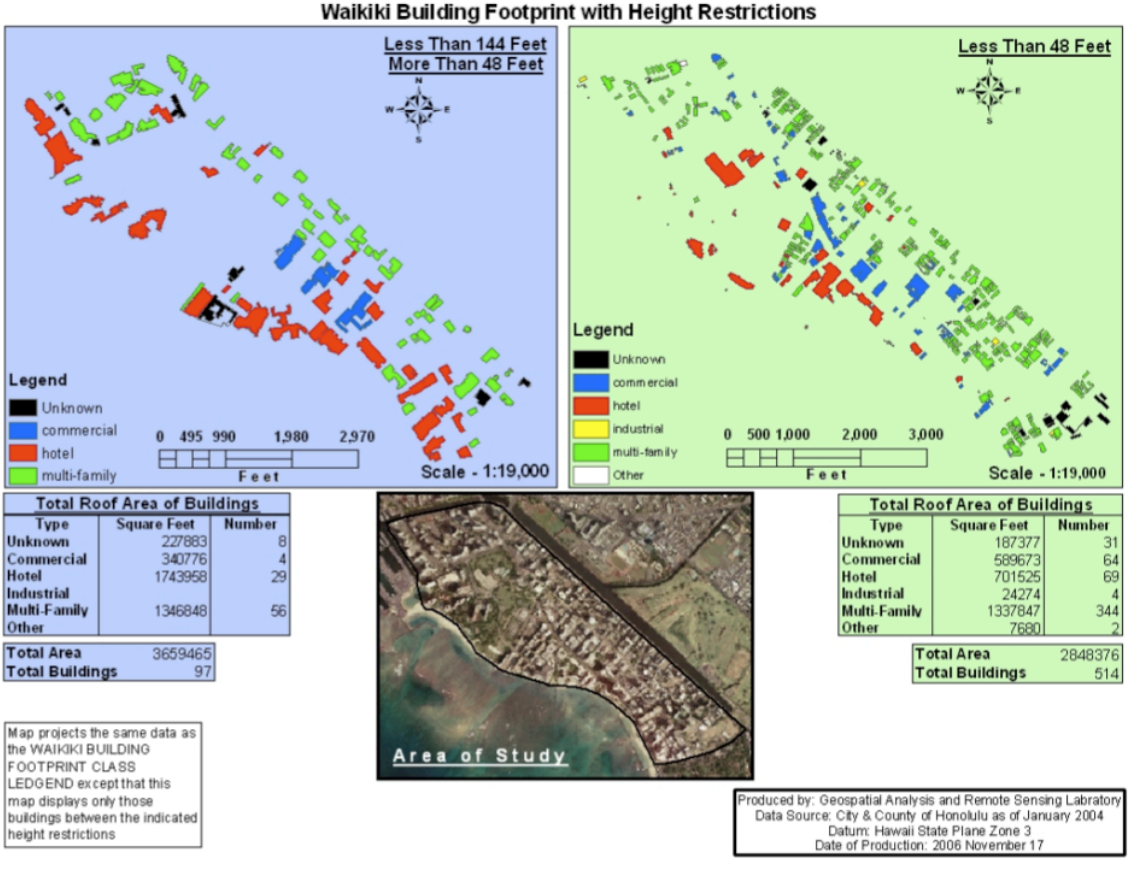
GIS Overlay for Analysis and Map Creation



Comprehending Existing Information into a Geodatabase



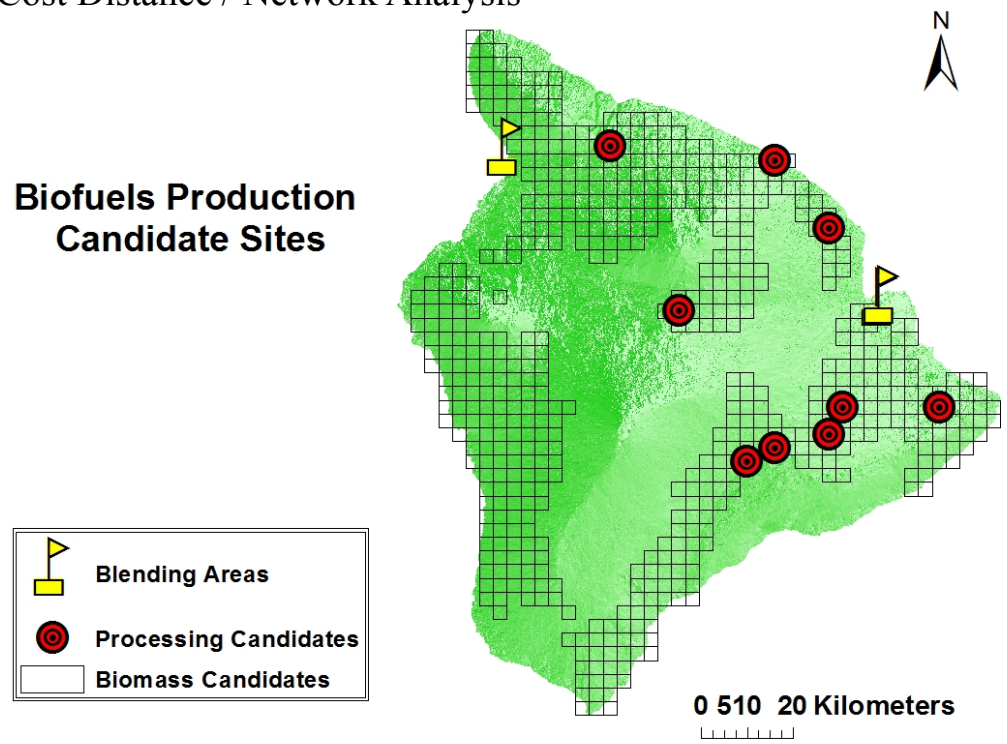
NAD 83, UTM Zone 4N



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	

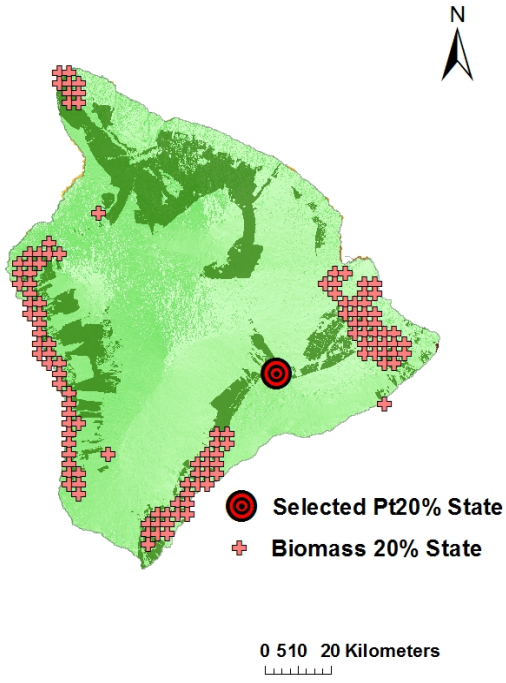
Cost Distance / Network Analysis



(Mochizuki et al., 2014)

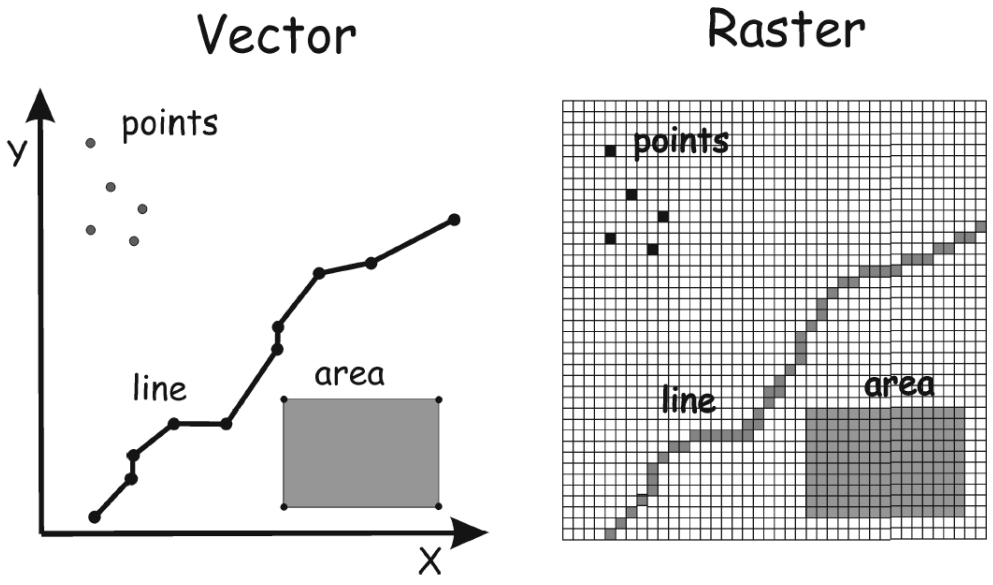
Results: 20% of State Demand

	20% of State Demand
Ethanol Production	83.23MGY
Cultivated Land Area	279.3 km²
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

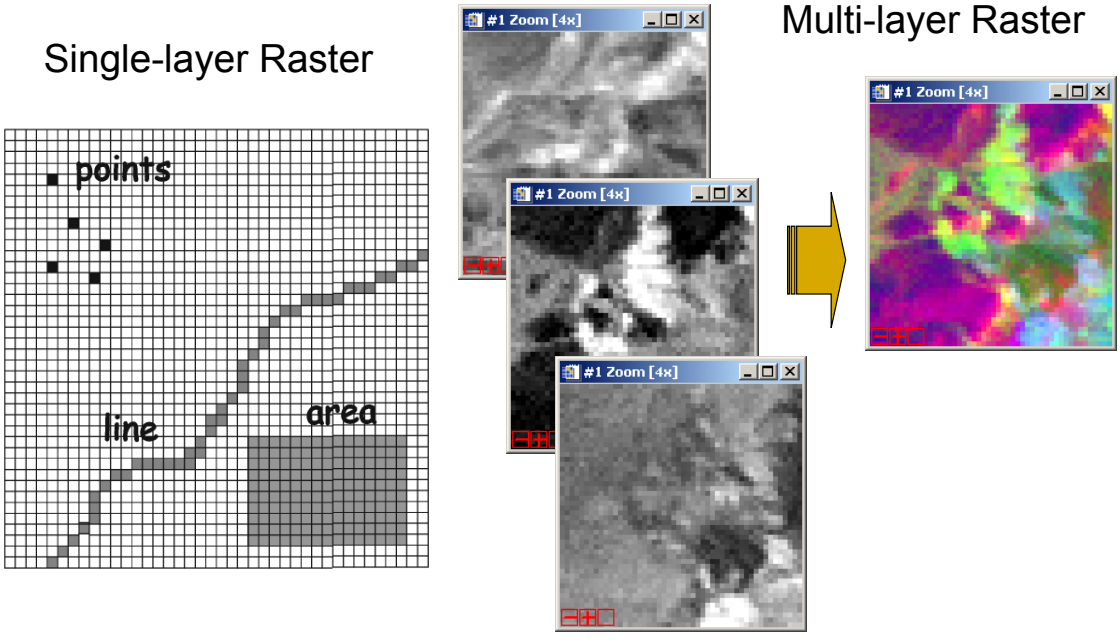


(Mochizuki et al., 2014)

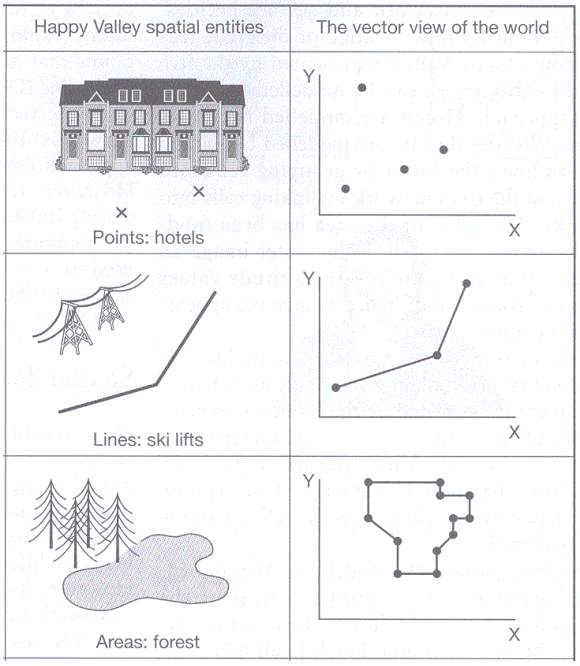
What Types of Data Are Available/Used?



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



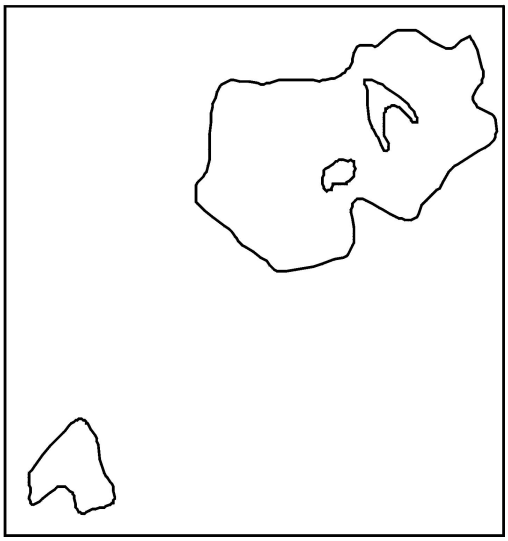
Vector Representation of Geographic Features / Objects



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

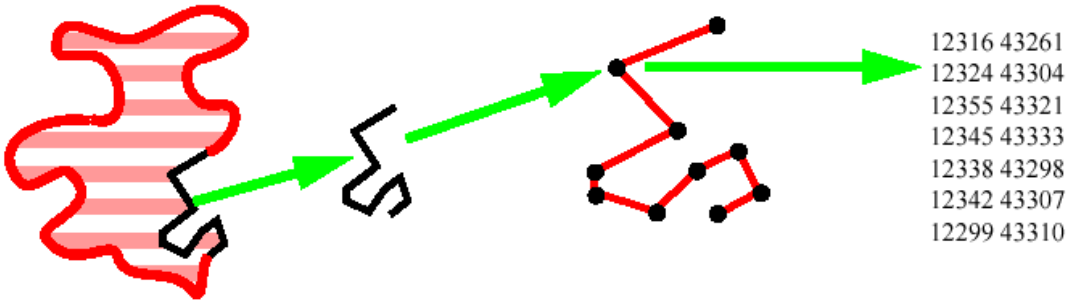
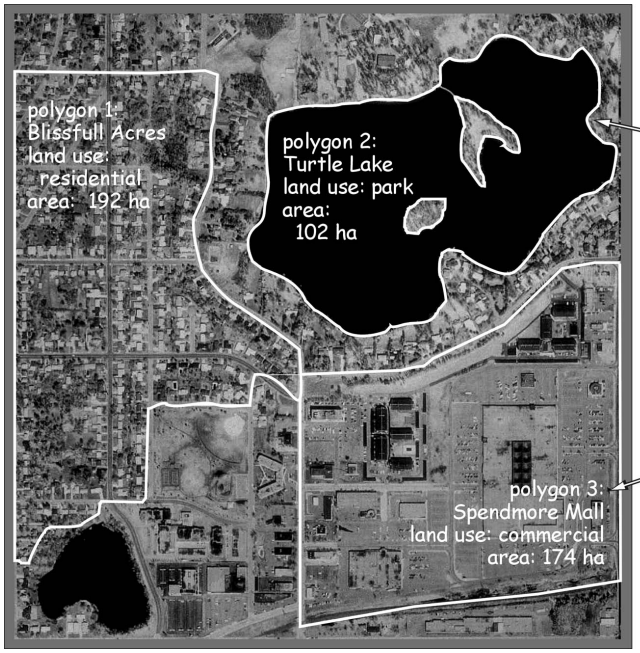


Figure 2.19 Geographic information has *dimension.* Areas are two-dimensional and consist of lines, which are one-dimensional and consist of points, which are zero-dimensional and consist of a coordinate pair.

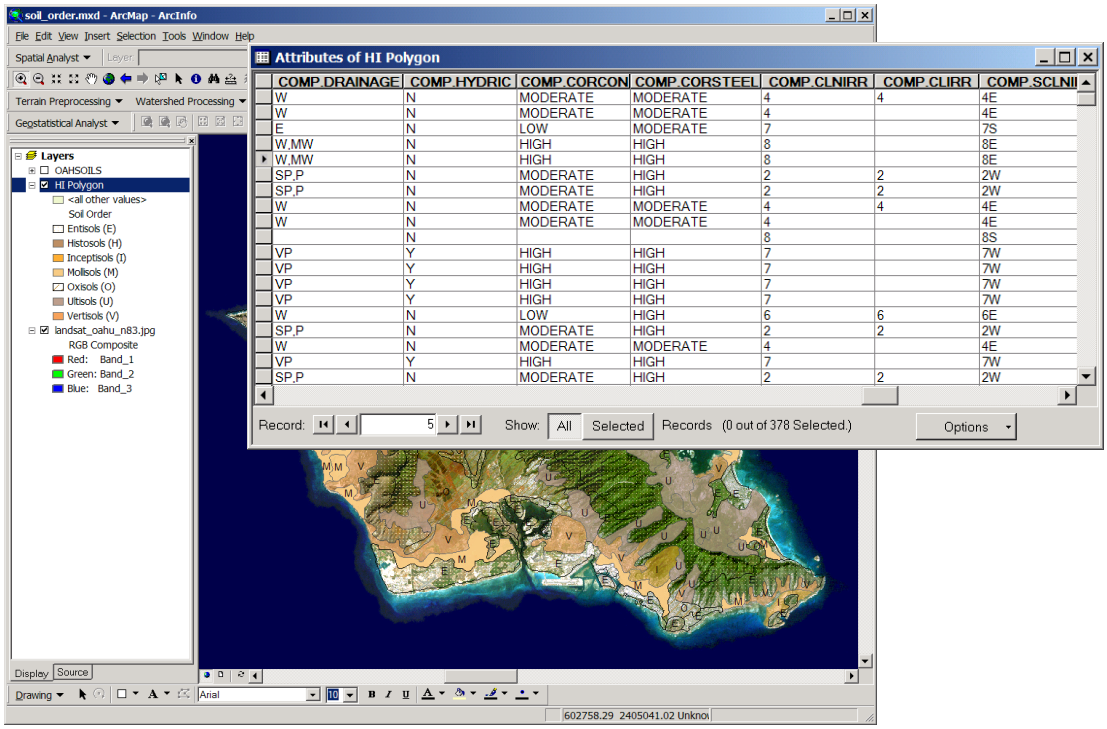
Attributes



coordinates are used to define feature boundaries

attributes define feature properties

Vector Data Structure

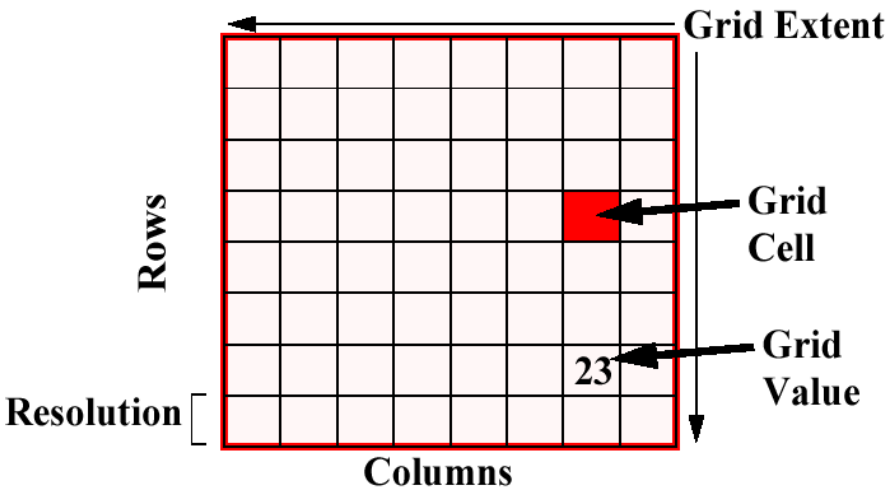


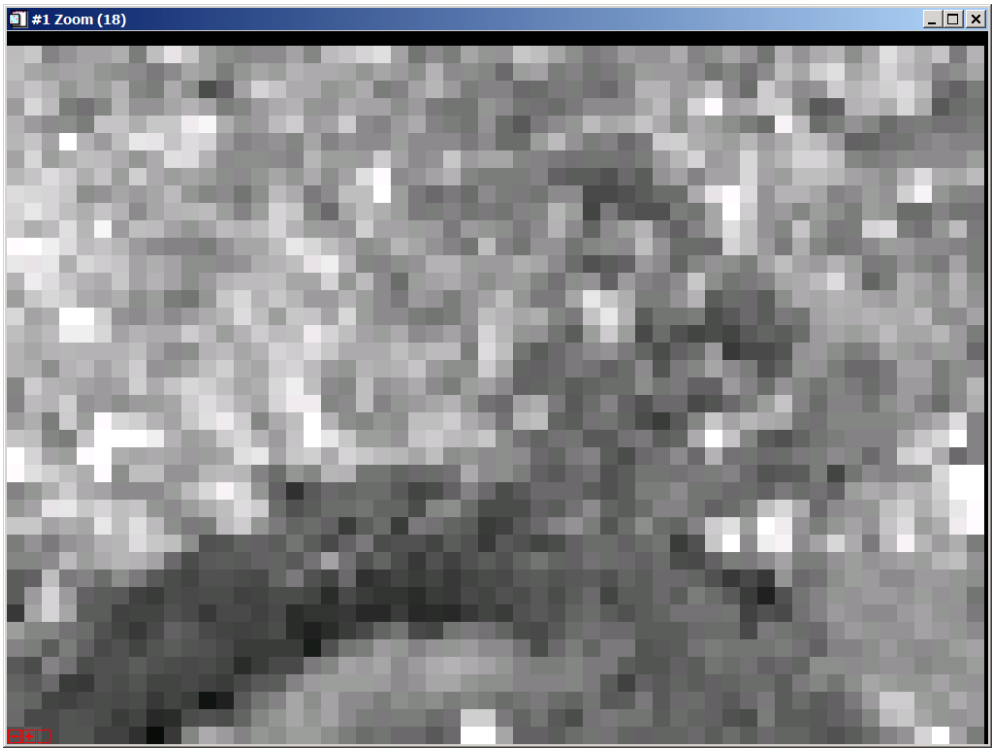
Attributes of HI Polygon

COMP.DRAINAGE	COMP.HYDRIC	COMP.CORCON	COMP.CORSTEEL	COMP.CLNIRR	COMP.CLIRR	COMP.SCLNII
W	N	MODERATE	MODERATE	4	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

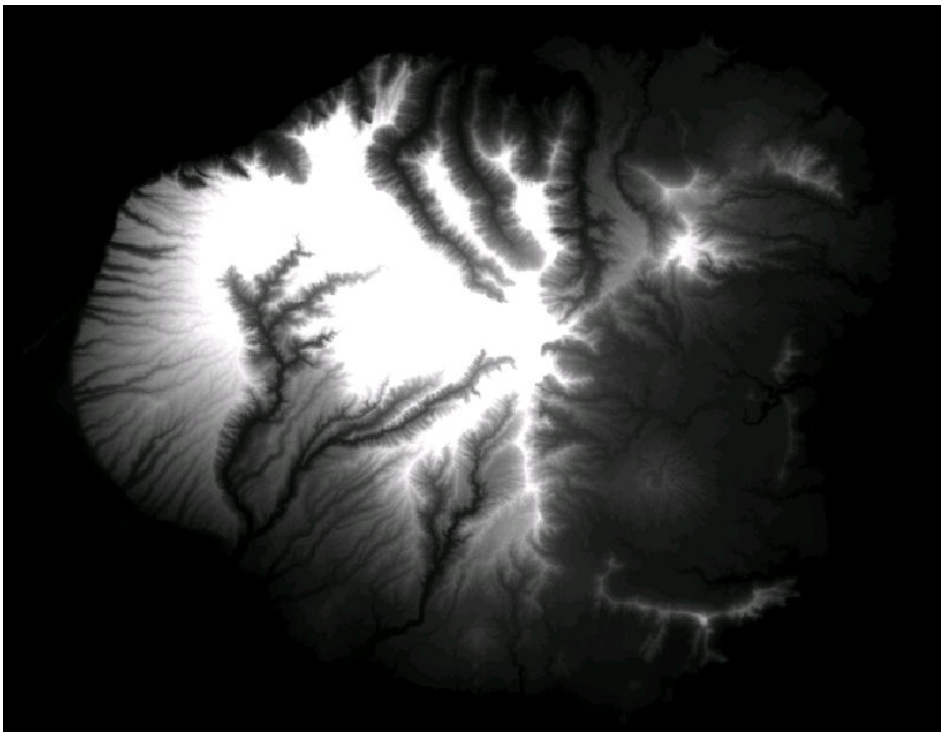
Record: 5 Show: All Selected Records (0 out of 378 Selected.) Options

Generic Structure for a Raster

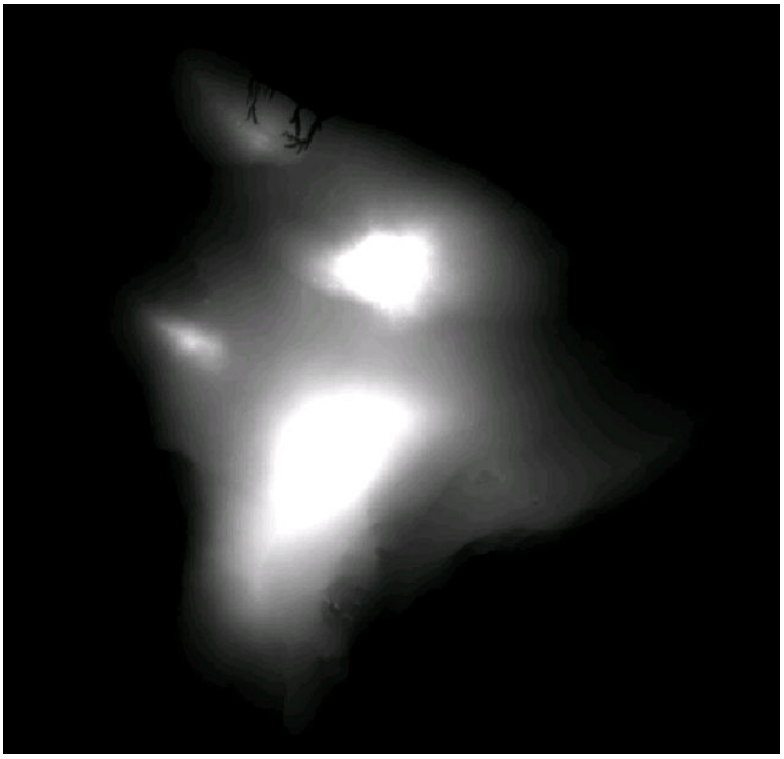


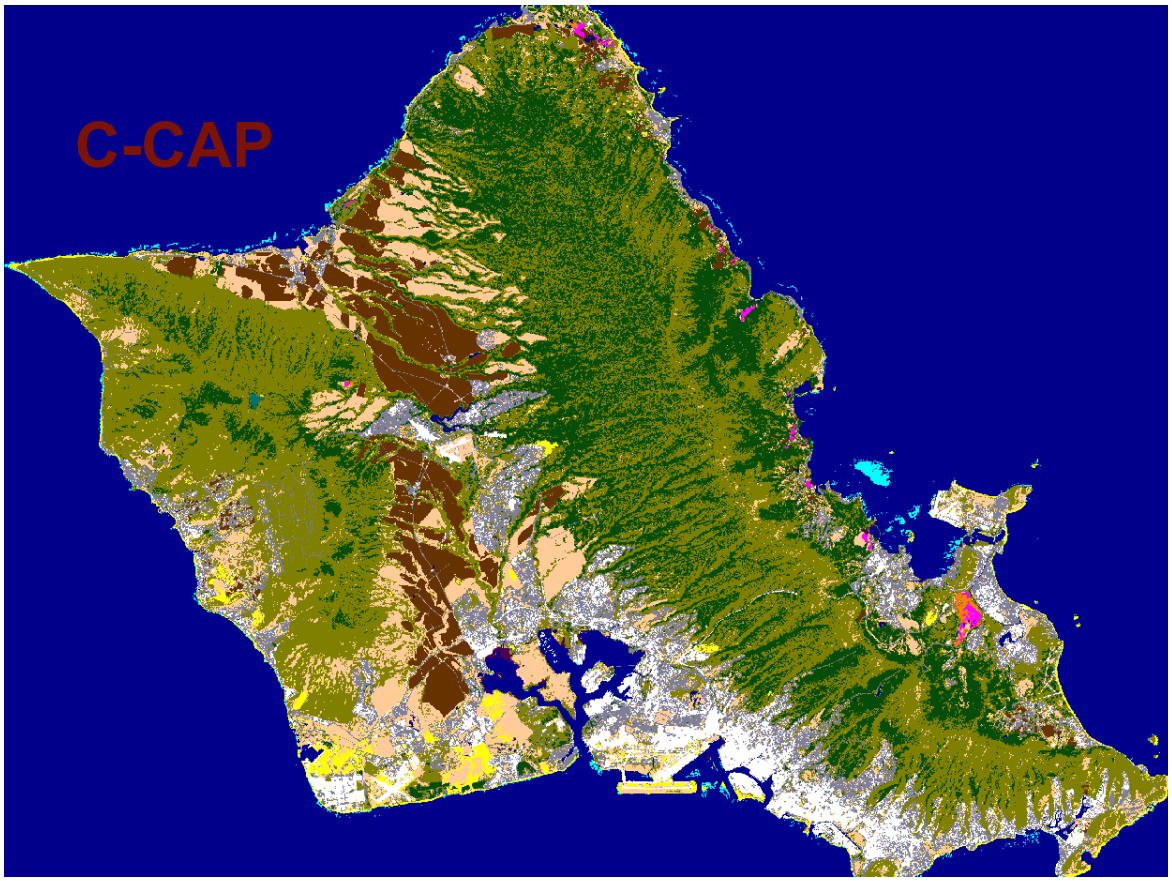


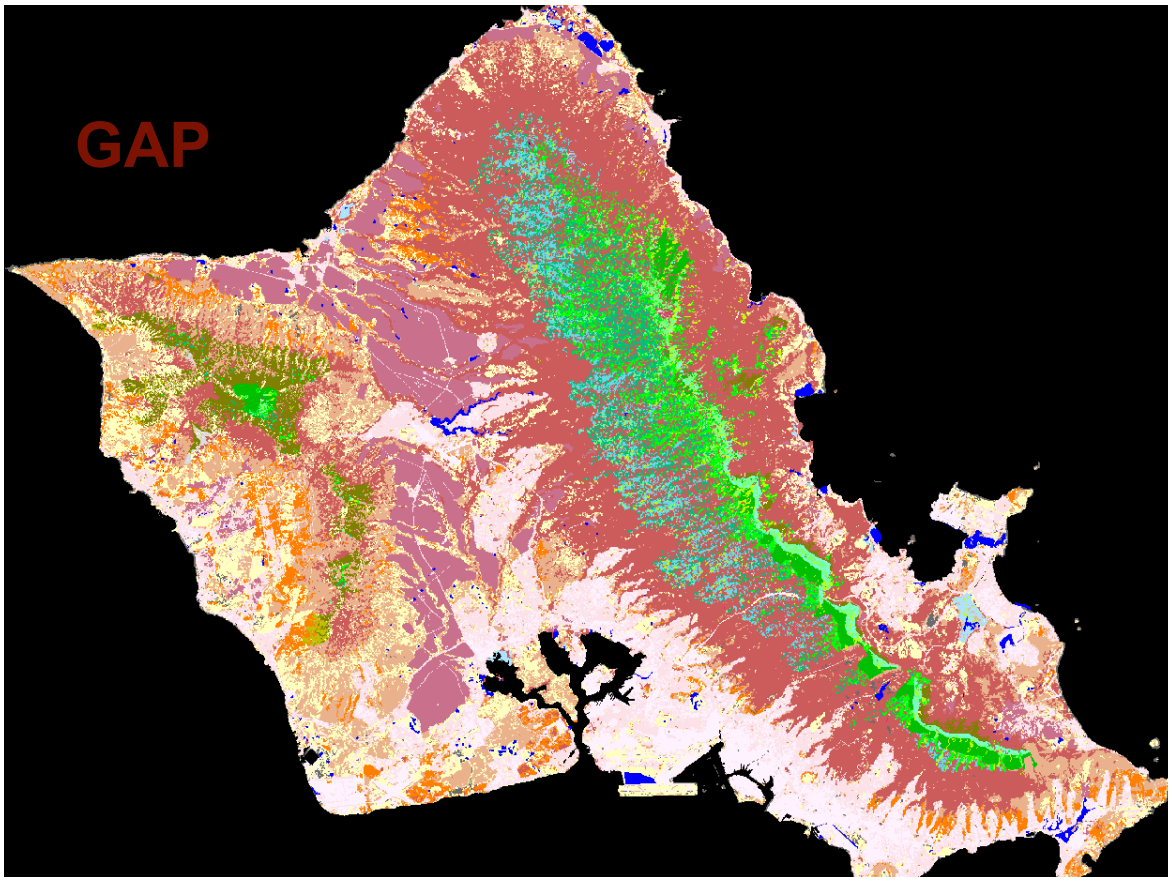
Digital Elevation Model (DEM)

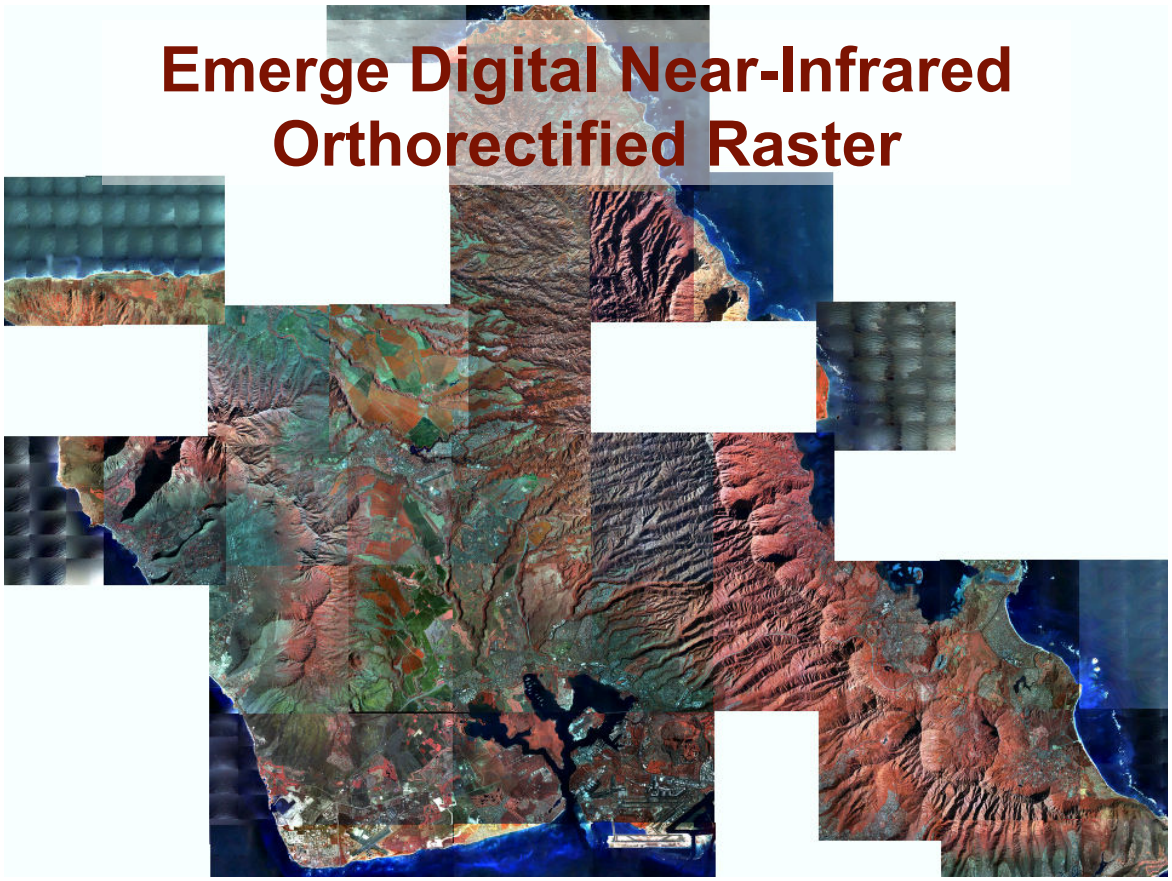


DEM of the Big Island of Hawaii

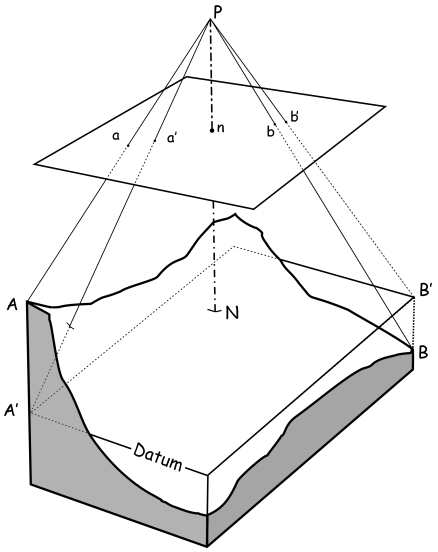


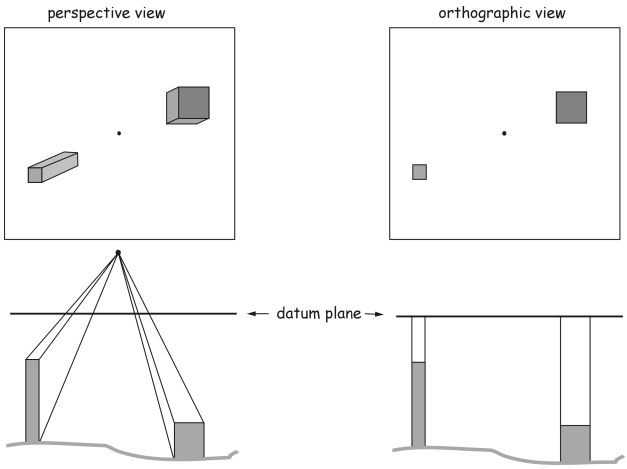



GAP

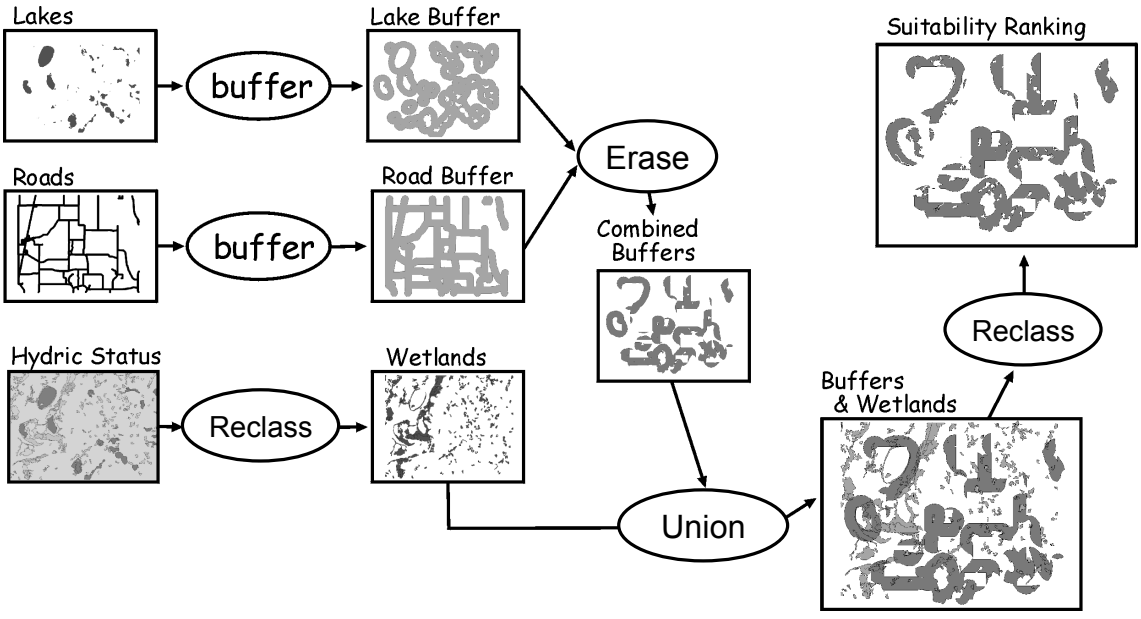

Emerge Digital Near-Infrared
Orthorectified Raster

Ortho-rectification

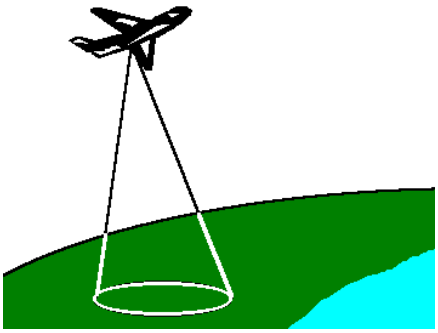


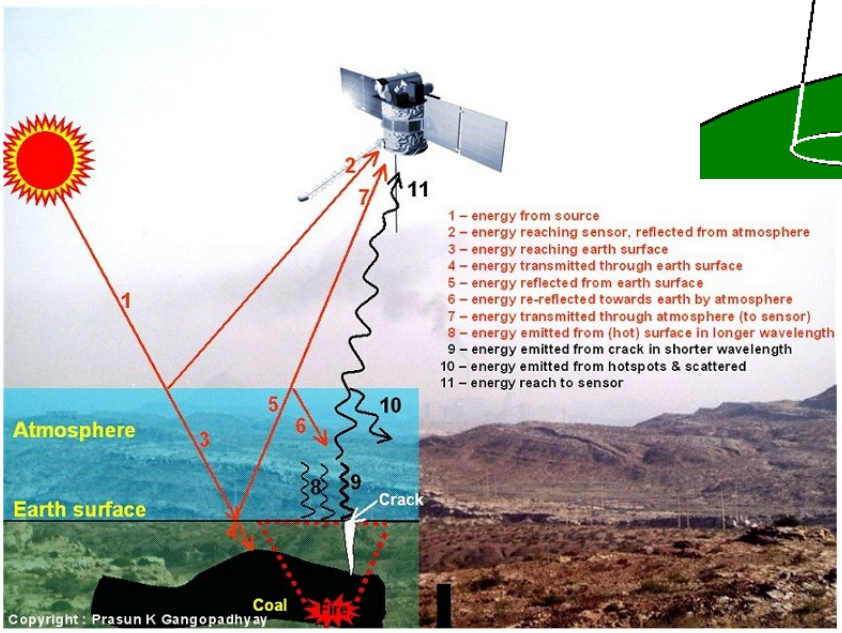


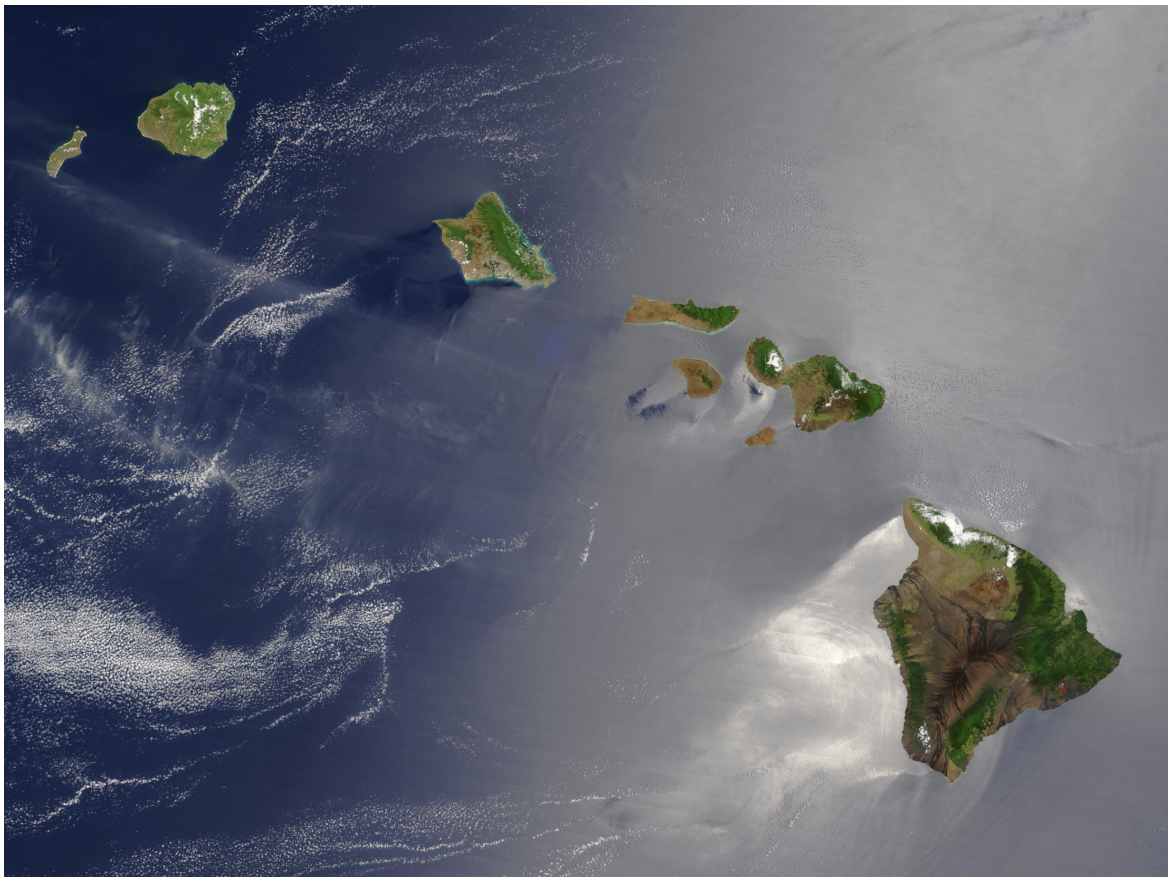
Geoprocessing (Flowchart)

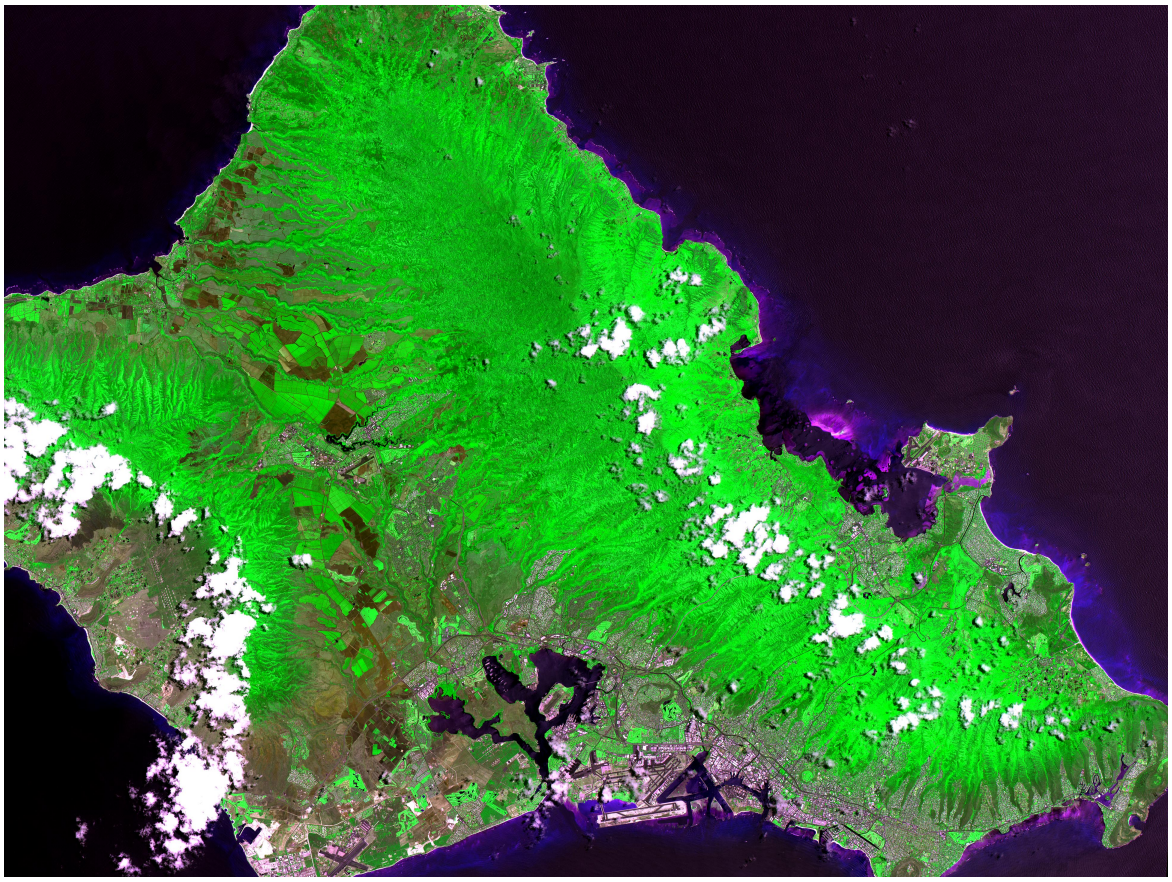


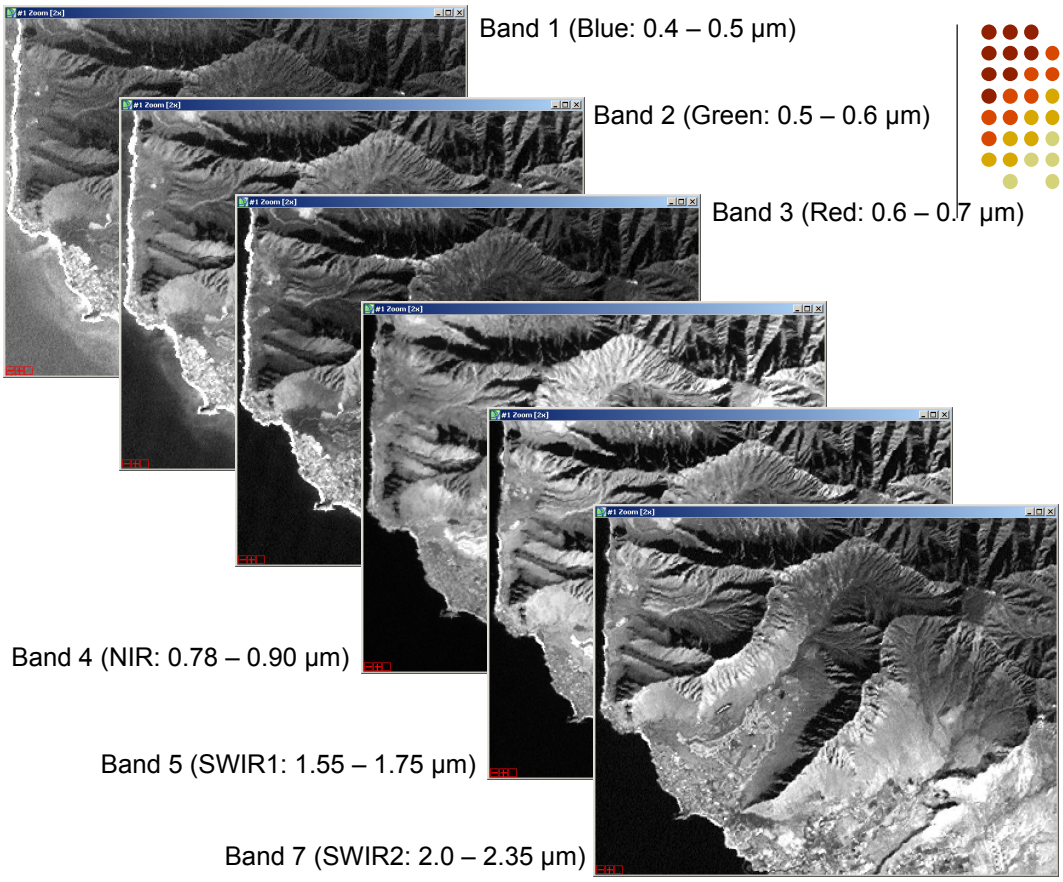
Remote Sensing



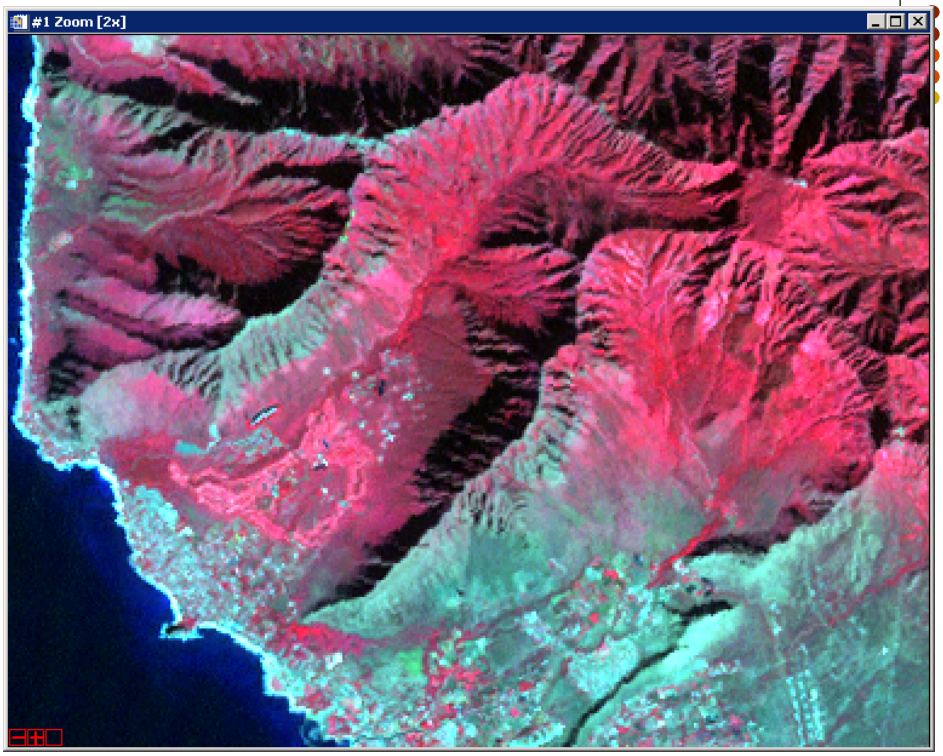




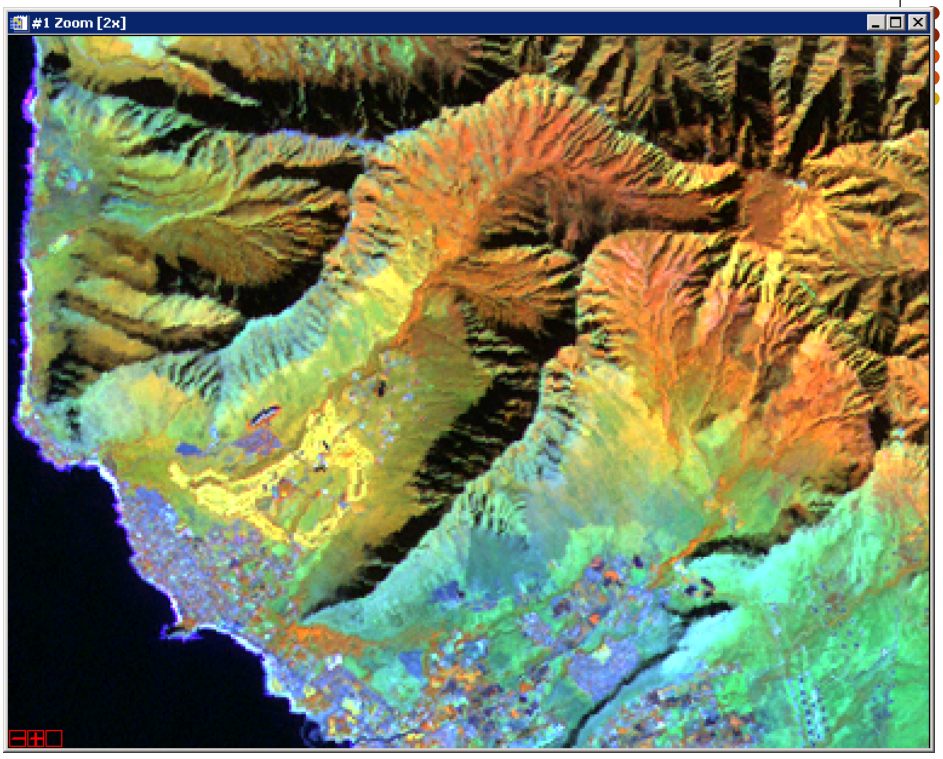




True Color Composite



False Color Composite (4,3,2)



False Color Composite (4,5,3)

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