

National Park Service Base Cartographic Inventory



IKONOS High Resolution Imagery

Alaska Inventory and Monitoring Program
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Need

Mapping Base

Accurately identify location and extent (length, area)

OHV Mapping, trail assessment, habitat assessment and infrastructure planning.



Resource Status

Park-wide Imagery

1950s – USGS BW Photography

1980s – AHAP CIR Photography

2005 – IKONOS Imagery



Muir Inlet 1941 to 2004 (USGS Photos)

GIS/GPS Compatible



Approach

Minimum Specification

Consistent Park-wide Coverage

Color infrared and true color

1 meter pixel

1:24,000 NMAPS

Constraints

Large Area (222,000 sq km - 54,000,000 acres)

Tall Mountains, Rugged, Remote

Poor Weather

Minimum ground control (\$\$\$)

Imagery Sources

Space Imaging IKONOS®

680 km orbit

1 meter panchromatic
4 meter multispectral

DigitalGlobe® QuickBird

450 km orbit

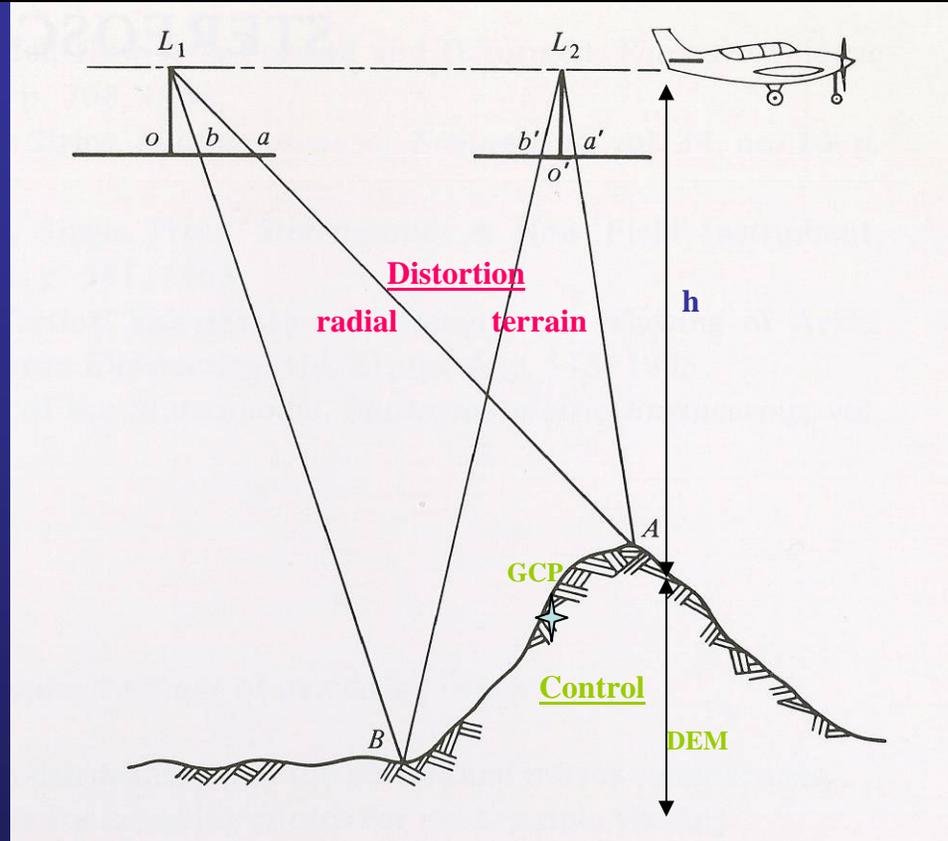
.61 meter panchromatic
2.44 meter multispectral



Aircraft
~12 km

Many resolution/bandwidth options

Imagery to Ortho



$$DOQ = \text{Image} + \cancel{GCP} + \text{DEM} + \cancel{\text{\$}\$}\$$$

GCP=ground control point

DEM=digital elevation model

Image Inherent Accuracy

- Specification

- 12 meters CE90

- IKONOS Test Results

- 7.2 meters CE90 exclusive of terrain displacement

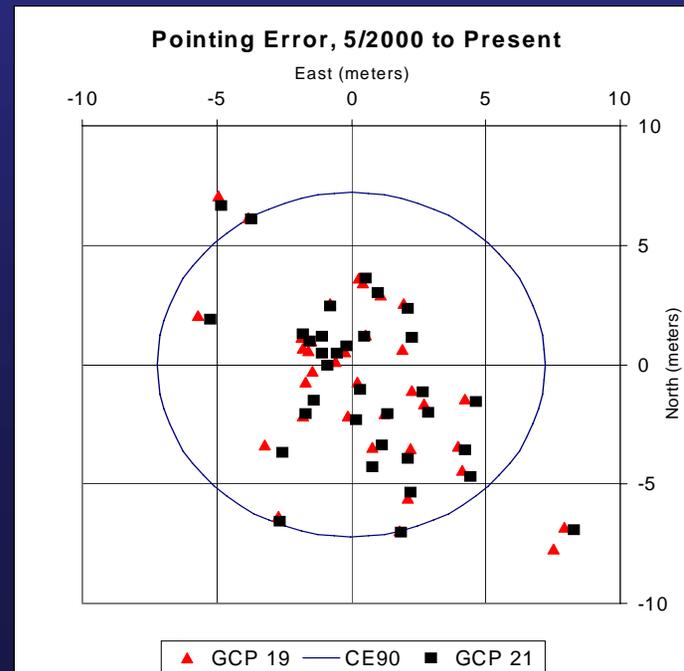
IKONOS accuracy is regularly tested by imaging targets and measuring locational error.

Record to date:

7.2 meters CE90 average

11 meters worst case

CE90 = Horizontal Circular Error at 90% Probability



Ortho Error Budget

No Ground Control Points

Description	CE90
Image inherent error	7.2 m
DEM/View Angle error 22 m LE90 DEM 71° Sensor Angle	7.6 m
Predicted Accuracy (RSS)	10.5 m

- Predicted accuracy at 10.5 m CE90 is better than the 12 m CE90 required for 1:24,000 mapping.
- Typically accuracy will be better than prediction due to (1) analysis using worst-case DEM accuracy and (2) sensor elevation angle $> 71^\circ$ for most of the collected images.
- LE90 = Vertical Linear Error



2004 Ortho Contract – 36,519 sqkm

Priority Acquisition Areas

Existing Control vs IKONOS Ortho/DEM

2005-6 Acquisition Seasons

20% Cloud Cover

2005 Imagery Contract – 171,000 sqkm

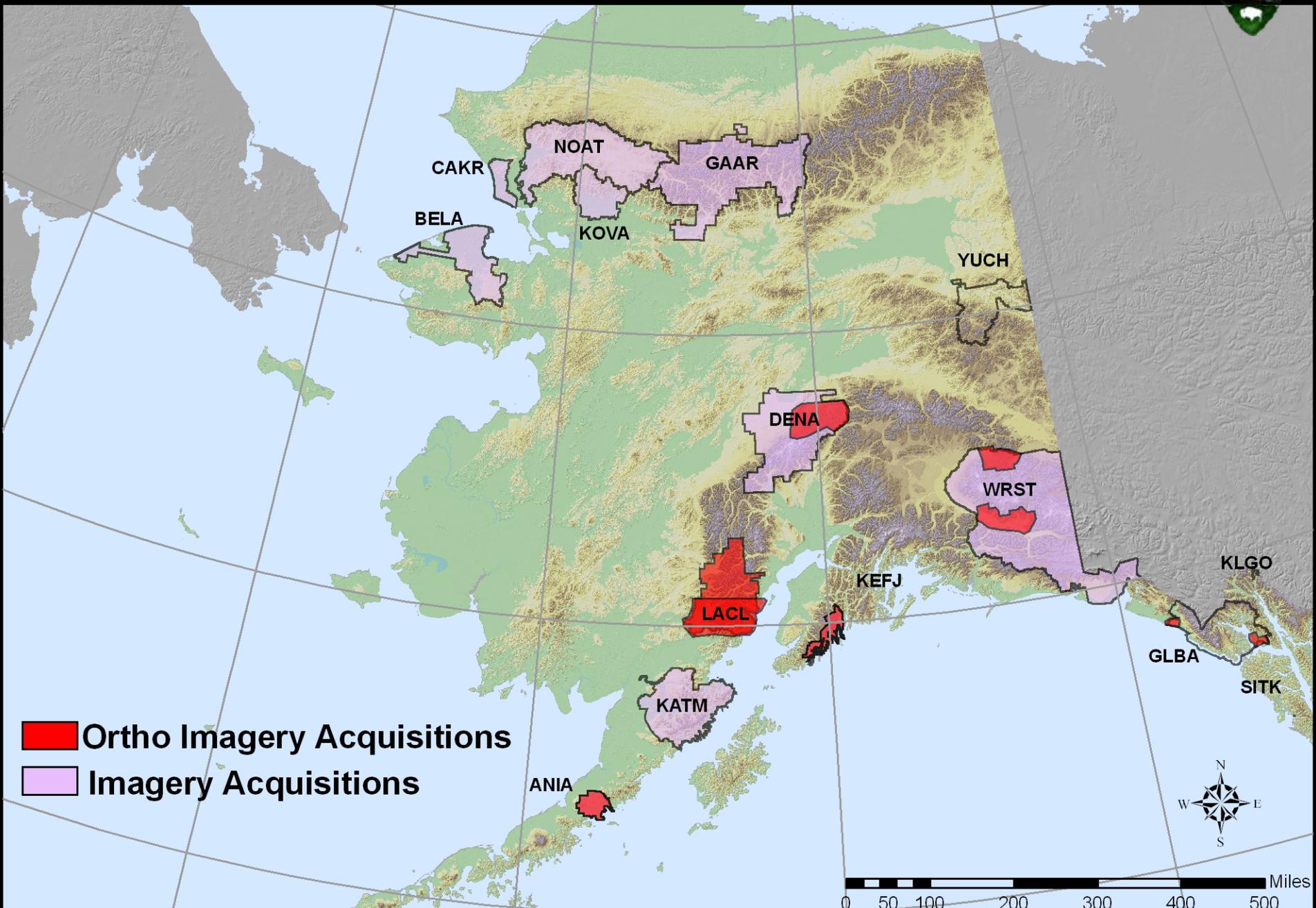
Park-wide Acquisition Areas

Optimize Collection and Cost

2006 Acquisition Season

10% Cloud Cover

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Ortho Imagery Acquisitions
Imagery Acquisitions

0 50 100 200 300 400 500 Miles



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Alaska-wide STATUS

- Ortho – 72% Complete (2 seasons)
- Imagery – 25% Complete (1 seasons)
- Total Coverage – 30% Complete