

Civilian GPS Service Interface Committee
U.S. States and Local Government Subcommittee
Regional Meeting - Honolulu, Hawaii
June 23 – 24, 2009

Minutes

The meeting was held at the Honolulu Coast Guard Station on Sand Island, Oahu, Hawaii. The meeting began at 9:00 am, Tuesday, June 23, and followed the attached agenda.

Between 37 and 50 people attended the two day conference with attendees representing the Military, Federal Government, State Government, Academia, Consultants, and business. In addition to fulfilling a requirement under the Charter for CGSIC USSLGS to provide an open forum for civil user information exchange, the meeting also provided information on:

- Updates on GPS and GPS augmentation systems
- Identify the common needs of state and local governments for GPS and GPS augmentation information
- Identify information requirements and methods
- Maintain a list of active points of contact in state and local governments, and
- Conduct state and local government GPS information studies

There were 12 presentations ranging from updates and status reports of systems to information on applications. All presentations can be found on the Coast Guard Navigation Center's web site, under CGSIC, U.S. States and Local Government Subcommittee:

http://www.navcen.uscg.gov/cgsic/meetings/USSLGS/Hawaii_June_2009/Hawaii_23June_2009.htm

After each presentation, questions were answered by the presenter, and often, discussions continued on related issues with active participation by all. The knowledge level of the audience varied from experienced practitioners to less experienced users. In all cases the participants were interested in how they could use GPS and GPS augmentations more fully, and what future capability would bring.

Prior to closing the conference on Wednesday afternoon, June 24, 2009, the participants were asked to share their views and concerns relative to GPS and GPS augmentations. Some of the general themes shared:

- Ensure that GPS Modernization remains on schedule
- Support High Accuracy development of NDGPS
- Evaluate the need for another Wide Area Reference Station in Hawaii
- Continue to support the ongoing Height Modernization effort in Hawaii
- Add additional CORS in Hawaii
- Continue to have open forums and encourage greater participation

Hawaii DOT Height Modernization Plans

June 23, 2009

Coast Guard Integrated Support Command

DK4164



Purpose of the Height Modernization in Hawaii

- The purpose of the Height Modernization in Hawaii is because we have not updated our benchmarks since the 70's. A good portion of the benchmarks were lost due to construction, vandalism and highway widening, etc...
- After looking at vertical issues, we proceeded to look at the horizontal controls and decided there is a need to be updated. Comparing with what the other states are doing to address this same issues, we decided to do a Height Modernization project with some additional activities to make the most of it.



Who will Benefit MOST?

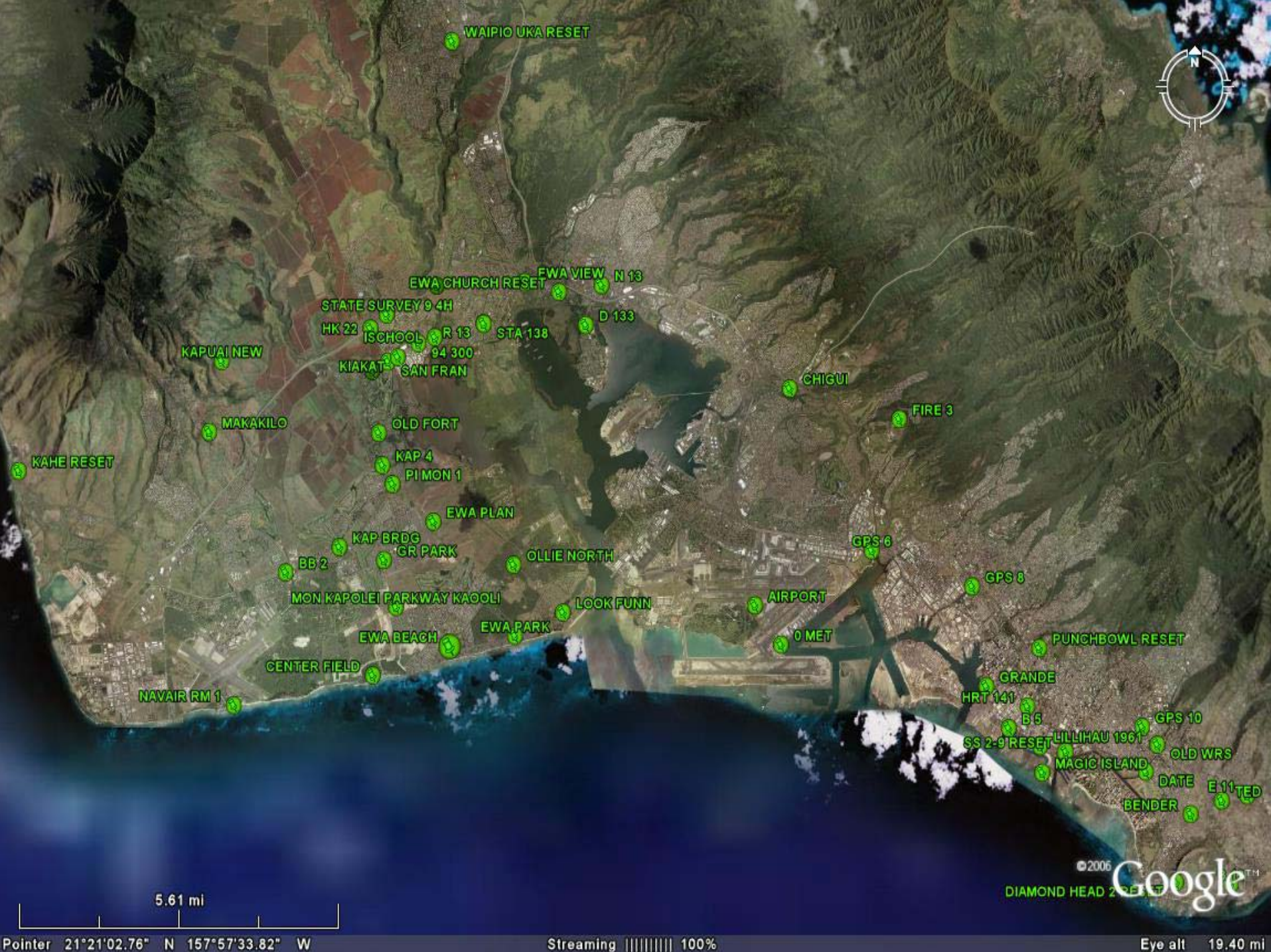


- Private Sector (Engineers, Surveyors, Planners, Contractors, and Construction Company's, etc.)
- Government Sector (Military, Federal, State, County)
- Public Utilities - Precision As-builts
- GIS Community
- And the **tax payers** in general (lower cost for surveying, engineering, etc.)



Benchmark Recovery

- Cadastral Engineering Section has completed the benchmark recovery for Oahu. Field work only.
- A total of 341 benchmarks was searched for
- 197 benchmarks recovered
- 144 benchmarks destroyed, damaged or could not be found.



5.61 mi

Pointer 21°21'02.76" N 157°57'33.82" W

Streaming ||||| 100%

Eye alt 19.40 m

© 2006 Google
DIAMOND HEAD 2

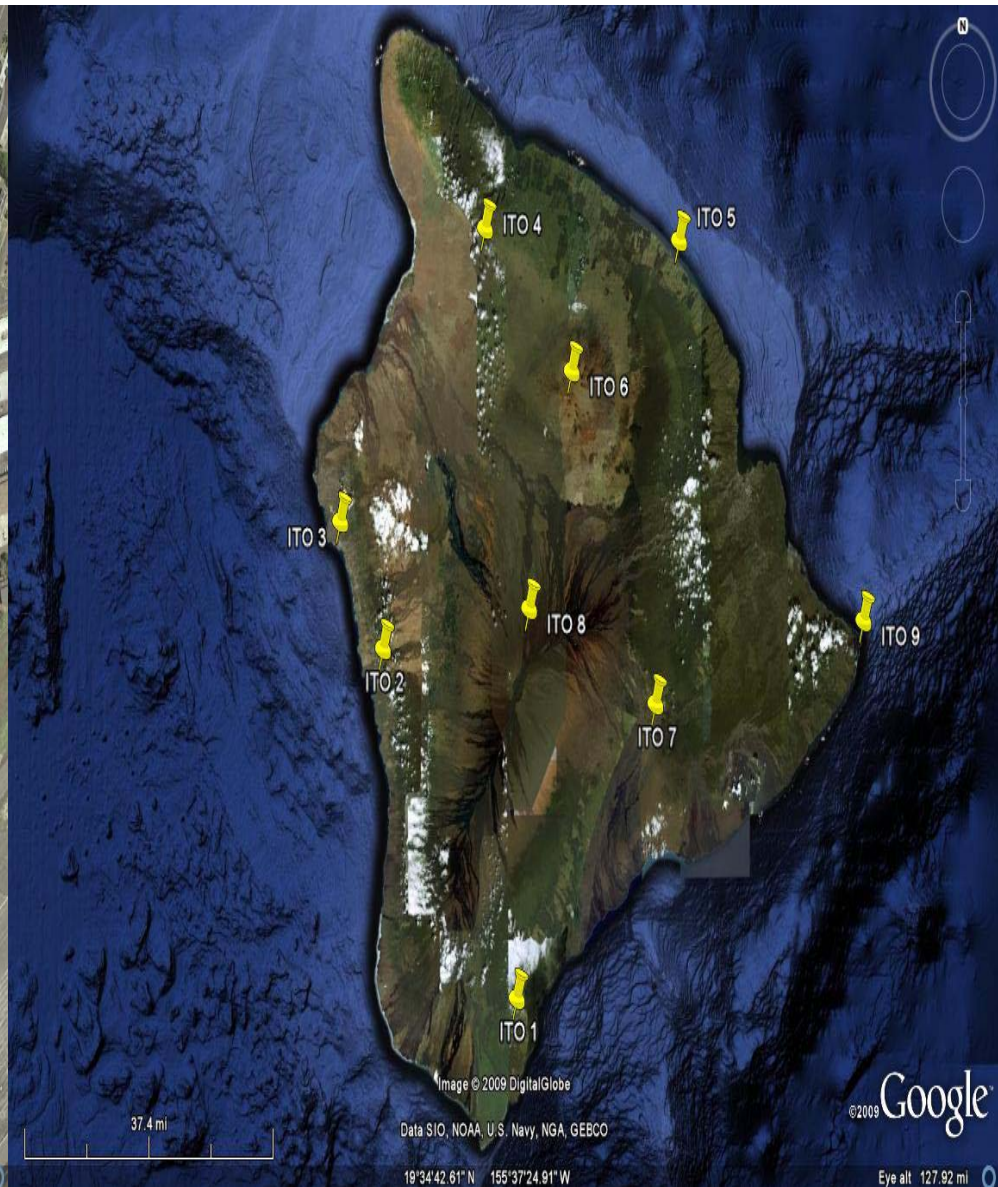
Plans for Hawaii DOT Height Modernization

- Phase 1 – CORS / VRS (Begin in FY 10 and 11)
- Phase 2 – Digital Leveling (Begin in FY 10 and 11)
- Phase 3 – LIDAR (FUTURE)
- Phase 4 - Research and Development (FUTURE)
- Phase 5 - Reference Center (FUTURE)
- Phase 6 - Outreach and Training (FUTURE)

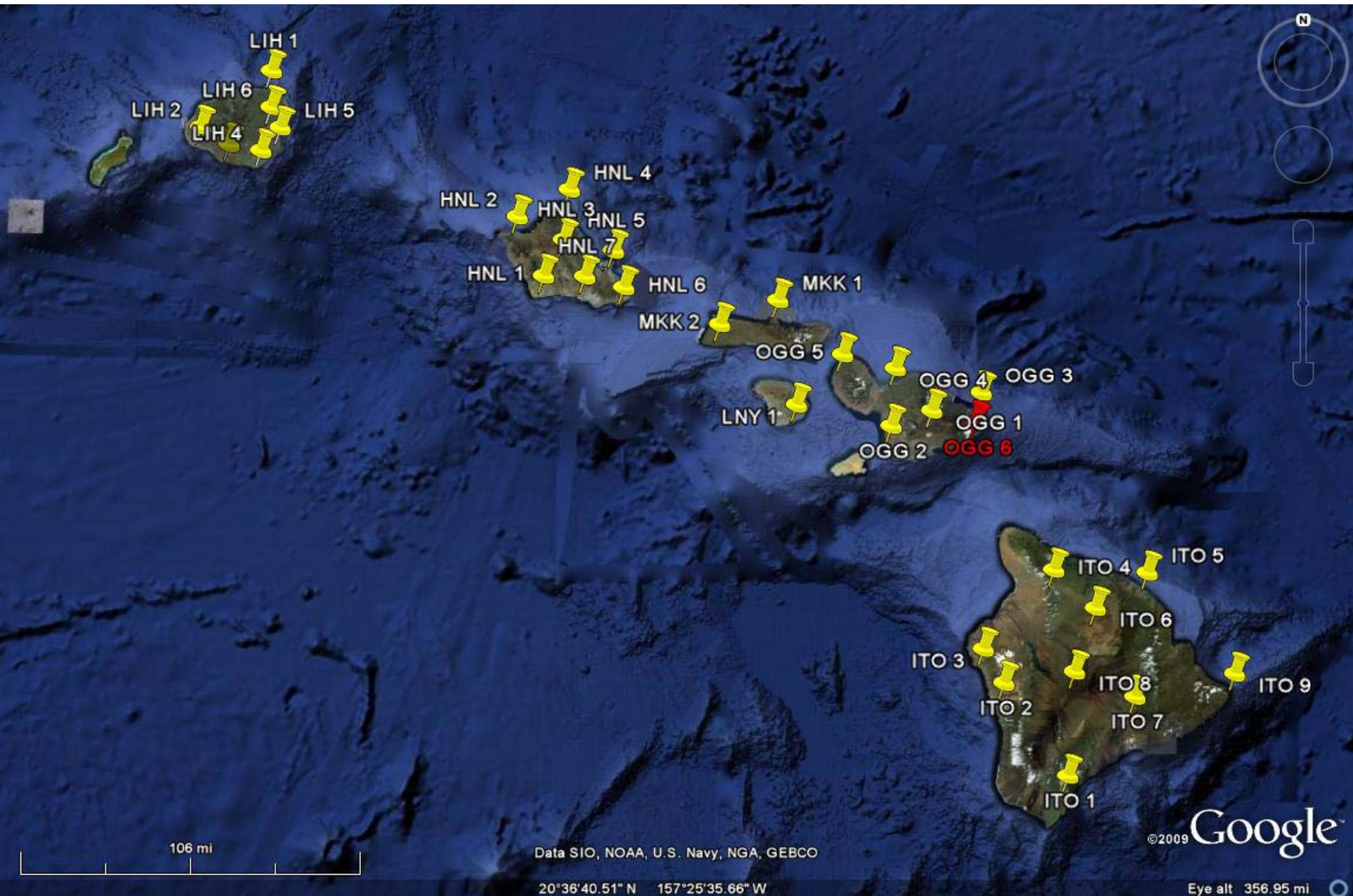
Phase 1 CORS and VRS Plans

- Oahu - 7 CORS Stations
- Maui - 8 CORS Stations with a possible 9th station
- Kauai – 6 CORS Stations
- Big Island – 9 CORS Stations

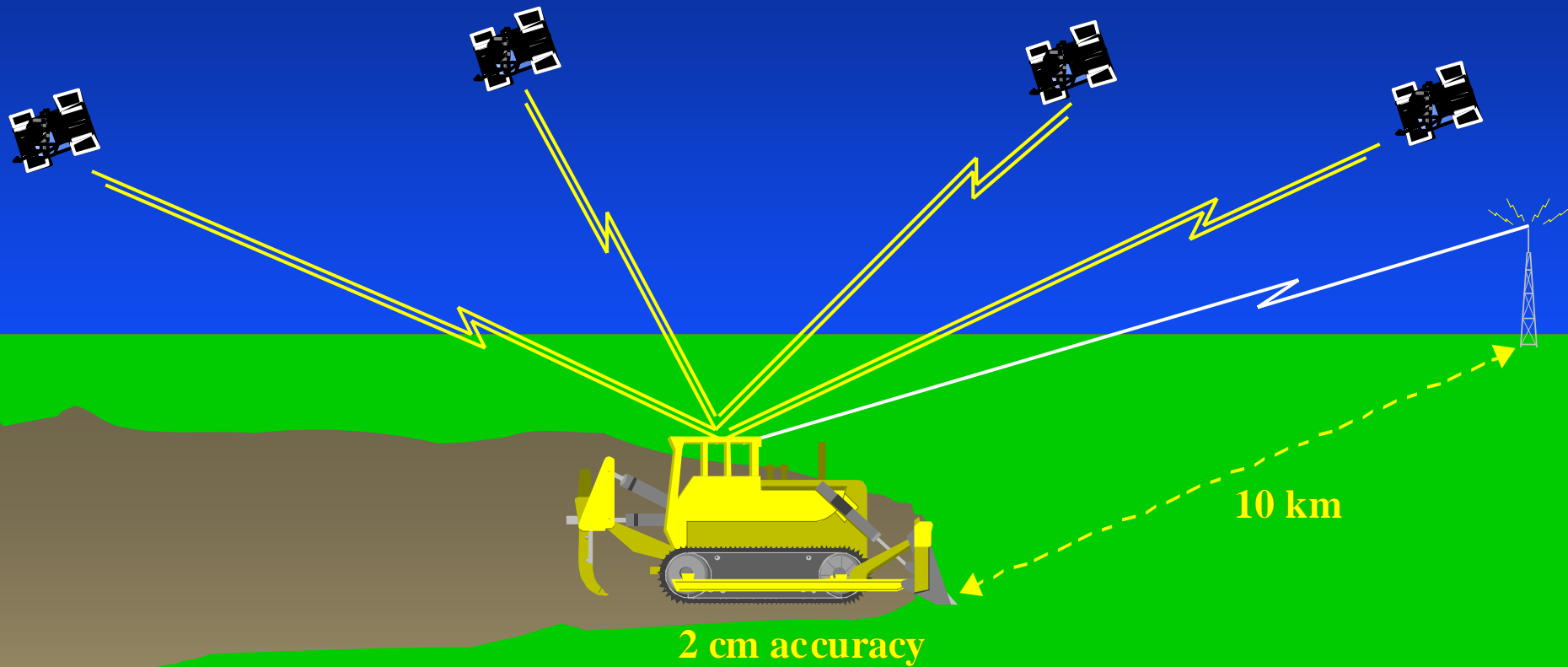
Scaleable from a small single network to a island wide



to a State Wide Network

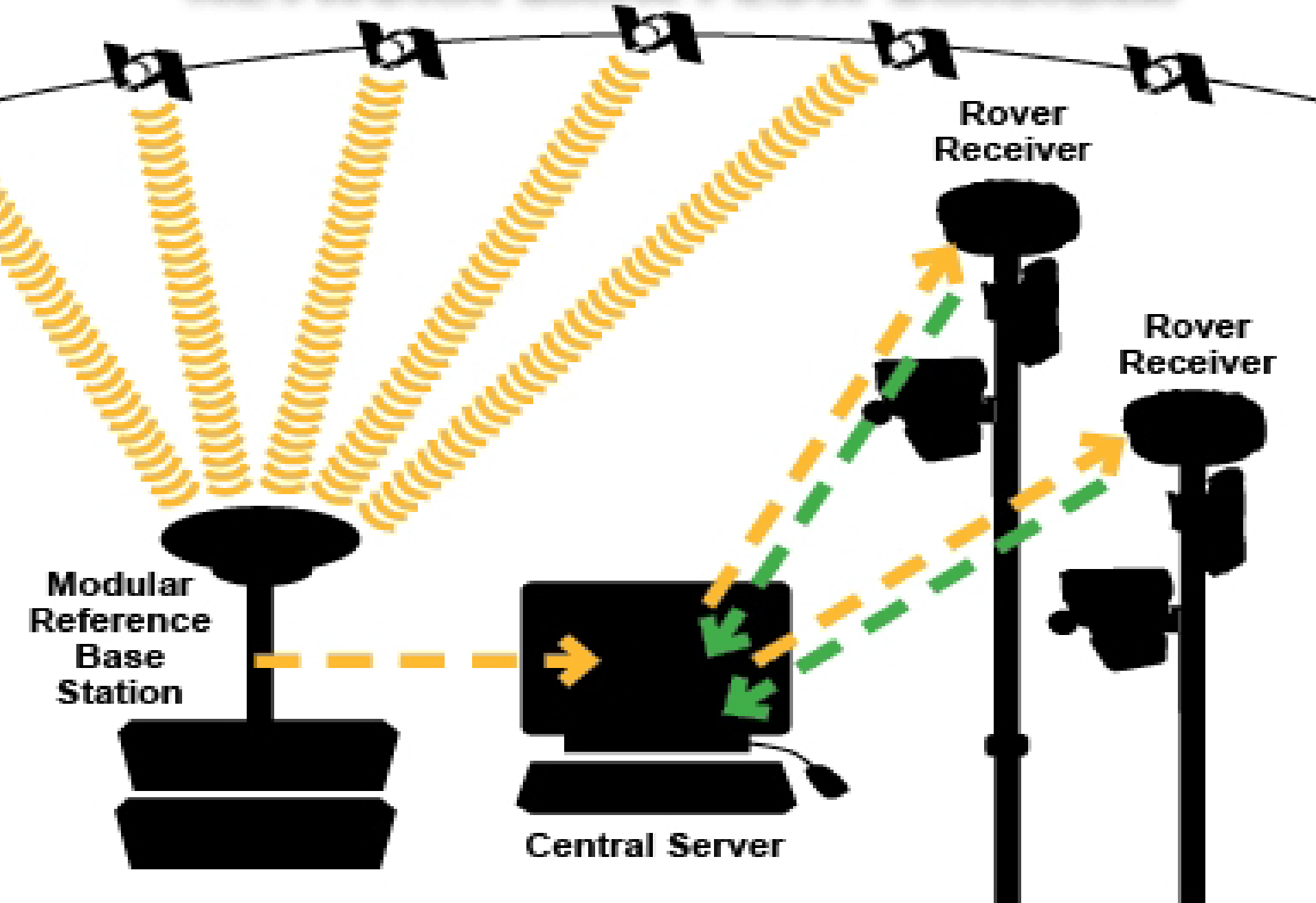


Real-Time Kinematic: Today



- L1 Code and Carrier
- L2 Carrier
- Data Link

NETWORK DATA FLOW DIAGRAM







HNL 4

HNL 2

HNL 3

HNL 5

HNL 1

HNL 7

HNL 6



12.90 mi

Image U.S. Geological Survey
Image © 2009 DigitalGlobe
© 2009 Tele Atlas

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
21°29'35.06" N 157°55'48.05" W

Google

Eye alt 44.51 mi



MKK 1

MKK 2

LNY 1

OGG 5

OGG 4

OGG 3

OGG 1

OGG 2

OGG 6

23.8 mi

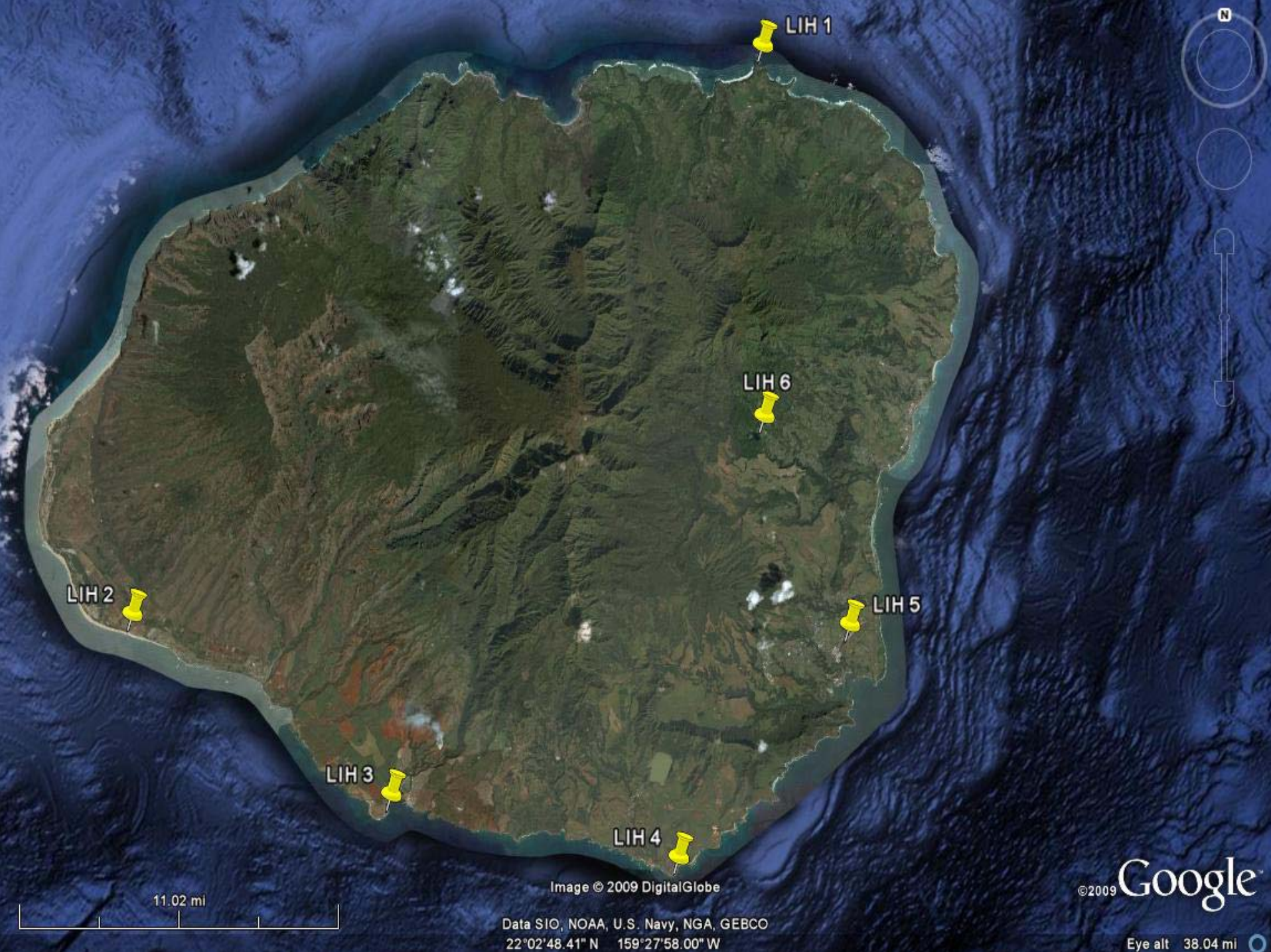
Image © 2009 DigitalGlobe

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

20°53'34.70" N 156°36'08.92" W

©2009 Google

Eye alt 81.89 mi



LIH 1

LIH 6

LIH 2

LIH 5

LIH 3

LIH 4

11.02 mi

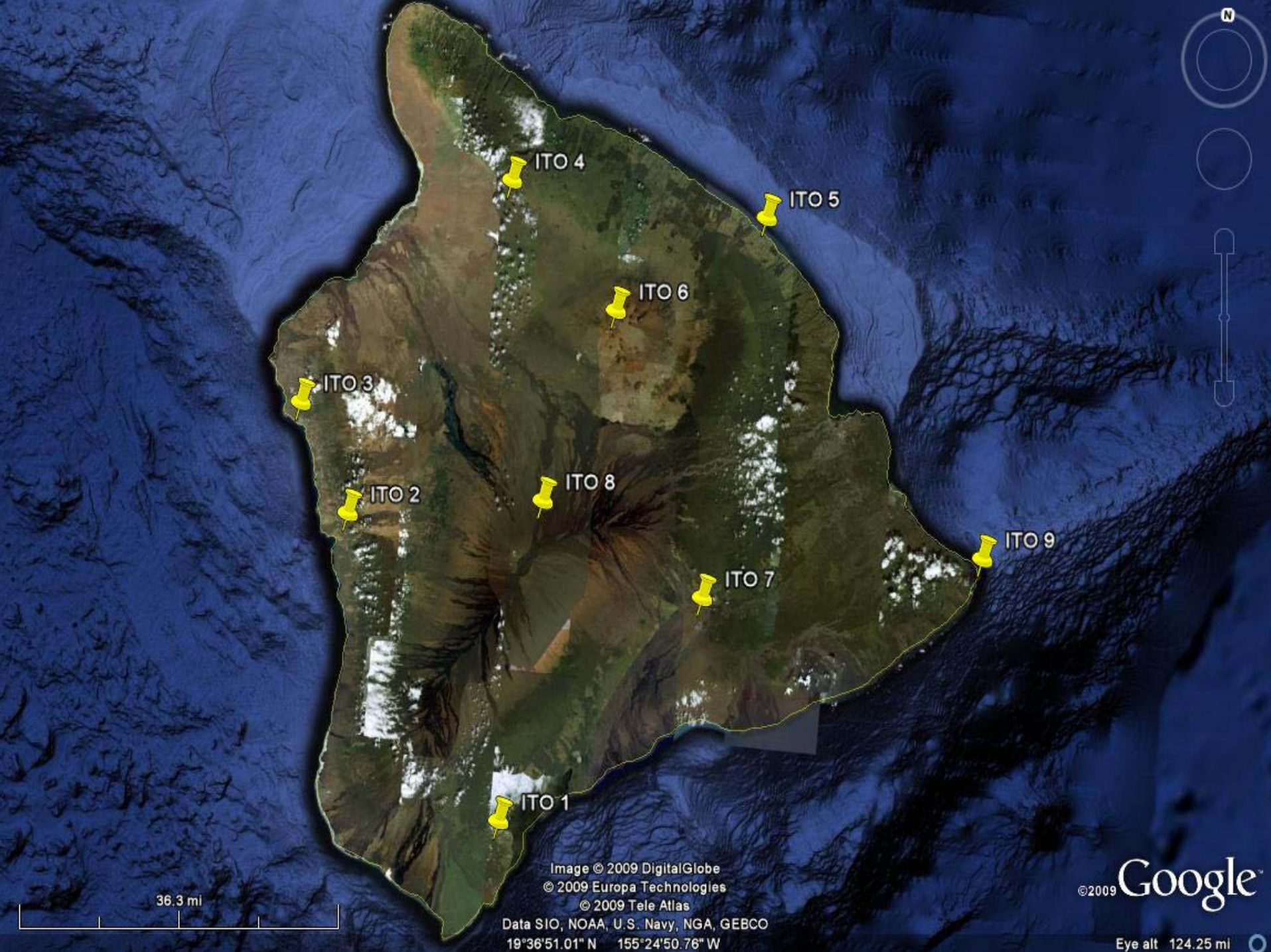
Image © 2009 DigitalGlobe

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

22°02'48.41" N 159°27'58.00" W

©2009 Google

Eye alt 38.04 mi



36.3 mi

Image © 2009 DigitalGlobe
© 2009 Europa Technologies
© 2009 Tele Atlas
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
19°36'51.01" N 155°24'50.76" W

©2009 Google

Eye alt 124.25 mi

ITO 4

ITO 5

ITO 6

ITO 3

ITO 2

ITO 8

ITO 7

ITO 9

ITO 1



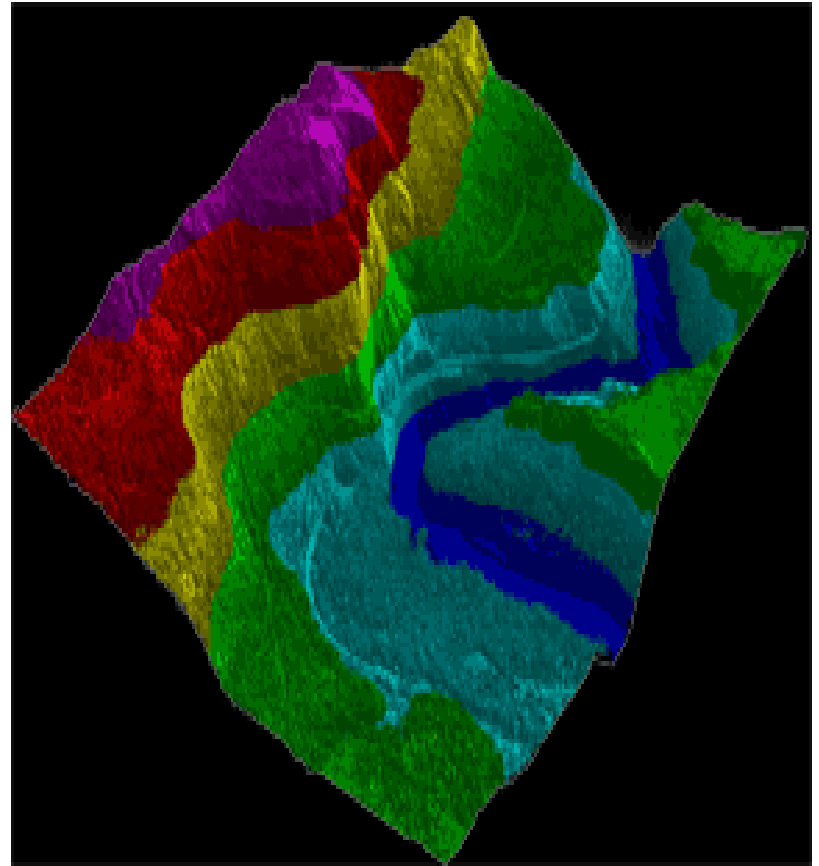
12.08 mi

Image U.S. Geological Survey
Image © 2009 DigitalGlobe
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2009 Tele Atlas
21°28'55.20" N 157°56'40.24" W

©2009 Google
Eye alt 41.72 mi

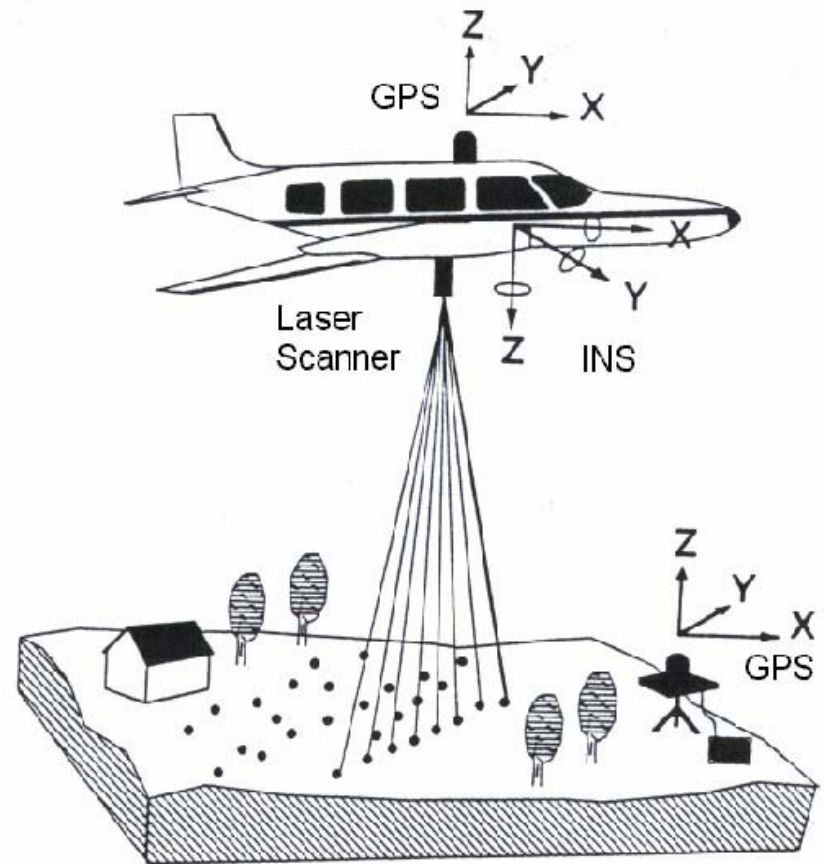
LIDAR (Light Detection and Ranging)

- Help to create a more accurate DEM (Digital Elevation Model) for the Hawaiian Islands.
- Help to create a more accurate Geoid Model for Hawaii.

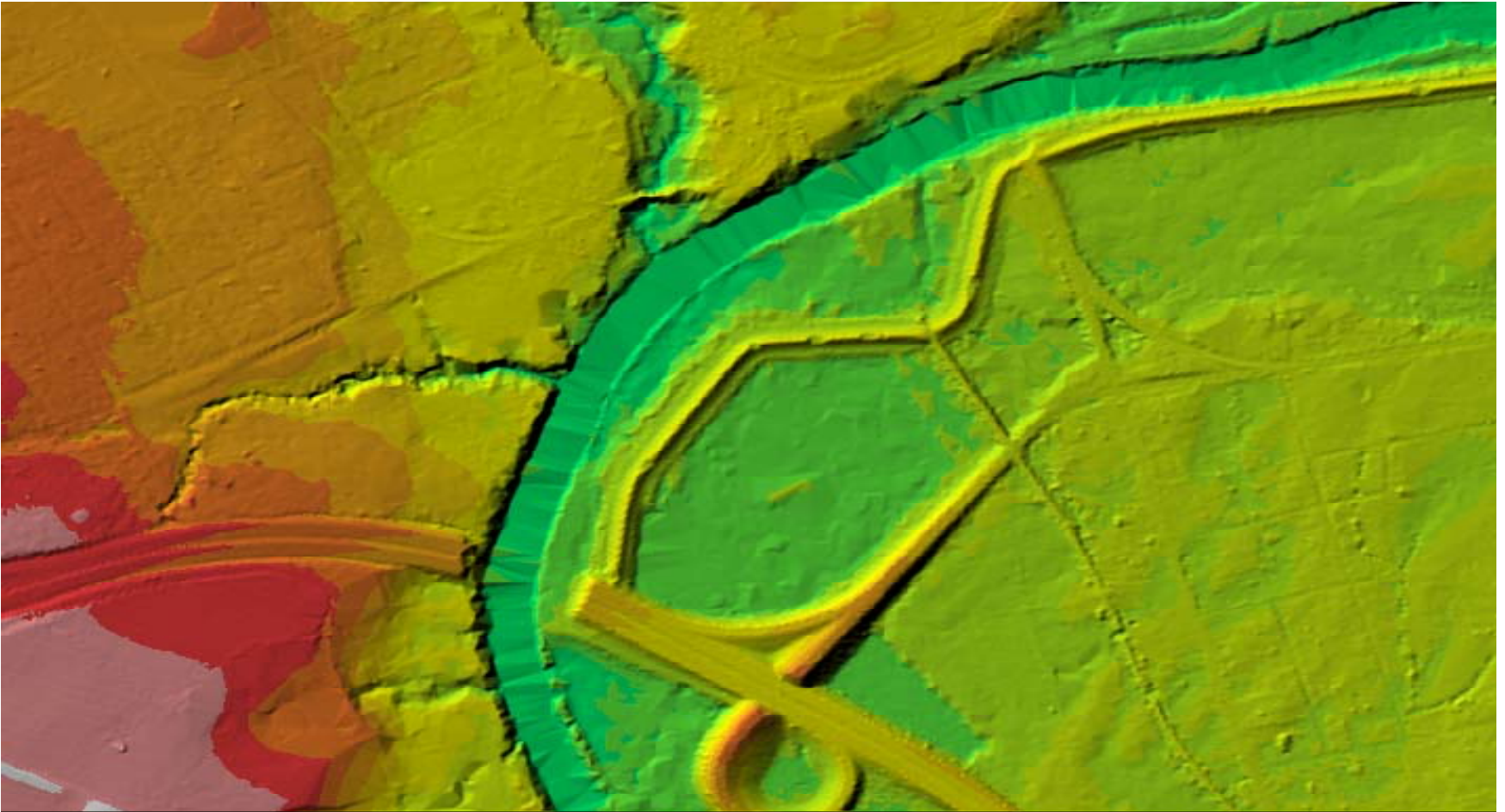


Example of LIDAR

- LIDAR is flown with a airplane or a helicopter
- A Laser scanner is shot from the plane to the ground feature, the return signal will create X,Y and Z for the ground features.
- Large amount data is collected in a very short amount of time.
- Shoreline Mapping
- Good for vary large areas



Digital Elevation Model (DEM)



Sample Bare Earth DEM
(Tarboro, NC)

Future Phase 4 - Research and Development and Future Phase 5 - Reference Center

- Calculating of a new Geoid Model for the State of Hawaii
- Using the LIDAR Data and Airborne Gravity for the new Geoid Model.
- A major University to make calculation
- NGS to advise when needed.
- New Geoid Model to be published and used for Hawaii
- LIDAR and Gravity Data to be stored and shared as needed.
- Data center for VRS/ CORS data.