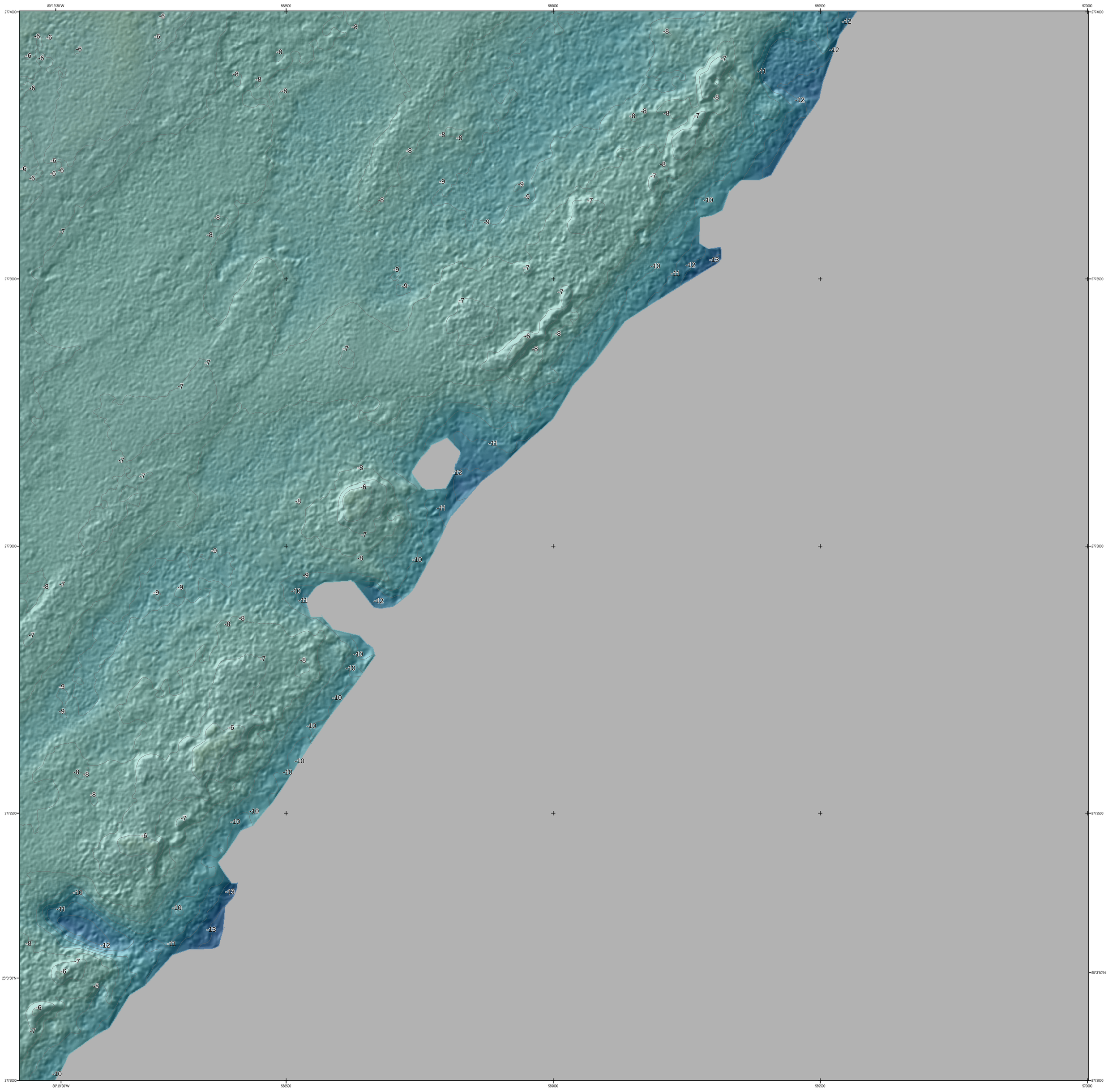
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with:
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA),
THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA),
AND THE NATIONAL PARK SERVICE (NPS)

OPEN FILE REPORT 2007-1395
TILE 24 of 46 (ST)

Brock, J.C., Wright, C.W., Nayegandhi, A., Woolard, J., Patterson, M., Wilson, I., and Travers, L. J., 2007,
USGS-NASA-NOAA-NPS Submarine Topography-Florida Keys National Marine Sanctuary,
U. S. Geological Survey Open File Report 2007-1395 (On DVD).



Universal Transverse Mercator. 1983 North American Datum-Zone 17 North
Topography mapped using NASA Experimental Advanced Airborne Research Lidar (EAARL) April 2006
This map is not intended for use in navigation.

Project Description
This lidar-derived submarine topography map was produced as a collaborative effort between the U.S. Geological Survey (USGS) Coastal and Marine Geology Program, the National Oceanic and Atmospheric Administration (NOAA) Remote Sensing Division, the National Aeronautics and Space Administration (NASA) Wallops Flight Facility, and the National Park Service (NPS) South Florida/Caribbean Network of the NPS Inventory and Monitoring Program. One objective of this research is to create techniques to survey coral reefs for the purposes of habitat mapping, ecological monitoring, change detection and event assessment (for example: coral bleaching, hurricanes, disease outbreaks). This product is based on data from an innovative airborne lidar instrument under development at the NASA Wallops Flight Facility, the NASA Experimental Advanced Airborne Research Lidar (EAARL). The sensor has the potential to make significant contributions in this realm for measuring submerged topography and conducting cross-environment surveys.

Data Description
The laser soundings used to create this map were collected in April 2006 by the NASA EAARL system mounted on a NOAA Twin Otter aircraft. The EAARL uses a "waveform-resolving" green laser capable of mapping submerged and sub-aerial (land) topography in a single overflight. The EAARL system is typically flown at 300 m altitude AGL, resulting in a 240 m swath for each flightline. Data collection occurred with approximately 50% overlap between flightlines, resulting in about one laser sounding per square meter. The data were processed by the USGS Florida Integrated Science Center to produce 1-meter resolution raster images that can be easily ingested into a Geographic Information System (GIS) software. The data were organized as 2 km by 2 km data tiles in 32-bit floating-point integer GeoTiff format. Contour line and hillshade layers were generated from the lidar data tile and incorporated into this map product.

Further Reading
Brock, J.C., and Sallenger, A., 2001, Airborne topographic lidar mapping for coastal science and resource management: U.S. Geological Survey Open File Report 01-46, p. 4.

Brock, J.C., Wright, C.W., Nayegandhi, A., Clayton, T., Hansen, M., Longenecker, J., Gesch, D., and Crane, M., 2002, Initial results from a test of the NASA EAARL lidar in the Tampa Bay Region: Transactions of the Gulf Coast Association of Geological Societies, v. 52, p. 89-98.

Wright, C.W. and Brock, J.C., 2002, EAARL: A lidar for mapping shallow coral reefs and other coastal environments, *in* the Proceedings of the Seventh International Conference on Remote Sensing for Marine and Coastal Environments, Miami, May 20-22, 2002: Ann Arbor, MI, Veridian International Conferences, On CD-ROM.

Nayegandhi, A., Brock, J.C., Wright, C.W., OConnell, M.J., 2006. Evaluating a small footprint, waveform-resolving lidar over coastal vegetation communities, Photogrammetric Engineering and Remote Sensing, Vol. 72, No. 12. pp.1407-1417.

SCALE 1:2500

0.1 0.05 0 0.1 0.2 0.3 MILES

0.1 0.05 0 0.1 0.2 0.3 KILOMETERS

NORTH AMERICAN VERTICAL DATUM OF 1988

CONTOUR INTERVAL 1 METER

NAVD 88 Elevation (meters)

0 -2 -4 -6 -8 -10 -12 -14 -16 NO DATA

Florida Keys National Marine Sanctuary
USGS-NASA-NOAA-NPS EAARL Submarine Topography
Map Tile 568000e_2774000n_17z

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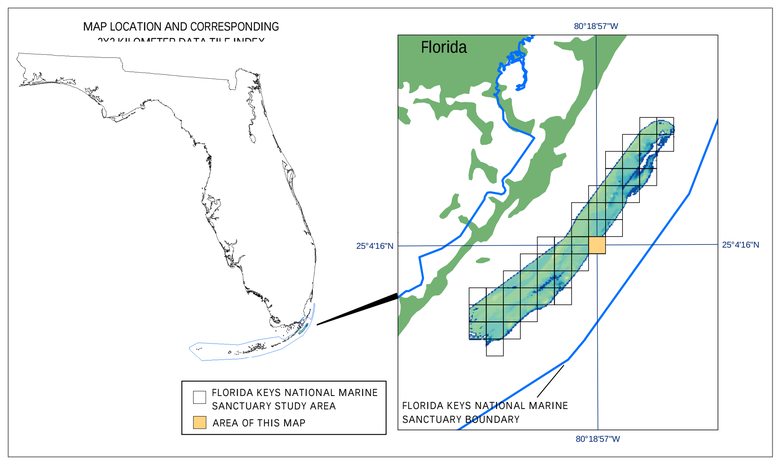
[5] NPS, South Florida/Caribbean Network and Monitoring Program, Miami, FL
[6] Eckerd College, contracted to the US Geological Survey, Florida Integrated Science Center, St. Petersburg, FL

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