

HICO Data User Agreement

Between the

Naval Research Laboratory

And

The HICO Data User Principal Investigator

Issued on: Mapping the bathymetry and seafloor by HICO in south-west coast of Leizhou Peninsula in South China

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Note that approval of a data user proposal does not imply Navy S&T financial support.

Proposal

Title : Mapping the bathymetry and seafloor by HICO in south-west coast of Leizhou Peninsula in South China

Primary Application Domain: Coastal Zones

Secondary Application Domain: Calibration/Validation

Abstract/project summary (approximately 200 word overview of the project)

The capability of HICO remote-sensing methods for mapping the bathymetry and coral reefs in south-west coast of Leizhou Peninsula in South China is evaluated. Habitats were defined as assemblages of benthic macro-organisms and substrata. Their health was influenced by environmental changes (such as transparency and sediment cover etc.). By combined analysis of water quality parameters (chlorophyll A, suspended matter and yellow substances), spectral reflectance features at different depths and radiative transfer modeling, we expect to quantify the depth-of-detection limit and map the different seafloors in typically clear coral reef waters of subtropical zone. The results will validate HICO products of reflectance and bathymetry and guide habitat managers by appropriate remote-sensing methods of bathymetry and coral reef environment.

Statement of work/project description, background, state of the field, what HICO data are requested and how the data are useful to the proposer. Describe study sites, in situ and other data, algorithms and proposed products and deliverables.

South-west coast of Leizhou Peninsula in Xuwen County of South China is the only coral reef nature reserves near China mainland. The coral reefs distribute there spread about 45 km. However, due to the discharging of the domestic sewage and industrial effluents into nearby maritime space, coral reefs there have presented a sign of degradation. This proposal aims to use the hyperspectral resolution HICO remote sensing sensor to map the environmental water quality (TS S and transparency and bathymetry) of study area by analyzing the relationship between water parameters, in-situ reflectance and HICO remote sensing reflectance.

We request the HICO data at South-west coast of Leizhou Peninsula in South China with 90m spatial resolution and 87 channels (400-900nm).

Data area:

Up left corner: 109.82E, 21.82N

Down left corner: 109.82E, 20.10N; Down right corner: 110.2E, 20.1N

Xuwen National Coral Reef Reserve, which was established in 1999 and promoted as national Reserve in April 2007, lies in the south west of Leizhou peninsula of Guangdong Province (South China), covering an area of 14,378.5 ha. According to

scientific investigation, the coral reefs in Xuwen Reserve formed about 10,000 years ago. It is the uniquely modern coral reef developed and well-preserved in mainland China. Total reef area reached about 10,866 ha with concentrated regions of about 6,000 ha (<http://www.gdofnr.gov.cn/>). As present, scientific researches have been doing to figure out the species, numbers, size and distribution of the population, health status, diseases and harmful organisms of the coral in the reserve. Moreover, water quality has been monitoring and analyzing regularly as well. However, there is not any remote sensing research on the important habitats.



in situ and other data: On Dec.5, 2010, we carried out an in-situ experiment and collect the water quality parameter (dissolved oxygen, NH₄-N, COD and chlorophyll-a, CDOM, TSS etc), water depth, surface spectra (ASD: 350-2500nm) for 19 sites, and MODIS image. **More in-situ data will be collected once the HICO image is scheduled for programming.**

Algorithms:

In order to study the effect of depth and turbidity to the spectral reflectance of reef substrate and characterize spectral features of various reef components such as healthy coral, bleached coral, sand and debris, we will collect spectra of reef substrate along three transects (Sample the reflectance and essential water parameters of the same bottom type at different depth in one section; collect the reflectance and essential water parameters of different bottom type at the same depth in another section; acquire the reflectance and essential water parameters of same bottom type on different turbidity in the third section.). Based on in situ data,

the hyper spectral images are used to identify the coral reef features and map the bathymetry and seafloor.

Proposed products: coral reef distribution mapping, bathymetry mapping;

Deliverables: 1-2 published papers;

Biographical sketch and available facilities.

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Visiting Scholar: Florida State University

Ph.D. - Chinese Academy of Sciences (CAS)

2005, Institute of Remote Sensing Applications, China.

M.Sc. - Peking University

1992, Institute of Remote sensing and GIS

B.Sc. - Jiangxi Normal University

1986, Department of Geography

Recent publications:

- 1) Shuisen Chen*, Ligang Fang, Hongli Li, Weiqi Chen, Wenrui Huang. Evaluation of a three-band model for estimating Chlorophyll-a concentration in tidal reaches of the Pearl River Estuary, China. *ISPRS Journal of Photogrammetry & Remote Sensing*, Vol.66(3), 2011: pp 356-364, DOI: 10.1016/j.isprsjprs.2011.01.004.
- 2) Wenrui Huang, Debraj Mukherjee, Shuisen Chen. Assessment of Hurricane Ivan Effects on Chlorophyll-a in Pensacola Bay by MODIS 250m Remote Sensing. *Marine Pollution Bulletin*, Vol. 62(3), March 2011, pp 490-498.
- 3) Shui-sen Chen, Wenrui Huang, Weiqi Chen, Hongqing Wang. Remote Sensing Analysis of Rainstorm Effects on Sediment Concentrations in Apalachicola Bay, USA. *Ecological Informatics*, Vol.6(2), 2011: pp 147-155, 2011
- 4) Shuisen Chen, Xiuzhi Chen, Wei-qi Chen, Dan Li. A Simple Retrieval Method of Land Surface Temperature from AMSR-E Passive Microwave Data - A Case Study Over Southern China During the Strong Snow Disaster of 2008 (*International Journal of Applied Earth Observation and Geoinformation*, Vol.13(1), 2011:

pp.140–151)

5) Shui-sen Chen, Wenrui Huang, Hongqing Wang, Dan Li. Remote sensing assessment of sediment re-suspension during Hurricane Frances in Apalachicola Bay, USA. (Remote Sensing of Environment, Vol.113(12), 2009: pp. 2670-2681)

6) Ligang Fang; Shuisen Chen*; Hongqing Wang; Junping Qian; Lixin Zhang. Detecting Marine Intrusion into Rivers using EO-1 ALI Satellite Imagery: A Case Study in Modaomen Waterway, Pearl River Estuary, China. International Journal of Remote Sensing, Vol.31 (15), 2010: pp. 4125 - 4146)

7) SHUISEN CHEN*, LIGANG FANG, LIXIN ZHANG, Wenrui Huang. Remote sensing of turbidity in seawater intrusion reaches of Pearl River estuary- A case study in Modaomen waterway of Pearl River Estuary, China (Estuarine, Coastal and Shelf Science, Vol. 82(1), 2009: 119-127)

8) Li-gang FANG, Shui-sen CHEN*, Dong Li, Hong-li LI. Use of reflectance ratios as a proxy for coastal water constituent monitoring in the Pearl River Estuary (SENSORS 2009, 9, 656-673; doi:10.3390/s90100656 [ISSN 1424-8220])

Available facilities:

ASD Spectral Device (350-2500nm);

YSI PRO PLUS water quality instrument (Dissolved oxygen, pH, Salinity, electrical conductivity, Temperature, NH4-N etc.)

HD-28T dual-frequency sounder;

Output and deliverables: Assuming a successful outcome, what are the products that will be produced (new products, validation of HICO products, etc.)? How will using HICO data advance the mission of the program?

We will produce the coral reef distribution mapping at South-west coast of Leizhou Peninsula in Xuwen County of South China, the transparency mapping of coral reef habitats. The advance on HICO mission is to quantify the depth-of-detection limit in typically clear coral reef waters of subtropical zone.

All HICO data users will be asked to attend an annual HICO team meeting to present their results and discuss HICO data and its uses and applications.

Yes, we will attend the annual HICO team meeting to present our research results.

References

http://www.gdofnr.gov.cn/EngNewsDetail.aspx?NewsId=20100416_155002;

The Hyperspectral Imager for the Coastal Ocean (HICO): Policy for Data Distribution to University and International Collaborators