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Overview of OSU HICO website & products

Jasmine Nahorniak
Curtiss Davis
Nick Tufillaro

Oregon State University



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Background

September 10, 2009

HICO launch

2009 – 2012

ONR support of HICO operations and website
OSU website source of HICO data and info

2013 – present

NASA support of HICO operations
NASA website serving HICO data archive
OSU website continues to serve the community



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Roles of the OSU HICO website

A resource of
HICO-specific information

The avenue for researchers
to request the collection of
HICO scenes



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KEY PAGES

- Targets
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NEW TOOLS

- Project Submission Form
- Scene Collection Request
- Atmospheric Correction Tool



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HICO Projects

[current projects](#) | [past projects](#)

CURRENT PROJECTS	
Maria Adamo <i>Italian National Research Council Italy</i>	Using HICO data for the preparation of the incoming Italian satellite hyperspectral mission PRISMA proposal 2012 AR
Enner Herenio de Alcântara <i>Sau Paulo State University Brazil</i>	Hyperspectral remote sensing of water quality in hydroelectric reservoirs in Sao Paulo State (Brazil) proposal
Adem Ali <i>College of Charleston USA</i>	Evaluating color producing agents and assessing algal bloom dynamics in the coastal waters of South Carolina, USA, using hyperspectral data proposal
Roy A. Armstrong <i>University of Puerto Rico USA</i>	Hyperspectral remote sensing of water quality indicators following episodic rainfall events in southwestern Puerto Rico proposal
Mohamad Awad <i>National Council for Scientific Research Lebanon</i>	HICO use in natural resources and coastal water chlorophyll-a monitoring proposal
Martin Bachmann <i>German Aerospace Center Germany</i>	Using HICO data for the preparation of the future satellite mission EnMAP proposal 2012 AR
Claudio Clemente Faria Barbosa <i>National Institute for Space Research, Brazil</i>	HICO for optical active constituents retrieval applied to Amazon floodplain lakes proposal
Stewart Bernard <i>Council for Scientific and Industrial Research South Africa</i>	Use of HICO in the Southern Benguela: Saldanha Bay case study 2014 AR
Caren Binding <i>Environment Canada Canada</i>	Exploring the potential for harmful algal bloom species discrimination using HICO hyperspectral imaging

Number of projects

47

Number of countries

22

Number of accounts

90



new webpage
in progress

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HICO Data Collection Request Form

Please complete all required fields on all 3 tabs before submitting your request.

* required field

STEP 1: PROPOSED STUDY

* Title

* Short title (< 20 chars) e.g. Oregon Rivers

* Abstract Please include objectives and expected benefits and results. (1000 characters maximum)

* Type

Embargo In rare circumstances, a researcher may request that public distribution of the data be delayed. Please contact odavis@coas.oregonstate.edu for more information.

NEW!

Types of information requested:

- title and abstract
- names and affiliations
- NASA affiliation (if any)
- study region(s)

Routed to appropriate agencies for review

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Targets

An alphabetical list of targets collected by HICO and distributed through this website are shown below. Alternatively, an [image of the target locations](#) may be viewed ([Google Earth plugin](#) required). Please see below the list for more information about the targets.

Name	Region	Latitude (°N)	Longitude (°E)	Status
AAOT	Italy	45.3000	12.5000	active
AlbuferaLake_SP	Spain	39.3300	-0.3600	active
AL_GrandBay	USA (Alabama)	30.2559	-88.3109	active
Amazon_River_Mouth	Brazil	0.5327	-49.9952	active
Amazon_River_Plume	Brazil	7.0000	-51.0000	active
Annaba_ALG	Algeria	36.9000	7.7500	active
ArabianSea	Arabian Sea	22.0000	64.0000	active
ARG_GulfoNuevo	Argentina	-42.7000	-64.5500	active
ARG_GulfoSanJose	Argentina	-42.3500	-64.3000	active
ARG_LaPlataRiver1_asc	Argentina	-34.4856	-58.3077	active
ARG_LaPlataRiver2_asc	Argentina	-34.6754	-57.8190	active
ARG_LaPlataRiver_des	Argentina	-34.5047	-58.1241	active
ARG_PuntaRasa	Argentina	-36.2800	-56.7900	active
Ariake	Japan	32.7170	130.3680	active
<i>Australia_Moorings</i>	<i>Australia</i>	<i>-19.1765</i>	<i>117.0602</i>	<i>inactive</i>
AUS_AshmoreReef	Australia	-12.2700	123.0000	active
AUS_ElusiveReef	Australia	-21.1091	152.7772	active
AUS_Geraldton	Australia	-28.7602	114.6041	active
AUS_KingGeorgeRiver	Australia	-13.9500	127.3300	active
AUS_LakeLefroy	Australia	-31.3200	121.7200	active
AUS_MorindaShoal	Australia	-19.1500	147.6333	active
<i>AUS_Plnt_McGregor_PlasticDebris_target1</i>	<i>North Pacific Ocean</i>	<i>37.6000</i>	<i>165.3000</i>	<i>pending</i>
AUS_SweetlipReef	Australia	-22.2825	152.7382	active
<i>AUS_Tasmania_Forcett_Fires</i>	<i>Australia</i>	<i>-42.9000</i>	<i>147.6000</i>	<i>inactive</i>
AZE_NeftyanyeKamni	Azerbaijan	40.2500	50.9000	active

Number of targets
available from OSU

Active: 340

Inactive: 86

Total: 426

Number of targets
available from NASA

Active: 556

Inactive: 463

Total: 1019

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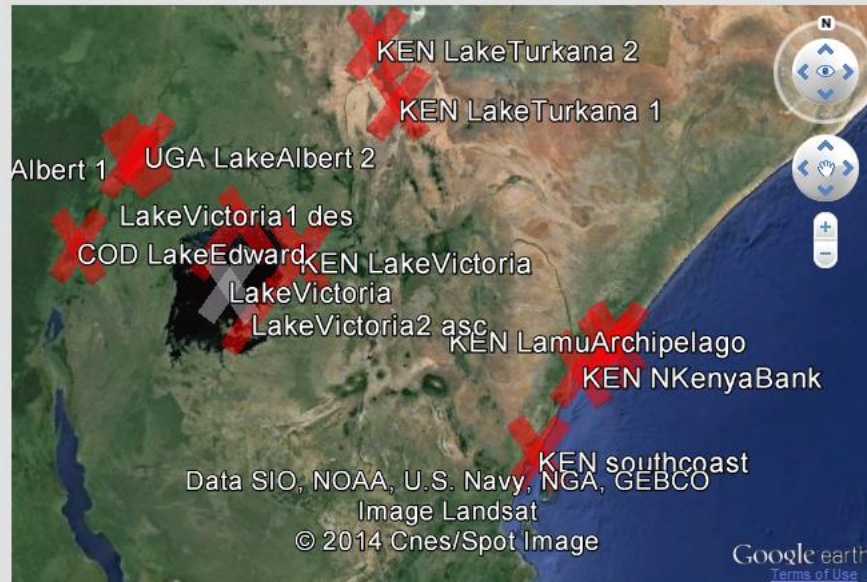
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Targets

Targets collected by HICO and distributed through this website are shown below ([Google Earth plugin](#) required). Alternatively, the targets may be viewed as a [list of target names](#).

Please see below for more information about the image.



Each target covers an area 50 km wide by 200 km long. The target areas are shown as rectangles on the globe above. There are two possible orientations for each target (northwest to southeast, or southwest to northeast). The target view depends on whether the satellite is in the ascending or descending portion of the orbit. During the ascending portion of the orbit, the satellite travels from southwest to northeast. During the descending portion it travels from northwest to southeast. On the above globe, the coverage is shown during the two different orbit directions, appearing as an X shape. Red rectangles are active targets (targets still on the list for possible collection). Grey rectangles are targets that were once collected, but are no longer on the list.

Note that each HICO Data User has access to only those targets requested in their proposals. Users may [request the creation of new targets](#) provided that the targets are relevant to their proposal.

Number of targets available from OSU

Active: 340

Inactive: 86

Total: 426

Number of targets available from NASA

Active: 556

Inactive: 463

Total: 1019

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HICO Target Request

HICO targets at new locations may be requested using the tool below. Target requests will be forwarded to the HICO team for approval before implementation. Please see below the form for more information.

HICO Target Request Form

Suggested Target Name NZL_LakePukaki
e.g. MtEverest_Nepal

Suggested Target

Lat: °N

Lon: °E

- ascending (SW-NE)
 descending (NW-SE)
 both orientations

All Targets

- show ascending
 show descending
 show names



update figure

Reason for Request

Higher priority will be given to targets with in-situ applications such as cruises and matchups.

submit request

More Information

Latitude range: The International Space Station (ISS) orbit has a 51.6° inclination - it only travels between 51.6° N and 51.6° S. At these extreme latitudes, HICO can tilt to view latitudes up to 53.8° N and 53.8° S but no further. Targets cannot be collected outside of this range.



account
required

- view existing targets
- view new target
- request new target



new webpage
in progress



account
required

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HICO Scene Collection Request

- PROJECT**
 Plankton blooms off South Africa
- TARGET**
Cape_Town_SAfrica
ZAF_SaldanhaBay
ZAF_StHelenaBay
- PRIORITY**
high
Please select your priority for this target relative to your other targets in the area. Your priority value will be used when multiple targets from your project are in view. If two targets are assigned the same priority, the target with the best view angle will be selected.
- DATE RANGE**
Begin: May 01 2014
End: May 01 2014
- STUDY TYPE**
Select the study type(s). Targets with planned field work will be given the highest priority during scheduling.
 field work
 recent event (e.g. volcanic eruption)
 satellite matchups
 time series monitoring
 no specific date preference
 other
- ADDITIONAL COMMENTS** (50 char max, optional)

NEW!

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HICO Scene Request Summary

Project	Target	Priority	Study Type				Start Date	End Date	Comments
ZAF_CSIR_Bernard_Blooms_AFF	ZAF_SaldanhaBay	2				NP	2014-03-03	2015-12-31	secondary site
ZAF_CSIR_Bernard_Blooms_AFF	ZAF_StHelenaBay	1	FW				2014-02-23	2014-02-28	
ZAF_CSIR_Bernard_Blooms_AFF	ZAF_StHelenaBay	1	FW				2014-03-02	2014-03-07	
ZAF_CSIR_Bernard_Blooms_AFF	ZAF_StHelenaBay	1				NP	2014-03-03	2015-12-31	primary location of fieldwork 2014

KEY: FW (field work), SM (satellite matchups), RE (recent event), TS (time series monitoring), NP (no date preference)

NEW!



new webpage in progress



account required

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HICO Schedule

DATE RANGE	TARGET	STATUS
2014-05-01 to 2014-05-13 YYYY-MM-DD available dates: 2009-09-25 to 2014-05-13	All AAOT AlbuferaLake_SP AL_GrandBay Amazon_River_Mouth Amazon_River_Plume Annaba_ALG	All imaged sent planned cancelled lockup failed

TIP: To select more than one item from a list, hold down the control or shift key while clicking.

Submit Help

TIP: Click on a column name to order the results by that column.

Date (UTC)	Target	Scene ID	Angle	Orient	Status
2014-05-01 01:00:49	Pusan_Korea	16062	-27.5	asc	sent
2014-05-01 08:49:40	ROU_DanubeDelta	16065	-6.7	asc	sent
2014-05-01 10:21:12	SP_EbroBasin	16066	-4.7	asc	sent
2014-05-01 12:00:50	LakeSchaalsee	16067	-29.4	asc	sent
2014-05-01 13:41:18	ROU_DanubeDelta	16068	22.2	des	sent
2014-05-01 15:15:10	AAOT	16069	-16.6		sent
2014-05-01 16:27:27	White_Sands_NM		-4.6	asc	cancelled
2014-05-01 21:22:57	MN_Duluth		15.9	des	cancelled
2014-05-01 22:33:52	NMariana_Maug		-20.7	asc	cancelled
2014-05-02 00:12:35	Tokyo_Bay		3.4	asc	cancelled
2014-05-02 01:46:11	Bohai_Sea		-16.3	asc	cancelled
2014-05-02 06:37:50	SouthernLakeBaikal	16072	-2.1	des	sent
2014-05-02 08:01:35	ROU_DanubeDelta	16073	-36.6	asc	sent
2014-05-02 09:36:31	HUN_LakeBalaton	16074	-6.5	asc	sent
2014-05-02 11:12:44	LakeSchaalsee	16075	-36.5	asc	sent
2014-05-02 12:49:19	LakeSchaalsee	16076	-27.2	des	sent
2014-05-02 14:06:48	Sanibel_RedTide	16077	14.9	asc	sent
2014-05-02 16:01:31	ESP_EbroBasinW	16078	7.3	des	sent
2014-05-02 17:15:33	SantaBarbaraChannel_PnB	16079	18	asc	sent

current schedule

- planned
- sent
- cancelled

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DATE RANGE	TARGET	STATUS
2014-03-12 to 2014-03-15 YYYY-MM-DD available dates: 2009-09-25 to 2014-05-13	All AAOT AlbuferaLake_SP AL_GrandBay Amazon_River_Mouth Amazon_River_Plume Annaba_ALG	All imaged sent planned cancelled lockup failed

TIP: To select more than one item from a list, hold down the control or shift key while clicking.

Submit Help

TIP: Click on a column name to order the results by that column.

Date (UTC)	Target	Scene ID	Angle	Orient	Status
2014-03-12 07:21:41	Vietnam_Nhatrang	15641	4.2	des	
2014-03-12 11:47:22	FRA_GirondeEstuary_des	15644	-0.7	des	
2014-03-12 13:24:43	Straits_of_Gibraltar_Spain	15645	-16.2	des	
2014-03-12 15:00:49	CanaryIslands_Volcano	15646	-32.5	des	
2014-03-12 16:26:49	CAN_BayofFundy_des	15647	-38.1	des	lockup
2014-03-12 21:09:44	SanClemente_CCE_LTER		-24	des	cancelled
2014-03-13 09:27:19	Kerch_Strait	15654	-36.7	des	
2014-03-13 14:11:18	CanaryIslands_Volcano	15659	25.4	des	
2014-03-13 15:37:22	CAN_BayofFundy_des	15660	-8.9	des	
2014-03-13 17:13:19	Chesapeake_LowerBay_CB72_des	15662	18.4	des	
2014-03-14 05:57:00	FreshwaterBeach_AUS	15664	-24.9	des	
2014-03-14 08:38:08	Kerch_Strait	15666	-7	des	
2014-03-14 10:10:51	AAOT	15667	-3.5	des	
2014-03-14 16:24:02	CCNY	15670	-0.4	des	

past schedule

- status of scenes
- thumbnails
- scene information

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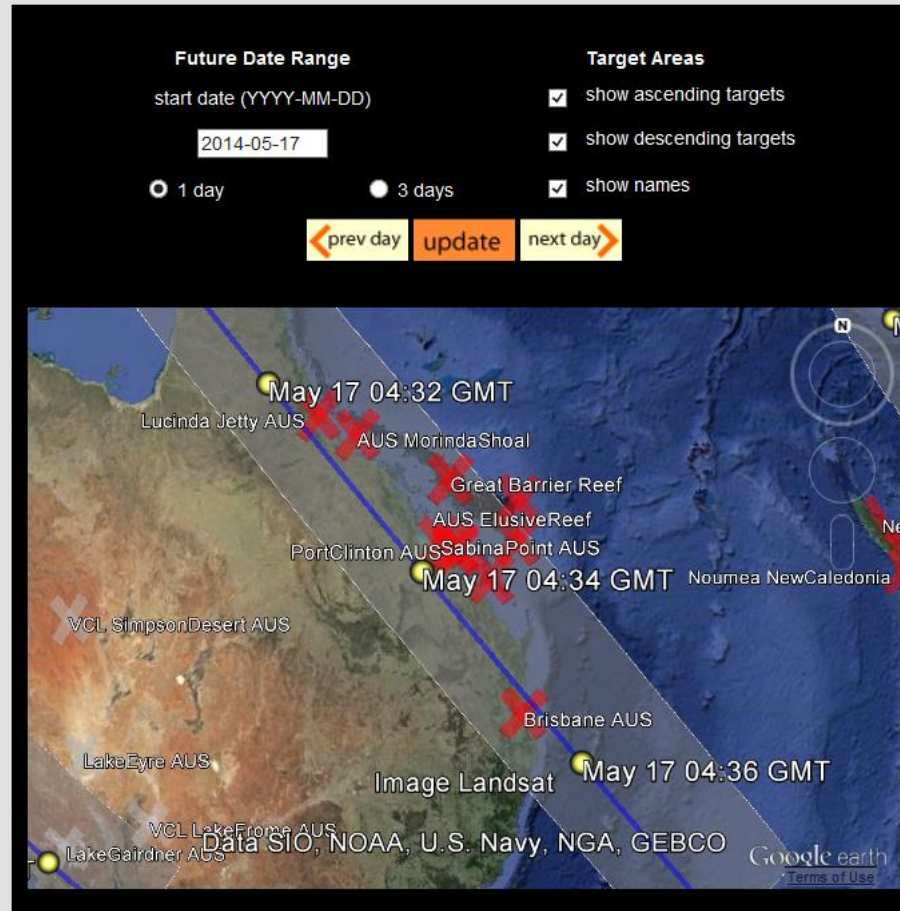
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ISS Orbit

ISS orbit predictions during local daylight (solar elevation above 15 degrees) are shown below ([Google Earth plugin](#) required). Note that **orbit prediction accuracy decreases considerably with time**. Please see below the figure for more information.



past and future
target locations
time of overpass
HICO view range
daytime only

HICO Data Search

TIP: To select more than one item from a list, hold down the control or shift key while clicking.
 Select the Help button below for details about the selection parameters.

Basic		Advanced	
TARGET	LEVEL	DATA FORMAT	
WI_Lakes_4_asc WI_Lakes_4_des WI_Lakes_5_asc WI_Lakes_5_des WI_Lakes_6_asc XuwenReef_CHN Yangtze_River_CHN YellowRiverEstuary_CHN ZAF_SaldanhaBay ZAF_StHelenaBay	All L1B	ENVI Standard	
DATE RANGE			
<i>the default is the entire date range available</i>			
2009-09-27 to 2014-04-29 YYYY-MM-DD			
SCENE DETAILS		VIEWING CONDITIONS	
orbit direction: All scene ID: <input type="text"/> satellite orientation: All	land coverage < 100 % (0 - 100%) solar zenith angle > 0 ° (0 - 90°) view angle from nadir < 45 ° (0 - 45°)		
STATUS		VERSION	
product status: All	data version: All 04	calibration code version: All Version 4.00.00	
RESULTS FORMAT			
<input checked="" type="checkbox"/> show images		<input checked="" type="checkbox"/> show text	
<input checked="" type="checkbox"/> true color	<input checked="" type="checkbox"/> target name <input checked="" type="checkbox"/> region <input checked="" type="checkbox"/> date <input checked="" type="checkbox"/> level <input checked="" type="checkbox"/> scene ID <input type="checkbox"/> land percent <input type="checkbox"/> image link <input type="checkbox"/> corner lats/lons	<input type="checkbox"/> orbit direction <input type="checkbox"/> solar zenith angle <input type="checkbox"/> solar azimuth angle <input type="checkbox"/> view angle from nadir <input type="checkbox"/> view azimuth angle <input type="checkbox"/> target angle <input type="checkbox"/> satellite orientation	



account req'd
 for data access











basic or advanced
 target name or region
 date range
 multiple search options
 results format options

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HICO Data Search Results

The search results from all available HICO scenes are shown below.

Note that access to data and high-resolution images has been restricted to the targets relevant to your proposal.

				
ZAF_SaldanhaBay South Africa 2013-12-11 12:11:24 L1B ID: 15334	ZAF_SaldanhaBay South Africa 2013-12-07 13:51:24 L1B ID: 15312	ZAF_SaldanhaBay South Africa 2013-12-04 14:42:12 L1B ID: 15295	ZAF_SaldanhaBay South Africa 2013-11-18 13:08:40 L1B ID: 15225	ZAF_SaldanhaBay South Africa 2013-11-14 14:46:12 L1B ID: 15180
download data	download data	download data	download data	download data
process to L2	process to L2	process to L2	process to L2	process to L2
				
ZAF_SaldanhaBay South Africa 2013-10-08 13:17:37	ZAF_SaldanhaBay South Africa 2013-10-03 07:30:55	ZAF_SaldanhaBay South Africa 2013-02-19 09:09:21	ZAF_SaldanhaBay South Africa 2013-02-16 10:02:11	ZAF_SaldanhaBay South Africa 2013-02-04 07:11:51



account req'd
for data access

thumbnails
scene information
click for full res
download data
process to L2

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IMPORTANT NOTE: The HICO data files provided by NASA differ in format from the HICO data files provided on this website.

General properties

platform	International Space Station (ISS)
HICO launch	September 10, 2009
HICO installed on ISS	September 24, 2009
first image date	September 25, 2009
on-orbit lifetime	one year minimum
orbit	near circular (see the Orbit page)
inclination	51.6°
altitude	343 km (varies)
ISS orientation	+XVV (standard forward orientation) -XVV (reverse orientation - infrequent)
orbit repeat time	3 days (approximate)
orbit lighting cycle	63 days
orbit period	90 minutes
scenes per orbit	1 maximum
scenes per day	15 maximum
cross-track pointing	varies from -45 to +30 degrees -45: 45 degrees port (north if +XVV orientation) +30: 30 degrees starboard (south if +XVV orientation)
swath orientation	varies depending on the orbit path: NW to SE (descending) SW to NE (ascending)
ground sample distance (GSD)	90 m (varies with altitude and angle)
scene size (km)	42 x 192 km (varies with altitude and angle)
scene size (pixels)	500 x 2000 pixels (width x length) (details below) (512 x 2000 pixels uncropped)
sensor field of view (FOV)	6.92° (i.e. +/- 3.46° from the center) covering 512 cross-track pixels
wavebands	87 bands (details below) (128 bands uncropped)

satellite/sensor properties
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 spatial data cropping
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in beta testing

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HICO Atmospheric Correction

The atmospheric correction algorithm used is tafkaa_6s from NRL, developed by Marcos Montes, Bo-Cai Gao, and Curtiss Davis. Further details are available in the [Tafkaa User's Guide](#).

Tiburon_CA 13273 2013-04-18 23:24:23 GMT

output parameter: rrs (remote-sensing reflectance) ?

MAJOR *The parameters in the section below have a significant effect on the magnitude of the output.*

aerosol model: maritime ?

aerosol optical depth (tau_550): 0.15 ?

elevation: 0 km ?

offset removal: remove positive offset over water ?

MINOR *The parameters in the section below make only minor changes to the spectrum; the default values are recommended.*

atmospheric model: automatic ?

ozone: -1 ppm ?

atmospheric gases: H₂O O₃ NO₂ O₂ ?

water vapor lines

?	adjacent window	H ₂ O band center	adjacent window
Set 1:	0.705 μm 3 ▾	0.725 μm 5 ▾	0.745 μm 3 ▾
Set 2:	0.805 μm 3 ▾	0.825 μm 5 ▾	0.845 μm 3 ▾

process to L2

NEW!

- based on tafkaa_6s
- runs at OSU
- currently accessible for select scenes from the Image Galleries webpage



new webpage
in beta testing

NEW!

HICO Atmospheric Correction for Tiburon_CA

Tiburon_CA 13273

reprocess download

true color negatives land/clouds remote sensing reflectance (1/sr) spectra transect

10

1 Tiburon_CA 13273 (86, 59)

0.010
0.008
0.006
0.004
0.002
0.000

400 500 600 700 800 900

y limits
0.01
0
update

2 Tiburon_CA 13273 (303, 1219)

0.030
0.025
0.020
0.015
0.010
0.005
0.000

400 500 600 700 800 900

y limits
0.03
0
update

3 Tiburon_CA 13273 (179, 1833)

0.10
0.08
0.06
0.04
0.02
0.00

400 500 600 700 800 900

y limits
0.1
0
update

LEFT
corrected scene

RIGHT
custom spectra

NEW!

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HICO Atmospheric Correction for Tiburon_CA

Tiburon_CA 13273 reprocess download

true color **negatives** land/clouds

remote sensing reflectance (1/sr) spectra **transect**

10

1 Tiburon_CA 13273 (line 59)

wavelength: 410 y limits: 0.01 0 update

2 Tiburon_CA 13273 (line 1219)

wavelength: 410 y limits: 0.03 -0.01 update

3 Tiburon_CA 13273 (line 1833)

wavelength: 410 y limits: 0.05 -0.01 update





new webpage
in beta testing

LEFT
negative pixels

RIGHT
custom transects



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OSU vs NASA		
Account type required	OSU HICO	EOSDIS
Data access restricted	yes	no
File format	ENVI	HDF5
Filename convention	iss*	H*_ISS
Wavelengths provided	400 – 900 nm	350 – 1080 nm
Data edges cropped	yes	no
Geolocation quality	good	better
Number of targets available	426	1019 (all)
Can request scene collections	yes	no
Can request new targets	yes	no
Atmospheric correction	hyperspectral	MERIS bands
Level 2 products (e.g. chlorophyll)	on request	yes
Orbit & schedule	yes	no
Support type	email	forum
Email list audience	HICO specific	ocean color



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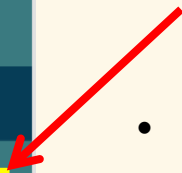
Subscribe

Request New Target

Projects

Future plans

- Finish webpages in progress
- Update website content (particularly NASA-related content)
- Create registration page





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Image Galleries

Current Projects

Acknowledgements

Our gratitude to **ONR**, **NRL**, and **NASA** for supporting this website.

Particular thanks to:

- Mary Kappus (NRL)*
- Ellen Wagner (NRL)*
- Karen Patterson (NRL)*
- David Lewis (NRL)*
- Marcos Montes (NRL)*
- William Stefanov (NASA)*

Additional thanks to all of the **HICO Data Users**, particularly our beta testers:

- James Goodman (HySpeed Computing LLC)*
- Marie Smith (University of Cape Town)*

