Update of the Chinese ocean color satellite mission

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Contents

• The past missions (HY-1A/1B)

• The coming missions (HY-1C/1D)

• The data processing system for HY-1C/1D
First Ocean color Satellite (HY-1A)

- China launched the first ocean satellite HY-1A on 15 May, 2002, together with meteorological satellite FY-1D using same rocket.
- HY-1A was an experimental ocean color satellite in China, and successfully operated for about two years (2002.5-2004.4).
HY-1A satellites

1. COCTS- Chinese Ocean Color and Temperature Scanner (Ten bands)

2. CZI- Coastal Zone Imager (4 bands CCD Camera)
## COCTS bands and detecting object

<table>
<thead>
<tr>
<th>Band (μm)</th>
<th>Main detecting object</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.402〜0.422</td>
<td>Yellow substance, water pollution</td>
</tr>
<tr>
<td>0.433〜0.453</td>
<td>Chlorophyll absorption</td>
</tr>
<tr>
<td>0.480〜0.500</td>
<td>Chlorophyll, sea ice, pollutant</td>
</tr>
<tr>
<td>0.510〜0.530</td>
<td>Chlorophyll, water depth, pollutant, suspended sediment</td>
</tr>
<tr>
<td>0.555〜0.575</td>
<td>Chlorophyll, vegetation, sand</td>
</tr>
<tr>
<td>0.660〜0.680</td>
<td>Fluorescence, suspended sediment, atmospheric correction, aerosol</td>
</tr>
<tr>
<td>0.740〜0.760</td>
<td>Suspended sediment, atmospheric correction, vegetation</td>
</tr>
<tr>
<td>0.730〜0.770</td>
<td>Suspended sediment, atmospheric correction, vegetation</td>
</tr>
<tr>
<td>0.845〜0.885</td>
<td>Atmospheric correction, water vapor</td>
</tr>
<tr>
<td>10.30〜11.40</td>
<td>Surface temperature</td>
</tr>
<tr>
<td>11.40〜12.50</td>
<td>Surface temperature</td>
</tr>
</tbody>
</table>
HY-1A/CZI Bohai image

Images courtesy of Dr.
Second ocean color satellite of China, HY-1B was launched by Long March rocket, in April, 2007.

Sponsored by: State Oceanic Administration, (SOA) Manufacturer: the Chinese Academy of Space Technology (CAST)
Comparing of HY-1B/COCTS and Aqua/MODIS (Chl_a)

卫星遥感水体叶绿素浓度专题图
（资料时间：年 月 日-年 月 日）

卫星遥感水体叶绿素浓度专题图
（资料时间：年 月 日-年 月 日）

May, HY-1B/COCTS

May, Aqua/MODIS
HY ocean satellite missions

HY-1系列

HY-2系列

HY-3系列

Pre-research

manufacture

CFOSAT

plan

Proved

Manufact. On obits

Going on

HY-1A

HY-1B

HY-1C

HY-1D

HY-1E

HY-1F

HY-2A

HY-2B

HY-3A

HY-1C/1D satellites

The morning-satellite (HY-1C) and afternoon-satellite (HY-1D) will be launched in 2018.

1. COCTS- Chinese Ocean Color and Temperature Scanner (Ten bands)
2. CZI- Coastal Zone Imager (4 bands CCD Camera)
3. UV sensor (2 Ultraviolet bands)
4. An on-board calibration system
COCTS for HY-1C/1D
LPS test results

<table>
<thead>
<tr>
<th>Band</th>
<th>LPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>1.54%</td>
</tr>
<tr>
<td>B2</td>
<td>1.35%</td>
</tr>
<tr>
<td>B3</td>
<td>1.37%</td>
</tr>
<tr>
<td>B4</td>
<td>1.74%</td>
</tr>
<tr>
<td>B5</td>
<td>1.66%</td>
</tr>
<tr>
<td>B6</td>
<td>1.56%</td>
</tr>
<tr>
<td>B7</td>
<td>1.30%</td>
</tr>
<tr>
<td>B8</td>
<td>1.32%</td>
</tr>
</tbody>
</table>
# A UV sensor on HY-1C/D

<table>
<thead>
<tr>
<th>编号</th>
<th>中心波长 (um)</th>
<th>带宽 (um)</th>
<th>典型辐亮度 (mW/cm²·um·Sr)</th>
<th>信噪比 (SNR)</th>
<th>最大辐亮度</th>
<th>应用对象</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.355</td>
<td>0.02</td>
<td>7.5</td>
<td>≥1000</td>
<td>35.6/18.5</td>
<td>浑浊水体大气校正，可溶性有机物</td>
</tr>
<tr>
<td>2</td>
<td>0.385</td>
<td>0.02</td>
<td>6.1</td>
<td>≥1000</td>
<td>38.1/16.5</td>
<td>浑浊水体大气校正，可溶性有机物，海洋溢油</td>
</tr>
</tbody>
</table>
The structure of the UV sensor
A new data processing system for HY-1C/1D

Layer 1: Atmosphere absorption
Layer 2: Rayleigh scattering reflectance
Layer 3: Aerosol scattering reflectance
Layer 4: Sea surface reflectance
Layer 5: Water-leaving reflectance
A test of the system
The standard products

original

Water-leaving
Result of the system

Original

Water-leaving
Comparison between aerosol and water-leaving reflectance

<table>
<thead>
<tr>
<th>Reflectance (%)</th>
<th>Water-leaving Reflectance</th>
<th>Aerosol Reflectance</th>
</tr>
</thead>
<tbody>
<tr>
<td>400</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>500</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>600</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>700</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>800</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>900</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Legend:
- Water-leaving Reflectance
- Aerosol Reflectance
In situ measurements (865 stations)
Validation (122 pairs, 3-h)
Validation (3751 pairs, 15-day)

In situ measured Reflectance (%) vs. Satellite-retrieved Reflectance (%)
Access HY-1/HY-2 data

http://www.nsoas.gov.cn
谢谢！

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国家海洋局第二海洋研究所