ADEOS-IIミッションと海洋学・海洋気象学
(ADEOS-II Mission and Oceanography/Marine Meteorology)

川村 宏
(東北大学大気海洋変動観測研究センター 教授)
Hiroshi Kawamura
(Tohoku University, Center for Atmospheric and Oceanic Studies, Professor)
Three Ocean Sensors On One Platform!!

- Microwave Radiometer
- Advanced Microwave Scanning Radiometer (AMSR)
- Scattrometer
- SeaWinds
- Visible-Infrared Radiometer
- Global Imager (GLI)

ADEOS-IIの3海洋関連センサーによる同時観測
GLIの代表的海洋プロダクト

ADEOS-II GLI chlorophyll-a concentration 03-10 April 2003

Global Chl-a Concentration

ADEOS-II GLI photosynthetically available radiation 03-10 April 2003

Global Daily Solar Radiation

ADEOS-II GLI sea surface temperature 03-10 April 2003

Global SST
GLI ocean products for the global coastal seas

(A) GLI observed radiance (F-678, G-545, H-468nm)

(B) Aerosol optical thickness at 865nm (standard product)

(C) Daily photosynthetically active radiation (standard product)

(D) Daily ocean primary productivity (Research product by Aizumono)

(E) Chlorophyll-a concentration (standard product)

(F) Sea surface temperature (standard product)

The West coast of North America

GLIの海洋プロダクトによる沿岸域観測

Aerosol optical thickness

Chlorophyll-a concentration

Ocean primary productivity
Validation of ADEOS-2 GLI ocean color products using in-situ Observations

By Murakami and 22 authors

- In situ observations collected for the GLI Cal/Val
- International cooperation with scientists and institutions
Validation of ADEOS-2 GLI ocean color products using *in-situ* Observations

By Murakami and 22 authors

- GLI ocean products (normalized water leaving radiances and ocean parameters (e.g., Chlorophyll-a concentration) are well characterized in the global oceans.
Optimal Primary Production Model and Parameterization in the Eastern East China Sea  By Siswanto, Ishizaka and Yokouchi

Verification of Vertically Generalized Production Model and Estimation of Primary Production in the Sagami Bay, Japan  By Ishizaka et al.

Atmospheric correction scheme for GLI with absorptive aerosol correction  By Toratani, Fukushima, Murakami and Tanaka

Activities for GLI Ocean Color algorithm development and product validation
Developing an In-water Algorithm for GLI Using Neural Network Technique with Optical Model Based on Optical Properties in East China Sea, Ariake Sound and Isahaya Bay

By Tanaka et al.

- Neural Network Based in water algorithm development
- NN trained by the intensive in situ observations
Estimating Photosynthetically Available Radiation at the Ocean Surface from ADEOS-II Global Imager Data by Frouin and Murakami
Validation of GLI and Other Satellite-Derived Sea Surface Temperatures Using Data from the Rottnest Island Ferry, Western Australia

By Barton and Pearce
Sea surface temperature observation by Global Imager (GLI)/ADEOS-II - Algorithm and accuracy of the product

By Sakaida et al.

GLIの海面水温プロダクトの検証結果
GLIのクロロフィル・海面水温画像の時系列: 太平洋赤道域
- Comparison of simultaneous IR (GLI) and MW SST (AMSR) observations

- Simultaneous SeaWinds winds for difference mechanism

- No measurable bias
GODAE has a fundamental dependence of SST data and products. In particular, the global perspective of GODAE demanded attention to the many gaps in present products (many not quantified) and improved representation of observational errors in data products.

**Ocean Theme:**

**GODAE SST Project**

Cloud Mask for IR Measurement and Diurnal Cycling of SST (Including the Bulk-Skin Problem)

Increase its temporal and spatial resolution largely

Less than 10km and Less than 24 hours

何が問題か？

従来の赤外センサーは、1）雲域観測不能、

2）日変化検出の問題

海洋変動予測のために、時空間分解能を飛躍的に向上させよ。

**目標:** 10km格子1日一回の雲無し海面水温
ADEOS-II SST:
Combination of infrared, microwave and in situ SSTs (1998)

- GLI infrared SSTs:
  - High accuracy, fine spatial resolution, wide coverage
- AMSR microwave SSTs:
  - Retrieval of SSTs under clouds, wide coverage
- In situ SSTs:
  - Standard and reliable SSTs, anchor points for the satellite SSTs

ADEOS-IIの特性を活かし、高精度高空間解像度を有するGLIと雲下の観測が可能なAMSRの海面水温を有効に活用する
New Generation SST

**Ver.1.0**

(2001)

Geostationary Met. Satellite

Hourly Infrared

AVHRR, VIRS

Merging by objective analyses

TMI SST

Microwave SST

Cloud free

5km spatial resolution, daily SST product

新世代海面水温 Ver.1.0

Ver.1.0 (2001)
New Generation Sea Surface Temperature on 31 May 2003
(Infrared/Microwave Merged SSTs)

http://www.ocean.caos.tohoku.ac.jp/~merge/sstbinary/actvalbm.cgi?eng=1
現行の新世代海面水温（ADEOS-II無し） 新世代海面水温＋ADEOS-II/GLI·AMSR

Pixel Numbers of Each Sensors

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GLI 250m Color Products: New directions for coastal monitoring

250mm products

1km products

GLI 250m ocean products (26 May 2003, p47s11)
GLI 250m海洋観測

250m Chl-a

1km Chl-a

250mRGB Composite
GLI captures the Red-Tide phenomena!!
リモートセンシング観測要求書: 海洋学・海洋気象学 (WMO/CEOS)

<table>
<thead>
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<th>&quot;USE&quot;</th>
<th>&quot;Requirement&quot;</th>
<th>&quot;HR Min&quot;</th>
<th>&quot;Hor Res&quot;</th>
<th>&quot;OC Min&quot;</th>
<th>&quot;Obs Cycle&quot;</th>
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<th>&quot;DA Min&quot;</th>
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<td>Ocean chlorophyll</td>
<td>25 km</td>
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<td>3 d</td>
<td>1 d</td>
<td>3 d</td>
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<td>0.5 % (Max)</td>
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<td>Ocean dynamic topography</td>
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<td>Dominant wave direction</td>
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<td>360 mo</td>
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<td>Marine biology (coastal water)</td>
<td>Aerosol (total column) size</td>
<td>1 km</td>
<td>10 km</td>
<td>24 h</td>
<td>18 h</td>
<td>3 h</td>
<td>7 h</td>
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<td>1 µm</td>
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<td>Ocean chlorophyll</td>
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<td>5 km</td>
<td>1 d</td>
<td>3 d</td>
<td>3 d</td>
<td>7 d</td>
<td>5 % (Max)</td>
<td>20 % (Max)</td>
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<td>Photosynthetically Active Radiation (PAR)</td>
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<td>20 % (Max)</td>
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<td>Marine biology (coastal water)</td>
<td>Sea surface bulk temperature</td>
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<td>5 km</td>
<td>24 h</td>
<td>18 h</td>
<td>3 h</td>
<td>7 h</td>
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<td>Marine biology (open ocean)</td>
<td>Aerosol (total column) size</td>
<td>4 km</td>
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<td>24 h</td>
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<td>Air pressure over sea surface</td>
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<td>Ocean yellow substance absorbance</td>
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<td>5 km</td>
<td>1 d</td>
<td>2 d</td>
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<td>5 % (Max)</td>
<td>20 % (Max)</td>
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<td>Marine biology (open ocean)</td>
<td>Ozone profile - Total column</td>
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<td>200 km</td>
<td>24 h</td>
<td>18 h</td>
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<td>Wind vector over sea surface (horizontal)</td>
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<td>50 km</td>
<td>24 h</td>
<td>18 h</td>
<td>3 h</td>
<td>7 h</td>
<td>2 m/s</td>
<td>5 m/s</td>
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### ADEOS-IIが貢献する海洋学・海洋気象学の観測パラメータ

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<th>Ocean Parameter</th>
<th>Chl-a</th>
<th>Sea Surface Height</th>
<th>Ocean Salinity</th>
<th>Sea Surface Temp.</th>
<th>Surface Winds</th>
<th>Surface Wave</th>
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<table>
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<th>Ocean Parameter</th>
<th>Aerosol Size</th>
<th>PAR (Solar Rad.)</th>
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GLIの海洋プロダクト群による新しい学際的研究・応用分野

- Physical-biological interaction processes
- 生物・物理相互作用過程
- 急速に変動する小スケール沿岸海洋過程
- 高解像度海洋生物・地球化学過程
- 全球の大スケール海洋生物・地球化学過程
- Global basin-scale bio-geochemical processes

統合地球観測戦略への貢献

1) 海洋テーマ
2) 全球炭素観測テーマ
3) 沿岸テーマ
Barton and Pearce (2005): Validation of GLI and Other Satellite-Derived Sea Surface Temperatures Using Data from the Rottnest Island Ferry, Western Australia
Frouin and Murakami (2005): Estimating Photosynthetically Available Radiation at the Ocean Surface from ADEOS-II Global Imager Data
Hosoda et al. (2005): Difference characteristics of sea surface temperature observed by GLI and AMSR aboard ADEOS-II
Ishizaka et al. (2005): Verification of Vertically Generalized Production Model and Estimation of Primary Production in the Sagami Bay, Japan
Murakami and 22 authors (2005): Validation of ADEOS-2 GLI ocean color products using in-situ Observations
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