Data Access to Marine Surface Observations and Products from COADS

29 January, 2002

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National Center for Atmospheric Research
Outline

- Definition of Products
- History of data access at NCAR
- Current interfaces at NCAR
- Improved Service from NCAR/CDC/NCDC
COADS data products

• Observations
  - Individual marine reports, 1784-1997
  - Called “LMRF”, 155 million records

• Monthly summaries of observations
  - Statistical summaries in lat. x long. boxes
  - Called “MSG”
  - Two resolutions
    - 1° for 1960-1997
    - 2° for 1800-1997
  - Two flavors (types)
    - Standard, ships only with 3.5σ outlier trimming
    - Enhanced, ships and buoys with 4.5σ outlier trimming
History of data access at NCAR

- Customized data request
  - Data packages prepared for individuals
  - 1983-2001
Brief COADS development history

- 1993, Release 1a + extensions, 1980 onward
- 1996, Release 1b, 1950-1979
- 2001, Release 1c, 1784-1949
- 1999, Online data request forms and subsetting
Number of Requests by Product Type from NCAR

Monthly Statistics and Observations

Years:
- 1983
- 1985
- 1987
- 1989
- 1991
- 1993
- 1995
- 1997
- 1999
- 2001

Legend:
- Monthly Summary Statistics
- Observations
Size of Data Requests from NCAR

Note: First records begin in 1991

Maximum Average, 2039 MB, 1996
2001 Value, 685 MB

40% + are now less than 10 MB
Nations Receiving COADS

7 Nations in 1990, 43 requests
- USA
- Japan
- Australia
- South Africa
- Russia
- Canada
- Germany

31 Nations in 2000, 137 requests
- Argentina
- Bangladesh
- Italy
- France
- Ivory Coast
- Iran
- Philippines
- Turkey
- Taiwan
- Sweden
- Netherlands
- Ireland
- Greece
- Denmark
- Mexico
- Columbia
- Venezuela
- Norway
- Cuba
- Brazil
- Poland
- Japan

Nations in 2000:
- Germany
- India
- Canada
- USA
- Portugal
- South Korea
- Spain
- UK
- Australia

Nations in 1990:
- Bangladesh
- France
- Iran
- Turkey
- Sweden
- Ireland
- Denmark
Current Interfaces at NCAR

• Interfaces are based on WWW pages

• Three methods of access
  - Directly from the NCAR MSS
  - Download primary archive files (binary) and software
  - Request temporal and spatial subsets in ASCII or binary format using online forms
Characteristics of the subsetting process

• NOT real time
  - Typical turn around is less than 24 hours
  - Notification via email

• Delivery by WWW or FTP download
  - Data
  - Documentation
  - Software if applicable
  - Summary of request and log of process
ds540.0 - Comprehensive Ocean Atmosphere Data Set (COADS), Global Marine Surface Observations

Marine surface observations that define many aspects of the physical environment at the ocean surface. For additional information, please contact the COADS project website.

**USAGE:**

**Data Access Options**

- For ASCII or binary temporal and spatial subsets use the [online data request forms](#).
- For the full global binary archive, [downloadable from this server](#) click on the "Data" file tab above.
- For file access from the NCAR MSS to NCAR computers click on the "MSS Files" file tab above.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>wind force (speed)</td>
<td>visibility</td>
</tr>
<tr>
<td>cloud cover</td>
<td>ocean wave</td>
</tr>
</tbody>
</table>

**More variables are available.** For more information see the "Data request ordering forms" or the "COADS project website".

**CONTACT:**

For assistance with this dataset, please contact Steve Worley (303-497-1248). If the specialist is unavailable, please contact Data Help or call 303-497-1219.

**RELATED DATASETS:**

- ds540.1 - Comprehensive Ocean Atmosphere Data Set (COADS), Global Monthly Summaries
To use these data you need:

- Fortran language code **software**
- LMR **documentation**

**NOTE**: Some of the data files are relatively large (See table below). You may want to use FTP instead of your browser to manage the transfer.

### Optional Contact Information.

If you wish to be notified about archive corrections, time series extensions, or general enhancements, fill in the information boxes below and then click on the [Submit Info.] button.

<table>
<thead>
<tr>
<th>Name</th>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### File Sizes

<table>
<thead>
<tr>
<th>File Name</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>lmr1.1955-1959.tar</td>
<td>200.47</td>
</tr>
<tr>
<td>lmr1.1960-1964.tar</td>
<td>242.93</td>
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<tr>
<td>lmr1.1965-1969.tar</td>
<td>379.16</td>
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<tr>
<td>lmr1.1970-1974.tar</td>
<td>384.31</td>
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<td>lmr1.1975-1979.tar</td>
<td>388.08</td>
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<tr>
<td>lmr1.1980-1984.tar</td>
<td>489.09</td>
</tr>
<tr>
<td>lmr1.1985-1989.tar</td>
<td>600.95</td>
</tr>
<tr>
<td>lmr1.1990-1994.tar</td>
<td>568.90</td>
</tr>
<tr>
<td><strong>Total Size</strong></td>
<td><strong>4558.14</strong></td>
</tr>
</tbody>
</table>

*Updated 21 August 2001*
Subsets of Observations

• Binary (LMRF)
• ASCII

The data can be provided in two different formats.

• **LMRF format.** This is the most efficient way to handle the data. All data fields and quality control options are included in each record. Along with the data we supply FORTRAN code programs that read the data, it therefore, requires you have a FORTRAN compiler and a little experience working with programming languages.

• **ASCII format.** This format has one observation per line in the output files with data fields in fixed width columns. Data fields, quality control, and filtering options are selected at the time the request is made and applied when the subset is created.

**NOTE:** ASCII formatted data files will be significantly larger than the equivalent LMRF formatted files.

**Select LMRF or ASCII output format**

• **LMRF format**
• **ASCII format**
LMRF Data Request

Adjust the pre-assigned fields as necessary. They are seeded with the minimum and maximum allowable limits. All other fields may be used.

Information We Need to Contact You

<table>
<thead>
<tr>
<th>Email Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephone Number</td>
</tr>
<tr>
<td>Your Name</td>
</tr>
</tbody>
</table>

Your Office/Business Postal Mail Address

Comments and/or questions (optional)

- Return to COADS Data Products Online Ordering
- Return to the COADS Website
- Return to the COADS Data and Metadata Page
- Send Email and/or Questions about COADS Data Products

Document maintained by Steve Worley (NCAR), worley@ucar.edu
Last updated: 13 March, 2001
<table>
<thead>
<tr>
<th>Column 1</th>
<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
</tr>
</thead>
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<tr>
<td>b10</td>
<td>10 degree box number</td>
<td>yr</td>
<td>year</td>
</tr>
<tr>
<td>dy</td>
<td>day</td>
<td>hr</td>
<td>hour</td>
</tr>
<tr>
<td>lon</td>
<td>longitude</td>
<td>lat</td>
<td>latitude</td>
</tr>
<tr>
<td>dck</td>
<td>deck</td>
<td>sid</td>
<td>source id</td>
</tr>
<tr>
<td>qi</td>
<td>quality indicator (unused)</td>
<td>ds</td>
<td>duplicate status</td>
</tr>
<tr>
<td>tc</td>
<td>track check (unused)</td>
<td>pb</td>
<td>pressure bias (unused)</td>
</tr>
<tr>
<td>d</td>
<td>wind direction</td>
<td>wi</td>
<td>wind speed indicator</td>
</tr>
<tr>
<td>vi</td>
<td>visibility indicator</td>
<td>vv</td>
<td>visibility</td>
</tr>
<tr>
<td>w1</td>
<td>past weather</td>
<td>w2</td>
<td>2nd past weather</td>
</tr>
<tr>
<td>t1</td>
<td>temperature indicator</td>
<td>at</td>
<td>air temperature</td>
</tr>
<tr>
<td>dpt</td>
<td>dew point temperature</td>
<td>sst</td>
<td>sea surface temperature</td>
</tr>
<tr>
<td>n</td>
<td>total cloud amount</td>
<td>nh</td>
<td>lower cloud amount</td>
</tr>
<tr>
<td>hi</td>
<td>cloud height indicator</td>
<td>h</td>
<td>cloud height</td>
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<tr>
<td>ch</td>
<td>high cloud type</td>
<td>wd</td>
<td>wave direction</td>
</tr>
<tr>
<td>wh</td>
<td>wave height</td>
<td>sd</td>
<td>swell direction</td>
</tr>
<tr>
<td>sh</td>
<td>swell height</td>
<td>c1</td>
<td>country code</td>
</tr>
<tr>
<td>sc</td>
<td>ship course</td>
<td>ss</td>
<td>ship speed</td>
</tr>
<tr>
<td>ppp</td>
<td>amt. of SLP change</td>
<td>is</td>
<td>ice acccretion</td>
</tr>
<tr>
<td>rs</td>
<td>ice accretion rate</td>
<td>ii</td>
<td>ship ID indicator</td>
</tr>
<tr>
<td>os</td>
<td>observation source</td>
<td>op</td>
<td>observation platform</td>
</tr>
<tr>
<td>ix</td>
<td>stn/weather indicator</td>
<td>wx</td>
<td>wave period indicator</td>
</tr>
<tr>
<td>ird</td>
<td>IMM receipt date</td>
<td>a6</td>
<td>allowance 6 flag</td>
</tr>
</tbody>
</table>
Sample LMRF ASCII output

<table>
<thead>
<tr>
<th>date/time</th>
<th>location</th>
<th>dck/sid/pt</th>
<th>wind</th>
<th>slp</th>
<th>sst</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 1 1</td>
<td>0.0</td>
<td>294.30</td>
<td>41.60</td>
<td>732</td>
<td>57</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>0.0</td>
<td>295.30</td>
<td>43.70</td>
<td>892</td>
<td>29</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>3.0</td>
<td>290.50</td>
<td>40.50</td>
<td>883</td>
<td>50</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>3.0</td>
<td>293.40</td>
<td>41.10</td>
<td>883</td>
<td>50</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>4.0</td>
<td>290.07</td>
<td>42.55</td>
<td>780</td>
<td>89</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>6.0</td>
<td>290.50</td>
<td>40.50</td>
<td>883</td>
<td>50</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>6.0</td>
<td>293.20</td>
<td>44.10</td>
<td>888</td>
<td>79</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>6.0</td>
<td>293.40</td>
<td>41.10</td>
<td>883</td>
<td>50</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>6.0</td>
<td>295.50</td>
<td>42.60</td>
<td>888</td>
<td>79</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>6.0</td>
<td>290.53</td>
<td>42.62</td>
<td>780</td>
<td>89</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>8.0</td>
<td>291.02</td>
<td>42.72</td>
<td>780</td>
<td>89</td>
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<tr>
<td>1990 1 1</td>
<td>9.0</td>
<td>290.50</td>
<td>40.50</td>
<td>883</td>
<td>50</td>
</tr>
<tr>
<td>1990 1 1</td>
<td>9.0</td>
<td>293.40</td>
<td>41.10</td>
<td>883</td>
<td>50</td>
</tr>
</tbody>
</table>

Subset to global size?

• For a short simple record like above

• 155 million ASCII records

• In compressed form the size is 1.7 GB
MSG Access

• Follows the same pattern as LMRF
  - Choose binary archive if desired
  - Select temporal or spatial subsets
  - Select 2º or 1º resolution
  - Select enhanced or standard statistics
  - Select variable
<table>
<thead>
<tr>
<th>MSG Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>S</strong>, Sea surface temperature</td>
</tr>
<tr>
<td><strong>A</strong>, Air temperature</td>
</tr>
<tr>
<td><strong>Q</strong>, Specific humidity</td>
</tr>
<tr>
<td><strong>R</strong>, Relative humidity</td>
</tr>
<tr>
<td><strong>C</strong>, Total cloudiness</td>
</tr>
<tr>
<td><strong>X</strong>, X=WU, psuedo-stress</td>
</tr>
<tr>
<td><strong>Y</strong>, Y=WV, psuedo-stress</td>
</tr>
<tr>
<td><strong>I</strong>, I=UA, Sensible heat parameter</td>
</tr>
<tr>
<td><strong>J</strong>, J=VA, Sensible heat parameter</td>
</tr>
<tr>
<td><strong>K</strong>, K=UQ, Latent heat parameter</td>
</tr>
<tr>
<td><strong>L</strong>, L=VQ, Latent heat parameter</td>
</tr>
<tr>
<td><strong>W</strong>, Scalar wind</td>
</tr>
<tr>
<td><strong>U</strong>, Wind U component</td>
</tr>
<tr>
<td><strong>V</strong>, Wind V component</td>
</tr>
<tr>
<td><strong>P</strong>, Sea level pressure</td>
</tr>
<tr>
<td><strong>D</strong>, D=S-A, Sea air temperature difference</td>
</tr>
<tr>
<td><strong>E</strong>, E=(S-A)W, temp. diff. × scalar wind</td>
</tr>
<tr>
<td><strong>F</strong>, F=QS^1-Q, Specific humidity difference</td>
</tr>
<tr>
<td><strong>G</strong>, G=FW, Evaporation parameter</td>
</tr>
<tr>
<td><strong>M</strong>, M=FU</td>
</tr>
<tr>
<td><strong>N</strong>, N=FV</td>
</tr>
<tr>
<td><strong>B1</strong>, B1=W^3</td>
</tr>
<tr>
<td><strong>B2</strong>, B2=W^3</td>
</tr>
</tbody>
</table>
Sample MSG ASCII output

<table>
<thead>
<tr>
<th>YEAR</th>
<th>MON</th>
<th>BSZ</th>
<th>BLD</th>
<th>BLA</th>
<th>PID2</th>
<th>S1</th>
<th>S3</th>
<th>S5</th>
<th>M</th>
<th>N</th>
<th>S</th>
<th>D</th>
<th>HT</th>
<th>X</th>
<th>Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
<td>296.0</td>
<td>45.0</td>
<td>0</td>
<td>-1.80</td>
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<td>1.00</td>
<td>0.00</td>
<td>30.00</td>
<td>1.00</td>
<td>0.80</td>
<td>0.90</td>
</tr>
<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
<td>297.0</td>
<td>45.0</td>
<td>0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
<td>6.00</td>
<td>1.00</td>
<td>0.70</td>
<td>0.90</td>
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<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
<td>298.0</td>
<td>45.0</td>
<td>0</td>
<td>0.18</td>
<td>1.00</td>
<td>3.00</td>
<td>1.67</td>
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<td>0.00</td>
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<td>3.00</td>
<td>1.58</td>
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<td>1.59</td>
<td>16.00</td>
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<td>1</td>
<td>292.0</td>
<td>44.0</td>
<td>0</td>
<td>4.48</td>
<td>5.00</td>
<td>5.84</td>
<td>5.19</td>
<td>7.00</td>
<td>0.95</td>
<td>16.00</td>
<td>0.60</td>
<td>0.80</td>
<td>0.20</td>
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<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
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<tr>
<td>1990</td>
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<td>1</td>
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<td>44.0</td>
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<td>1</td>
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<td>44.0</td>
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<td>0.43</td>
<td>1.50</td>
<td>2.00</td>
<td>1.40</td>
<td>10.00</td>
<td>0.94</td>
<td>16.00</td>
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<td>1</td>
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<td>44.0</td>
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<td>2.30</td>
<td>1.27</td>
<td>18.00</td>
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<td>44.0</td>
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<td>0.25</td>
<td>0.90</td>
<td>0.22</td>
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<td>14.00</td>
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<tr>
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<td>1.00</td>
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<td>0.50</td>
<td>0.60</td>
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<tr>
<td>1990</td>
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<td>1</td>
<td>300.0</td>
<td>44.0</td>
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<td>-0.66</td>
<td>0.00</td>
<td>0.33</td>
<td>-0.18</td>
<td>5.00</td>
<td>0.99</td>
<td>16.00</td>
<td>0.00</td>
<td>0.50</td>
<td>0.80</td>
</tr>
<tr>
<td>1990</td>
<td>1</td>
<td>1</td>
<td>290.0</td>
<td>43.0</td>
<td>0</td>
<td>4.40</td>
<td>5.60</td>
<td>6.71</td>
<td>5.58</td>
<td>13.00</td>
<td>1.08</td>
<td>22.00</td>
<td>0.40</td>
<td>0.60</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Each line has all computed statistics

- **S1** 1/6 sextile (est. of $M - 1S$)
- **S3** 3/6 sextile (the median)
- **S5** 5/6 sextile (est. of $M + 1S$)
- **M** mean
- **N** number of observations
- **S** standard deviation
- **D** mean day-of-month of observations
- **HT** fraction of observations in daylight
- **X** mean longitude of observations
Other access points for COADS data

- At CDC
  - Real time service for all MSG products
    - netCDF format
    - graphics and data subsets in netCDF
  - New, very recent
    - Real time access via LAS/Ferret/DODS to all MSG products
    - Many formats, graphics, and subsets
  - Roland will give the full story next
Other access points for COADS data

At NCDC
- Forthcoming, next 12 months or so
  - LAS/Ferret/DODS access to analyses based on COADS
    - First SST
  - Access to ASCII formatted observations based on GTS data stream.
    (extend formal COADS to near real-time)
Improved Service from NCAR/CDC/NCDC

- Better, single point, information center
  - Intuitive layout for users
  - Need to accommodate new methods and sources
  - Need clearer references to analyzed products from COADS
- COADS project activities
- Outside groups, e.g. various Kaplan analyses, work at JISAO, work at UK MET, work at FSU, and many others
COADS Data and Metadata
COADS Data

Documentation, Software, and Metadata

COADS data products fall into two basic categories:

- individual observations (surface marine reports from ships, buoys, etc.)
- monthly summary statistics for 2° latitude x 2° longitude boxes (and for 1°x1° boxes since 1960)

The current period of record is 1784-1997 (monthly summaries extend only back to 1830). The participating organizations offer a highly diverse set of products and formats in their respective data centers:

- **National Center for Atmospheric Research (NCAR)**
  - Spatial and temporal subsets, if provided, are required for both data products. NCAR data sets can be made available for appropriately small monthly summary and observational data requests.
  - Contact person: [Name] at NCAR/DSS.

- **NOAA/Climate Diagnostics Center (CDC)**
  - [COADS netCDF monthly summaries](http://www.cdc.noaa.gov)
  - NCEP Real-time Marine Data (1991-date) provide a continuation of some COADS products in near-real-time (updated monthly)
    - Individual observations (simple ascii format)
    - 2° monthly summaries:
      - [simple ascii format (1991-)](http://www.cdc.noaa.gov)
    - e-mail contact: cdc.data@cdc.noaa.gov

- **NOAA/National Climatic Data Center (NCDC):**
Intuitive Layout for Users
Product and Service Organization

Observations

Monthly Summary Statistics

Analyses

Help Sources

Metadata, Documentation, and Software
Why Bother?

- So the three centers can effectively serve the worldwide research community.

- **Problem:** Various versions of COADS are available online, some are quite old and out of date. Scientists may not get our best collection. Impacts could be small or large?
IRI/LDEO Climate Data Library
http://ingrid.ldgo.columbia.edu/SOURCES/.COADS/

National Snow and Ice Data Center
http://www-nsidc.colorado.edu/data/docs/daac/nsidc0057_coads.gd.html

Texas A&M University
http://bass.tamu.edu/SOURCES/.TAMU/.COADS/.COADS_anomalies.cdf/

German – DKRZ
http://www.dkrz.de/forschung/project/iaods/coads.html

Commercial Ventures – EarthInfo
http://www.earthinfo.com/databases/gm.htm

Just a few examples:
• out of date collections
• advanced products based on old collections
Benefits of a centralized COADS information

- Users can find a variety of access methods and formats in one place
- A full set of support information and help is available
- The archives are current
  - Scientist worldwide have the best and same information
End

• Email: worley@ucar.edu

• COADS website:
  http://www.cdc.noaa.gov/coads/