OpenADDE: Efficient Delivery of Remotely-Stored Data

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Introduction

Two computing issues that continue to face geophysical scientists throughout the world are large datasets and a variety of file formats. It is not unusual for individual files to be hundreds of megabytes in size in a format that your preferred software is not compatible with. Nearly a decade ago, a remote data access system was designed for use with the Man computer Data Access System (McIDAS). Called the Abstract Data Distribution Environment, ADDE is a remote data access protocol that communicates data requests from McIDAS-X client applications to data servers. The data servers, in turn, return the data objects to the clients. This client/server system addresses the two issues by:

- Data sectorizing to return only the data requested, not the entire file, and
- Returning data in a single format, not necessarily in the original file format.

The ADDE was designed for efficient data delivery by enabling servers to geographically sectorize and convert stored data to scientific values. The data is returned in a defined 'image object' which is unlike the original stored file format. The advantage to the image object is that all data is returned to the client in one format, regardless of the stored format on the server. Therefore, the application has to be written only for the image object format and does not have to deal with a variety of other formats, such as netCDF, HDF, GRIB, etc. The responsibility, therefore, is on the data provider to write an ADDE server for their specific format.

ADDE has been used by McIDAS-X client applications worldwide since 1994. The remote access feature, along with optional compression on-the-fly, enables scientists to work with data on servers that can be located anywhere, the only requirement being Internet connectivity. Recently, a Java interface has been written to allow non-McIDAS client applications to access the ADDE servers. These applications include Matlab, IDL, VisAD, and the IDV (Integrated Data Viewer). SSEC scientists continue to write ADDE data servers, but with the growing client base and the availability of other data types, we feel that the time is right to enlist others to write servers for their specific data formats. OpenADDE is an open source version of ADDE, which will allow others to write servers for their data types. The expansion of ADDE servers will encourage and enable the free use of data throughout the science community.

ADDE Features

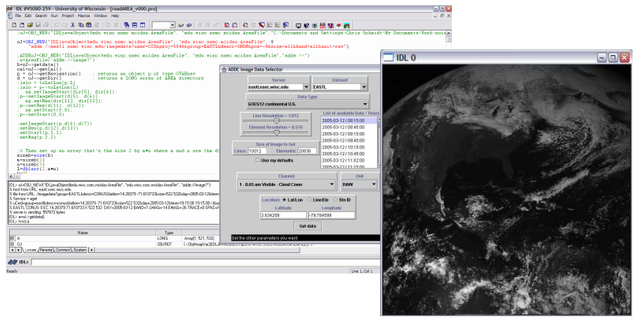
- In use for 10 years worldwide
- Open source
- Sectorizing of geographic coverage and bands [extracting 1 band is 2% of MOD021KM file]
- Compressed transmission on-the-fly
- Private TCP/IP through registered port 112
- Variety of clients can access the servers
- All data returned in common format; not the stored format

ADDE Servers

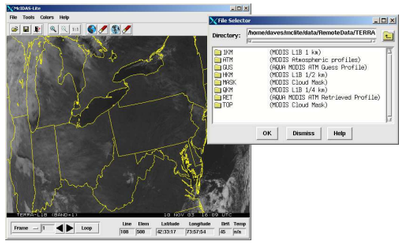
- MOD02: MODIS Level 1b
- MOD06: Cloud top properties
- MOD07: Atmospheric profiles
- MOD35: Cloud mask
- AIRS Level 1b
- Other satellites: GOES, POES, AMSR-E, Radar, etc.
- Other data types: GRIB, netCDF, HDF

Client Applications

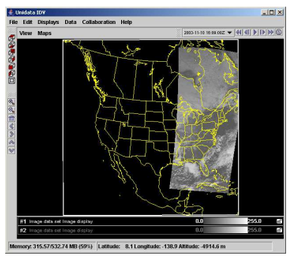
IDL



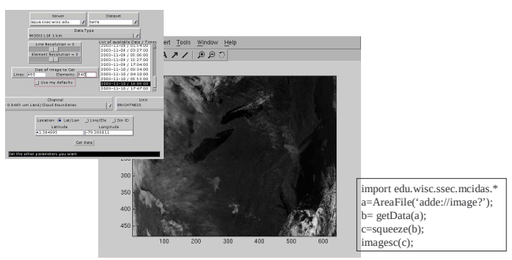
McIDAS-X
McIDAS-Lite



IDV



Matlab



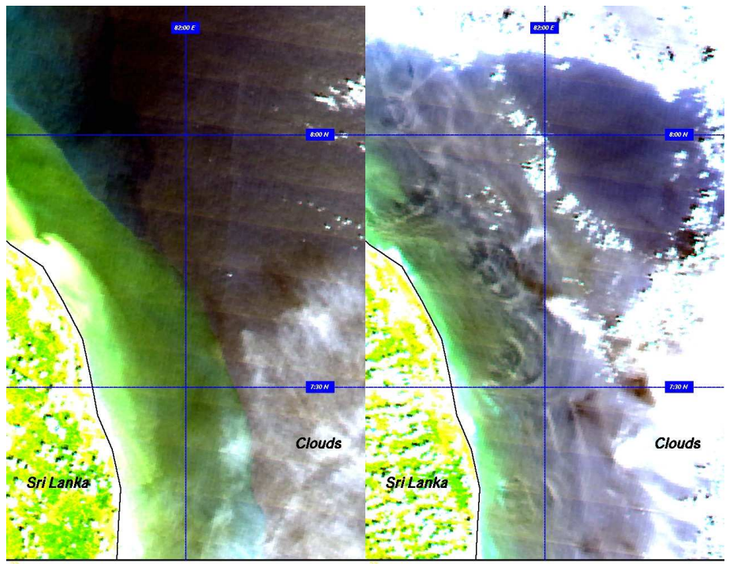
```
import edu.wisc.ssec.mcidas.*
a=AreaFile('adde://image7');
b= getData(a);
c=squeeze(b);
imagesc(c);
```

Available Servers

- GSFC DAAC [near realtime MOD02]: g0dug03u.ecs.nasa.gov
- NOAA bentpipe [realtime MOD02]: nanuk.eosdis.nasa.gov
- Direct Broadcast sites:
  - Fairbanks, Alaska
  - Kiruna, Sweden
  - Madison, Wisconsin
- Other data types: gp16.ssd.nesdis.noaa.gov
  - GOES, Meteosat, Radar, GOES products

Software Links

- OpenADDE: http://www.ssec.wisc.edu/mcidas/software/openadde/
- McIDAS-X: http://www.ssec.wisc.edu/mcidas
- McIDAS-Lite: http://www.ssec.wisc.edu/mcidas/software/mclite/
- VisAD: http://www.ssec.wisc.edu/~billh/visad.html
- IDV: http://my.unidata.ucar.edu/content/software/IDV/index.html



A unique view with MODIS: Nearly two hours and 30 minutes after the wave hit the coast, Terra passed over Sri Lanka's coastal zone providing a rare glimpse of sediment transport along the continental slope due to this tsunami. The satellite imagery indicates wave-like features from the tsunami being reflected, diffracted, and scattered off the steep continental slope and submarine canyons adjacent to Sri Lanka.