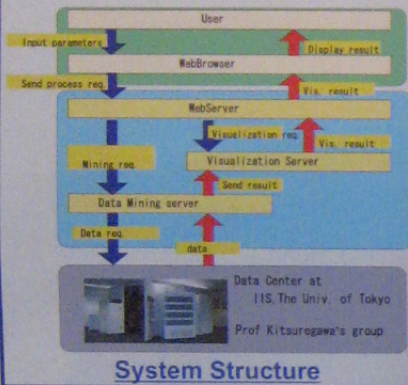# Development of Data Analysis Tools for CEOP Data Archive
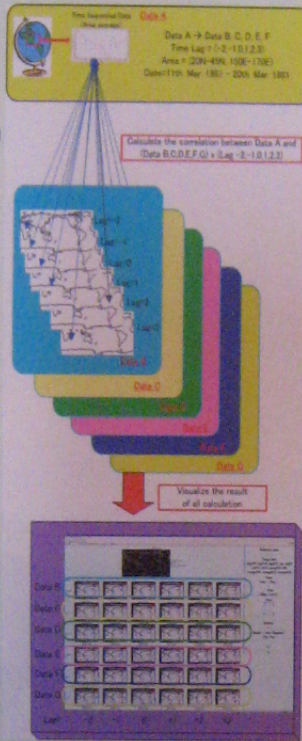
Eiji Ikoma, Masaki Yasukawa, Kenji Taniguchi, Toshio Koike, Masaru Kitsuregawa
The University of Tokyo
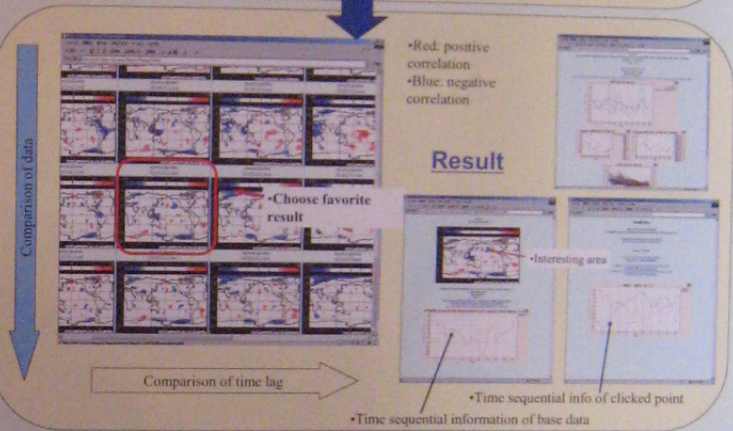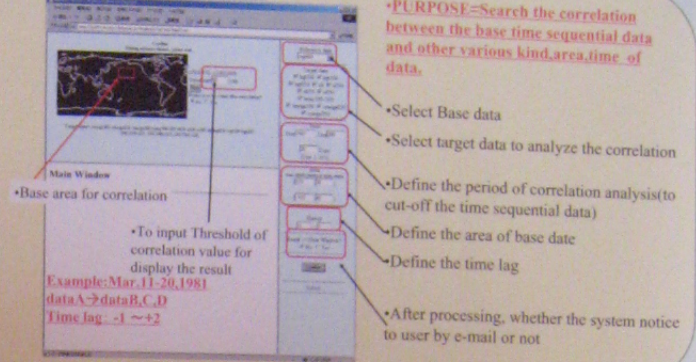
■ Visual Mining Tool for CEOP Data Archive

➤ Computation and Visualization of the correlative index with the targeted data among data with different spatial and temporal resolutions.

➤ Detection of the phenomenon with Tel-connection (Correlativity with spatial remote area)

➤ Analysis implementation of rug correlativity (Correlativity among data distant in time: e.g. a cold summer in Japan at El Nino phenomenon)

System Structure

Methods of processing

User Interface

• PURPOSE=Search the correlation between the base time sequential data and other various kind, area, time of data.

• Select Base data

• Select target data to analyze the correlation

• Define the period of correlation analysis (to cut-off the time sequential data)

• Define the area of base date

• Define the time lag

• After processing, whether the system notice to user by e-mail or not

• Base area for correlation

• To input Threshold of correlation value for display the result

Example: Mar.11-20,1981
dataA→dataB,C,D
Time lag: -1 ~+2

• Red: positive correlation
• Blue: negative correlation

Result

• Choose favorite result

• Interesting area

Comparison of time lag

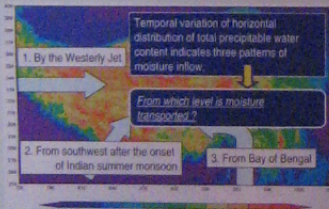• Time sequential info of clicked point
• Time sequential information of base data

■ Powered Visualizer for Three-dimensional AIRS Data Set

Recent satellite Aqua allows us to analyze three dimensional sensor data. Although lots of systems have been developed so far for two dimensional data, sophisticated tools for three dimensional data has not well explored.
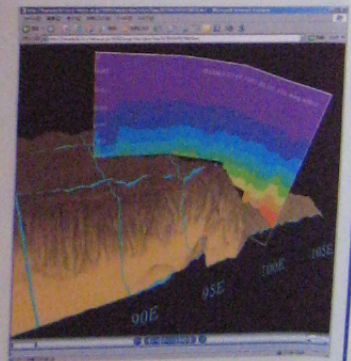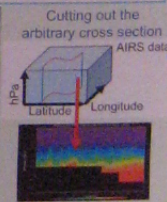
In this study we developed yet another visualizing system for AIRS data set to examine the moisture flow.

• Visualization for the raw data

The three-dimensionally visualization for the AIRS raw data has been available using the web-based interface and VRML (Virtual Reality Modeling Language).

Visualization of Multiple Products (voxel size: water vapor, color: temperature)

Temporal variation of horizontal distribution of total precipitable water content indicates three patterns of moisture inflow.

1. By the Westerly Jet

From which level is moisture transported ?

2. From southwest after the onset of Indian summer monsoon

3. From Bay of Bengal

Used data

• AIRS Level 2 Standard Retrieval Data Set
• H2OMMRStd (retrieved water vapor mass mixing ratio) , TAirStd (retrieved atmospheric temperature profile) and more
• The spatial resolution at nadir is 13.5 km
• Number of pressure level is 28.

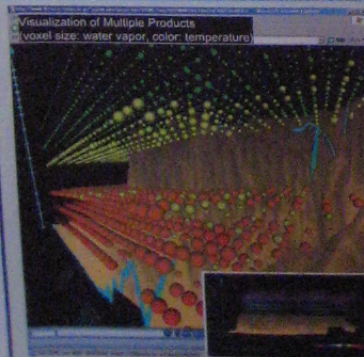### • Visualization of the arbitrary cross section

The three-dimensionally visualization tool for the arbitrary cross section of the AIRS data has been developed. Also, the users can view the time series data as the animation.

Flow:
• The users can select the parameters (the product, the period and the latitude-longitude on the cross section).
• The AIRS data is retrieved from the DBMS.
• Calculating the continuous cross section using the above input latitude-longitude.
• Resampling the AIRS data on the cross section.
• The resampled data is expressed with the color shaded image as horizontal axis of the track and vertical axis of the pressure level.
• The VRML (the axis of the latitude, the longitude and the pressure level) is generated with the above image.
• The DEM is overlaid.
• The result is displayed on the Web browser.

• Users can visually confirm the data along the arbitrary cross section such as the moisture flow.
• The animation of the time series is displayed.
• It is useful for the time series analysis along the arbitrary cross section.
• The AIRS data of necessity minimum is simply displayed.

Cutting out the arbitrary cross section

AIRS data

• Overlay of the AIRS arbitrary cross section and the reanalysis data

The flexible visualization tool for overlaying the arbitrary cross section of the AIRS data and the related data such as the reanalysis data

The localized torrential rain in Niigata Prefecture and Fukui Prefecture of Japan in July 2004.

2004.07.14.07
AIRS_H2OMMRStd and NCEP_HGT
2004.07.14.07

Flow:
• The users can select the parameters (see left figure).
• Retrieving the AIRS data and generating the arbitrary cross section.
• The server generates the contour chart of the geopotential height or the arrows of the wind in the selected pressure level.
• The above generated contents and the DEM are combined.
• The result is displayed.

• It is useful for the region analysis on the meteorological field.
• By overlaying the AIRS data and the reanalysis data such as the geopotential height and the wind, it is possible to recognize the trend of the moisture flow along the arbitrary curved surface.
• The two kinds of the time series display methods are prepared. (The side is suitable for viewing the detail of the moisture structure in the interest area. The animation is suitable for catching the movement of the moisture in the interest area.)
• The amount of the load download is small for the server side processing.

Change of the voxis