Lecture on outline of JMA's interactive tool for analysis of climate system

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Introduction

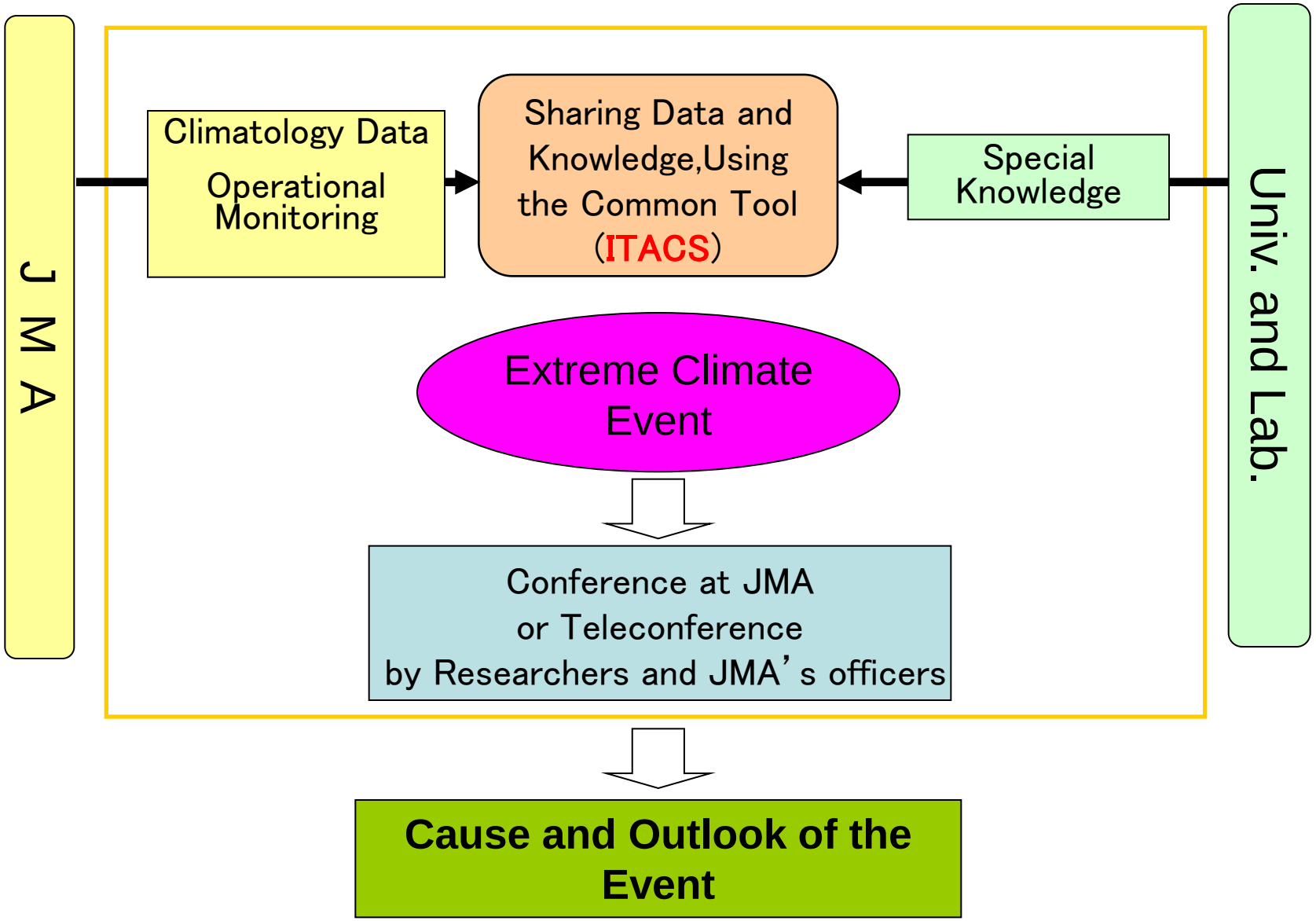
・To announce advanced information about climate events that occurred in Japan to people, JMA has established a panel composed by researchers at Univ. and Lab.

・To proceed to a discussion smoothly at the conference, we should share the climatology data with researcher. And it is effective that we and researchers use a common tool for analysis of climate system.

・So JMA developed new software named Interactive Tool for Analysis of Climate System (ITACS).

あいたくす
I entrust love.
我托愛
나는 사랑을 맡긴다

The Account Panel for Extreme Climate Event



The Account Panel for Extreme Climate Event

Dr. Masahide Kimoto
The Chairman of the panel
(Center for Climate System Research, University of Tokyo)

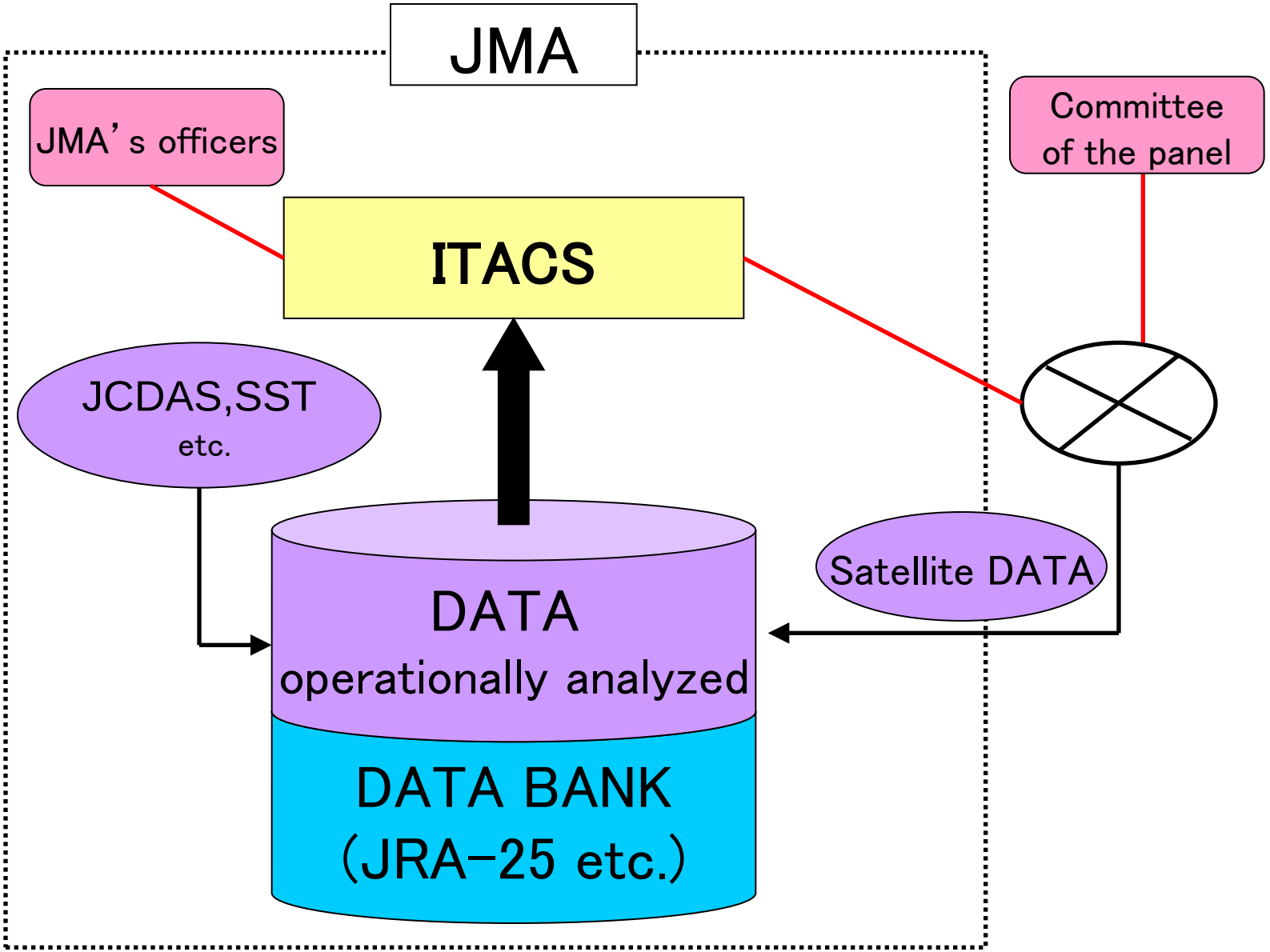
解説スペシャル

記録的猛暑　ゲリラ豪雨

偏西風蛇行で異常気象の夏

An article about heavy rain and heat wave in this summer

An Outline of ITACS



What can we do by ITACS?

Drawing chart

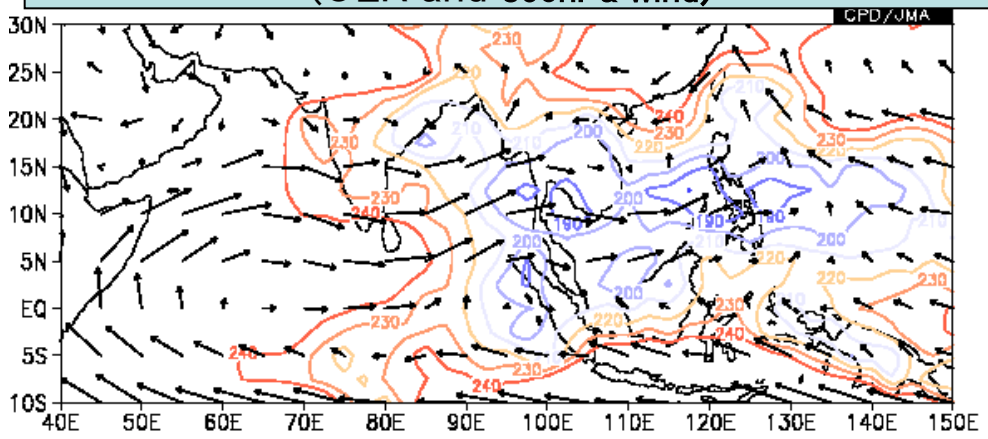
・On a web browser, we set parameters for the chart.
・We don't need any programming.
・We can make not only ordinary plane chart, but also vertical cross section, time cross section, time series and animation.

Statistical analysis

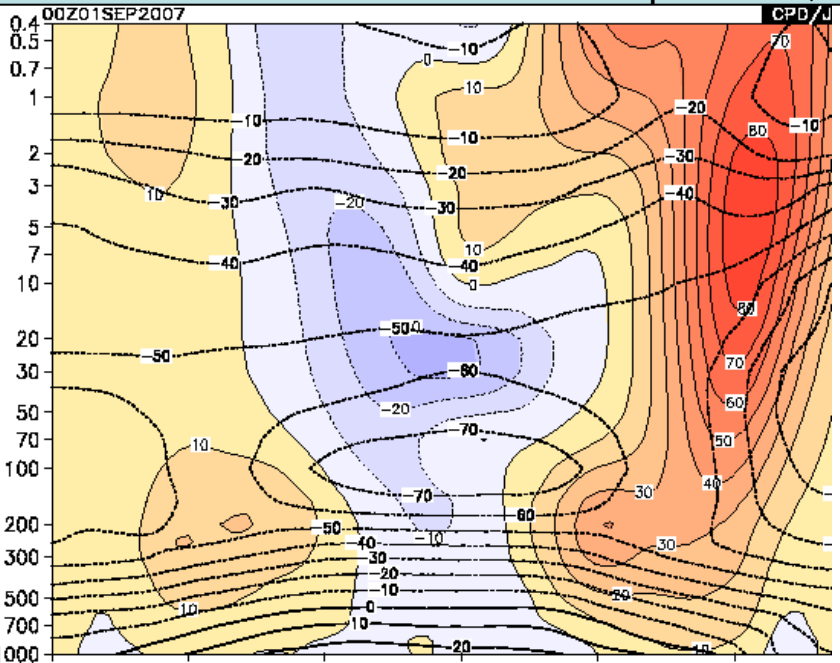
・We set parameters for the statistical analysis in the same way as drawing chart.
・We can test various techniques of statistical analyses.
・We can see the result with statistically confidence on the chart.

Example of Chart

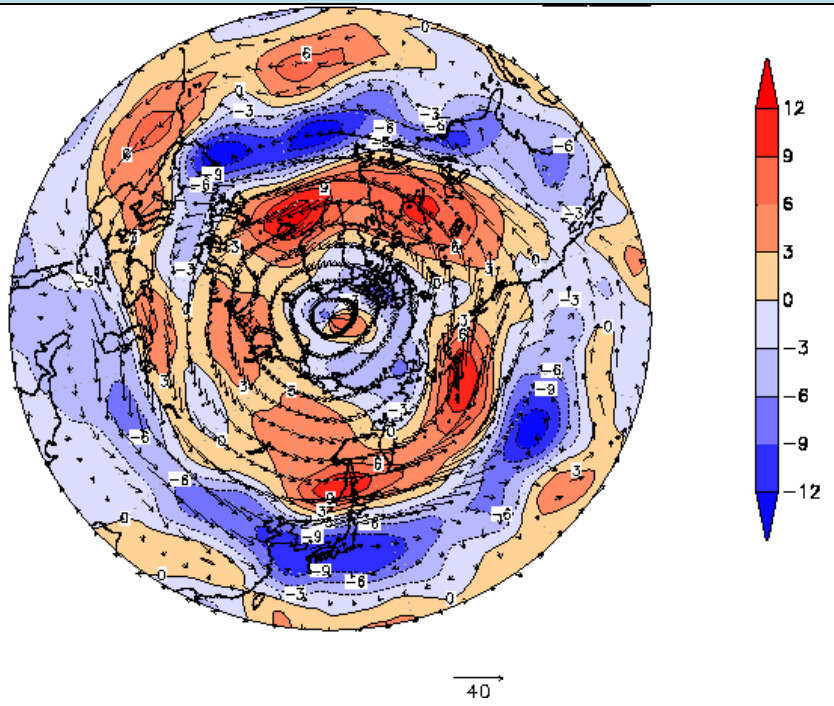
Mercator, contour and vector
(OLR and 850hPa wind)



vertical cross section, contour and shade
(zonal mean zonal wind and air temperature)

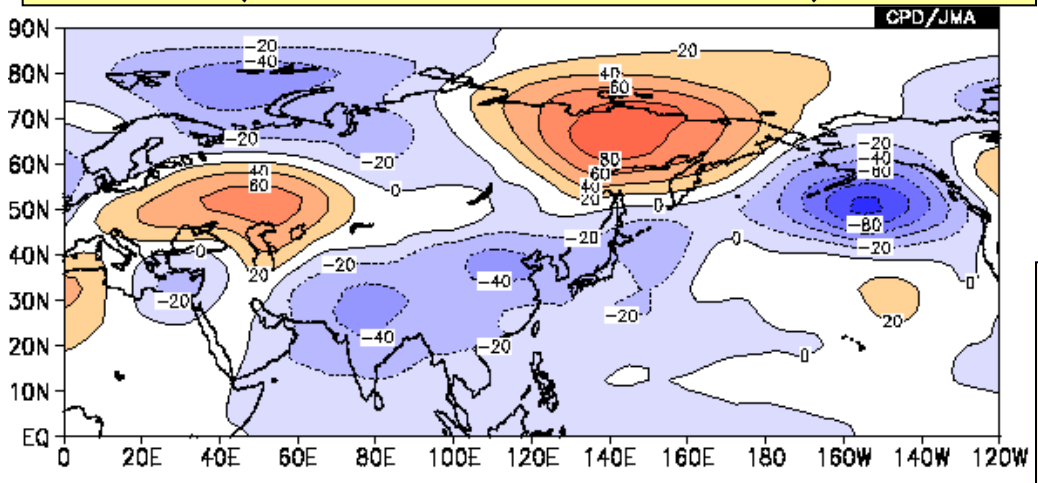


Polar Stereographic, shade and vector
(200hPa zonal wind anomaly and wind vector)

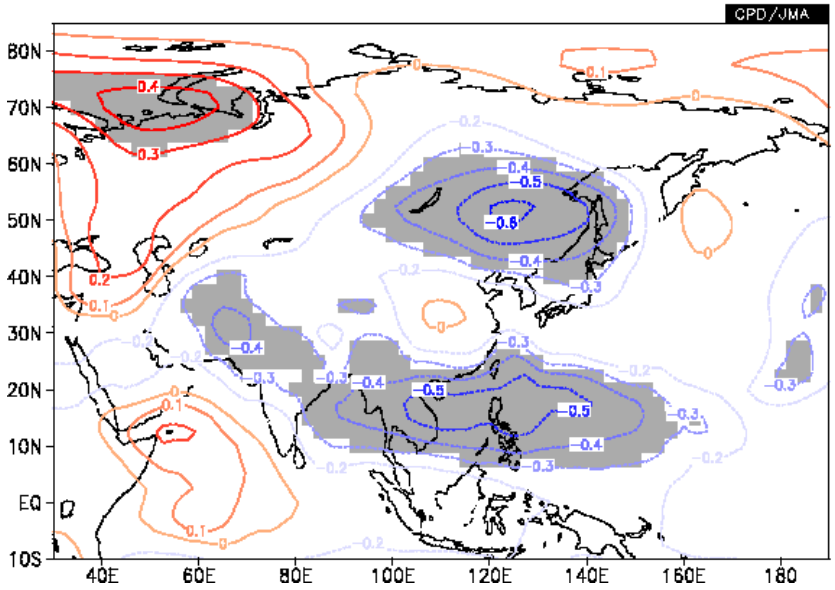


Example of statistical analysis.

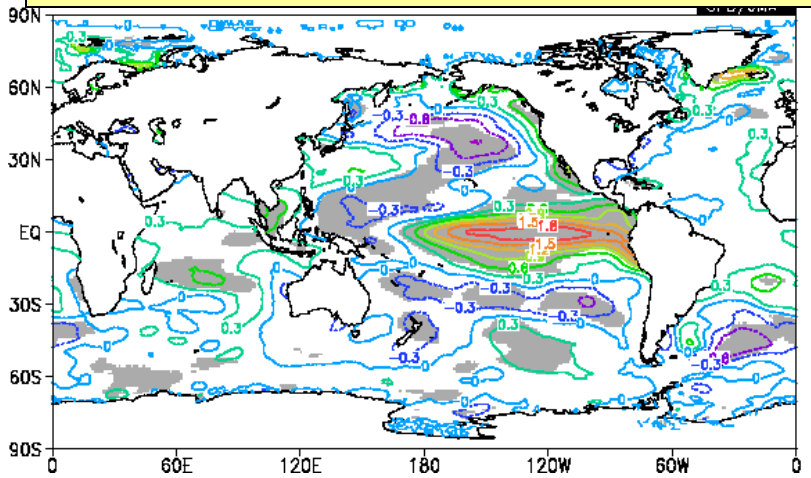
SUBTRACT
(Z500 minus zonal mean Z500)



CORRELATION COEFFICIENT
(between Z500 and OLR around INDIA in August.)



SIGNIFICANCE TEST
(SST composite of El nino years in January. In the shaded areas the differences between the composite patterns of EL Nina and La Nino are statistically significant with a 95% confidence level based on t-test.)



DATA

・**JRA-JCDAS**

atmospheric global analysis obtained by Japanese 25-year Reanalysis (JRA-25) project and JMA Climate Data Assimilation System (JCDAS) which is using same data assimilation system as that of JRA-25. (from 1979 to present, daily/pentad/monthly, 2.5deg x 2.5deg)

・**SST**

sea surface temperature (SST) and sea ice concentration obtained by operational analysis of JMA. (from 1891 to present, daily/pentad/monthly ,1deg x 1deg)

・**MOVE-G1, MOVE-G2** *being registered now

oceanic temperature, salinity, current velocity, and so on obtained by the operational ocean data assimilation system in JMA. (from 1958 to present, pentad/monthly, 2.5deg x 2.5deg)

・**ODAS**

ocean analysis data obtained by the assimilation system which has been operated until March, 2008 in JMA (from 1986 to March, 2008, pentad/monthly, 2.5deg x 2.5deg)

・**SAT**

outgoing long wave radiation (OLR) analysis from CDC/NOAA.
(from 1979 to present, daily/pentad/monthly, 2.5deg x 2.5deg)

・**CLIMAT**

monthly world climate data at surface stations received from CLIMAT message
(from 1951 to present. monthly, stations)

・**INDEX**

NINO-1, NINO-2, NINO-3, NINO-4, and NINO-WEST

DATA

・USER INPUT

We can input any index that we calculate beforehand and use those data for statistical analysis.

【Example】

Making correlation coefficient between 850hPa geopotential height and precipitation ratio at Tokyo.

Using data

・850hPa geopotential height has already been registered in ITACS.

・We must make dataset of precipitation ratio at Tokyo on the following format.

```
# Tokyo precipitation in 1982-2008.
#undef=-9999
1982,8,1,89
1982,9,1,70
1982,10,1,340
1982,11,1,185
1982,12,1,168
1983,1,1,189
1983,2,1,-9999
1983,3,1,-201
.
.
.
```

Setting Parameters

data1: Parameters for drawing chart

data1

dataset	element	data type	area	level	average period	show period
JRA-JCDAS	Geopotential height(gpm) Vector ☐ SD ☐	ANOM	ALL Lat: 20 – 90 Ave ☐ Lon: -45 – 315 Ave ☐	500 hPa 500 hPa	MONTHLY Ave ☐	RANGE 2008 01 2008 01

data2: Parameter about another data to overlay or for statistical analysis

dataset	element	data type	area	level	average period	show period
JRA-JCDAS	Geopotential height(gpm) SD ☐	HIST	ALL Lat: 20 – 90 Ave ☐ Lon: -45 – 315 Ave ☐	500 hPa 500 hPa	MONTHLY Ave ☐	RANGE 2008 01 2008 01

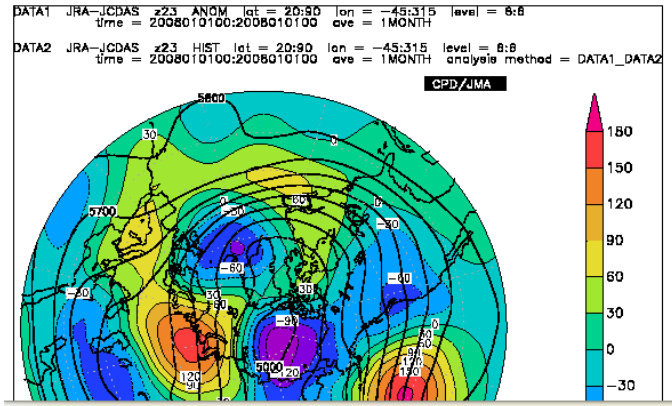
Graphic Option

Colorizing : COLOR
Drawing : SHADE
Image Format : png

☑ Show Contour Labels
☑ Show Color Bar
☐ Set Contour Parameters for data1
interval : min : max :
☐ Set Contour Parameters for data2
interval : min : max :

Color Table : Rainbow
☑ Polar Stereographic : North pole
☐ Logarithmic Coordinates
☐ Reverse the Axes
☐ Flip the X-axis ☐ Flip the Y-axis
☐ No Caption
☐ No Scale Labels
☐ Draw Credit Inside

Graphic options: Options about color, projection, contour ,and so on .



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イントラネット

①Dataset

- JRA-JCDAS
- SAT
- SST
- MOVE-G
- ODAS
- CLIMAT
- USERINPUT
- INDEX

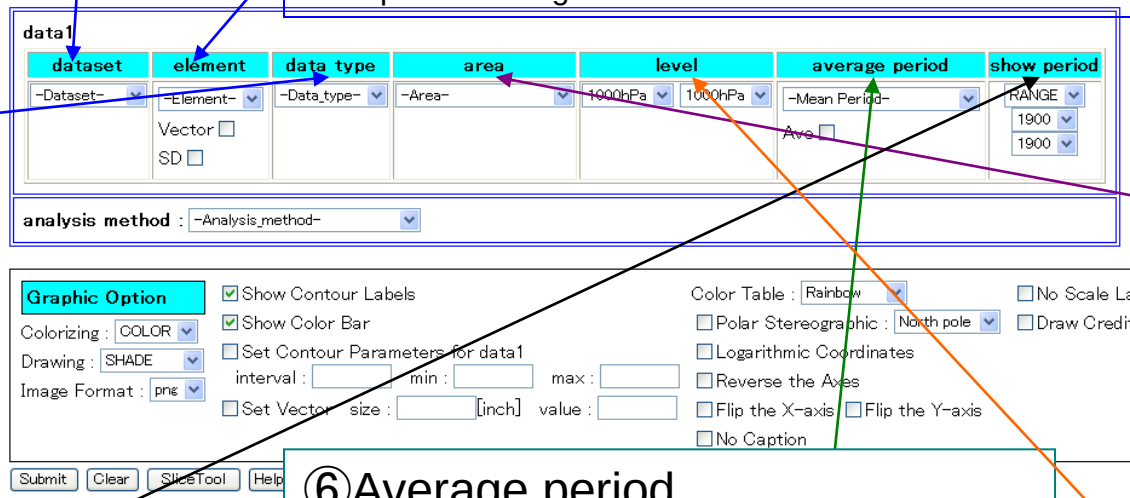
②Element

- Velocity potential
- Pressure vertical velocity
- Stream function
- Surface pressure to MSL
- Air temperature
- Zonal wind
- Meridional wind
- Zonal wind divergence
- Meridional wind divergence
- Calc Zonal component of wave activity flux
- Calc Meridional component of wave activity flux
- Geopotential height

radio button

Vector

SD:(Standard Deviation)



③Data Type

- HIST
- NORM
- ANOM
- ANOM_SD

④Area

- select area
- or input latitude and longitude

⑤Level

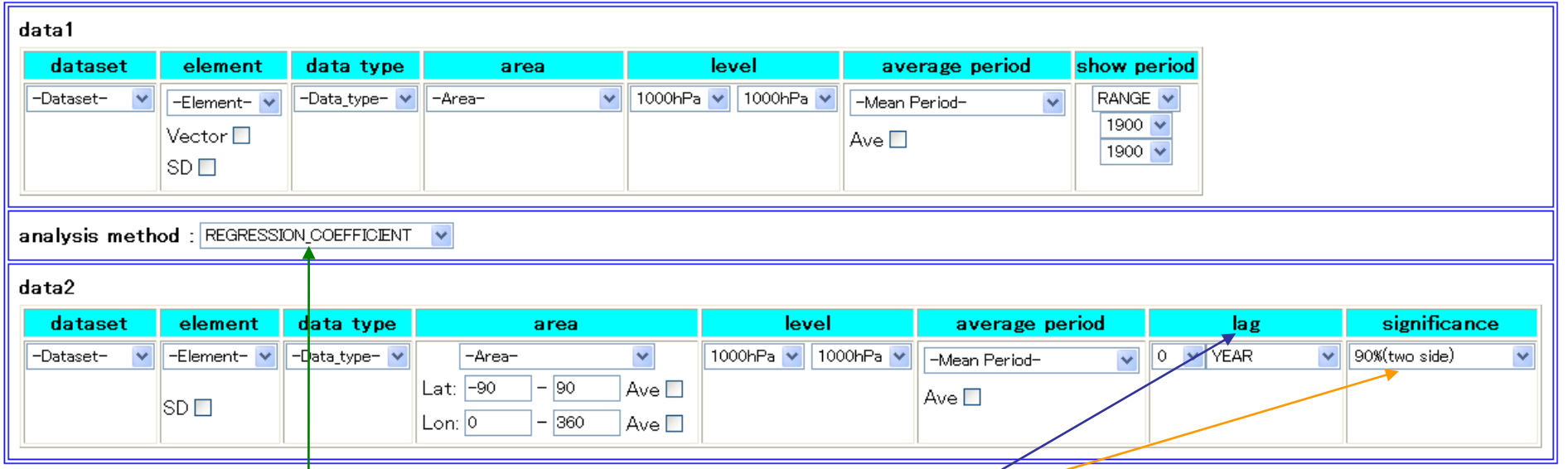
Select vertical level.
To show vertical cross section chart, input bottom level in upper raw and top level in lower raw.

⑥Average period

MONTH
PENTAD DAY
DAILY
Direct input
Year average
(for interannual variations of monthly data)
Year average pentad
(for interannual variation of petad data)
Year average day
(for interannual variation of daily data)

⑦Show Period

RANGE (used usually)
YEARS
(select several years to take the average)
INDEX
(to show the chart under the condition of an index)



⑧Analysis Method

DATA1_DATA2: To overlay data2 with data1(to show data1 and data2 on the same chart)

SUBTRACT: To show data1 minus data2

COMPOSITE: To make composite chart of data1 under the condition set on data2

SIGNIFICANCE_TEST: To show areas where the difference between the composite patterns of data1 and data2 is statistically significant.

REGRESSION_COEFFICIENT: To show regression coefficient (data1 is dependent variable, data2 is explanatory variable.)

CORRELATION_COEFFICIENT: To show correlation coefficient (data1 is dependent variable, data2 is explanatory variable.)

⑨lag

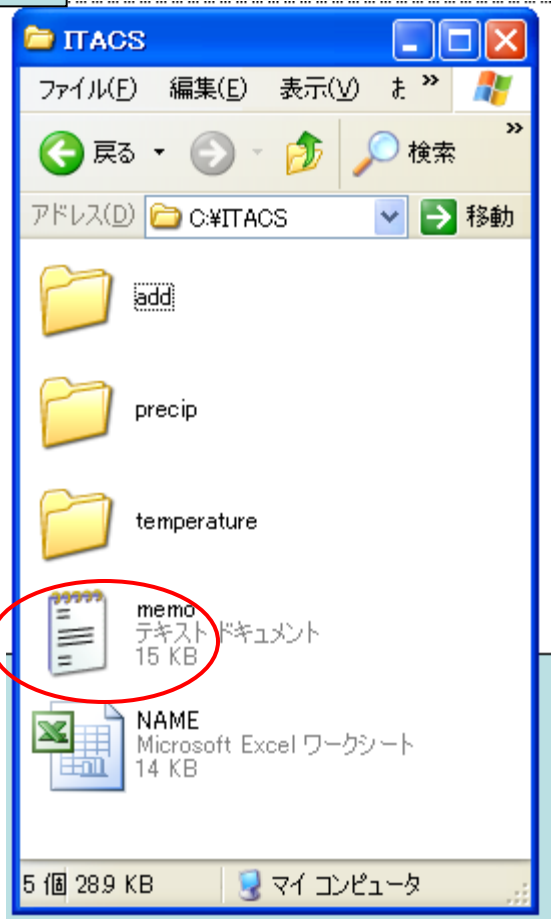
Set when analysis method is REGRESSION_COEFFICIENT or CORRELATION_COEFFICIENT. For example, to show regression coefficient between data1 in August and data2 in July, lag is "-1 month".

⑩significance

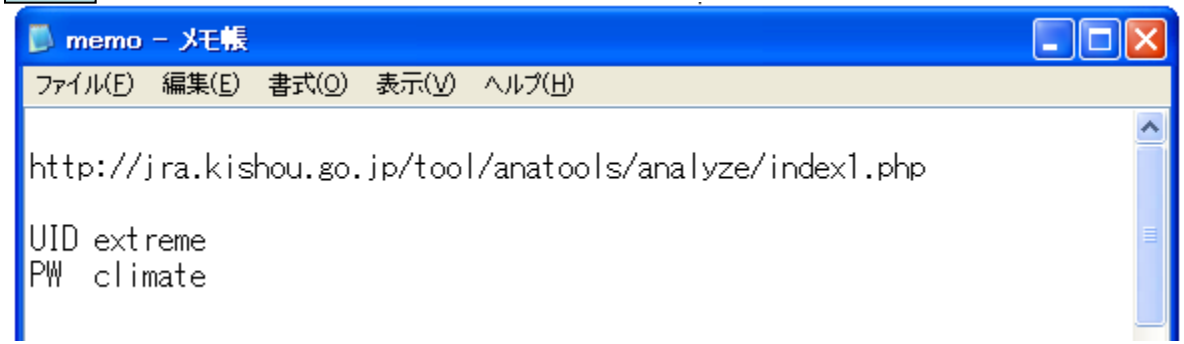
To set confidence level based on t-test

Now, let's use ITACS.

①

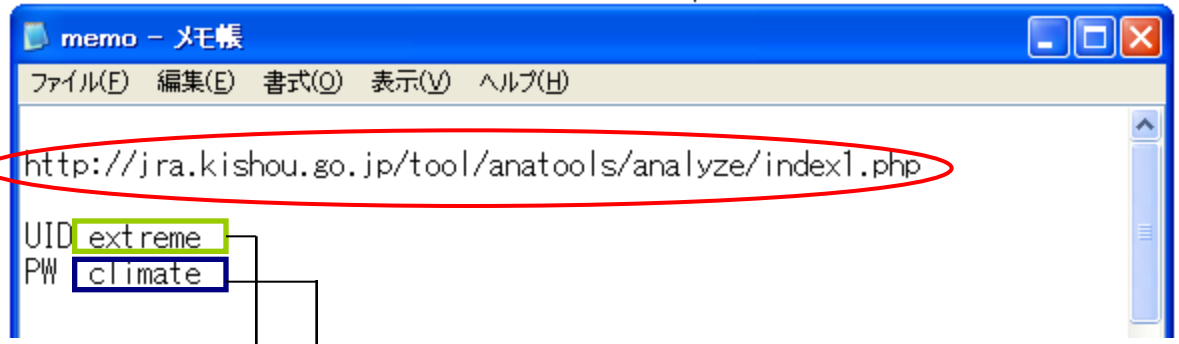


②



① Open the "C:¥ITACS" folder (Start => My Computer => Hard disk drives => C: => ITACS)

② Open the "memo.txt" (Double-click the file). You can find URL (http://***) for ITACS.

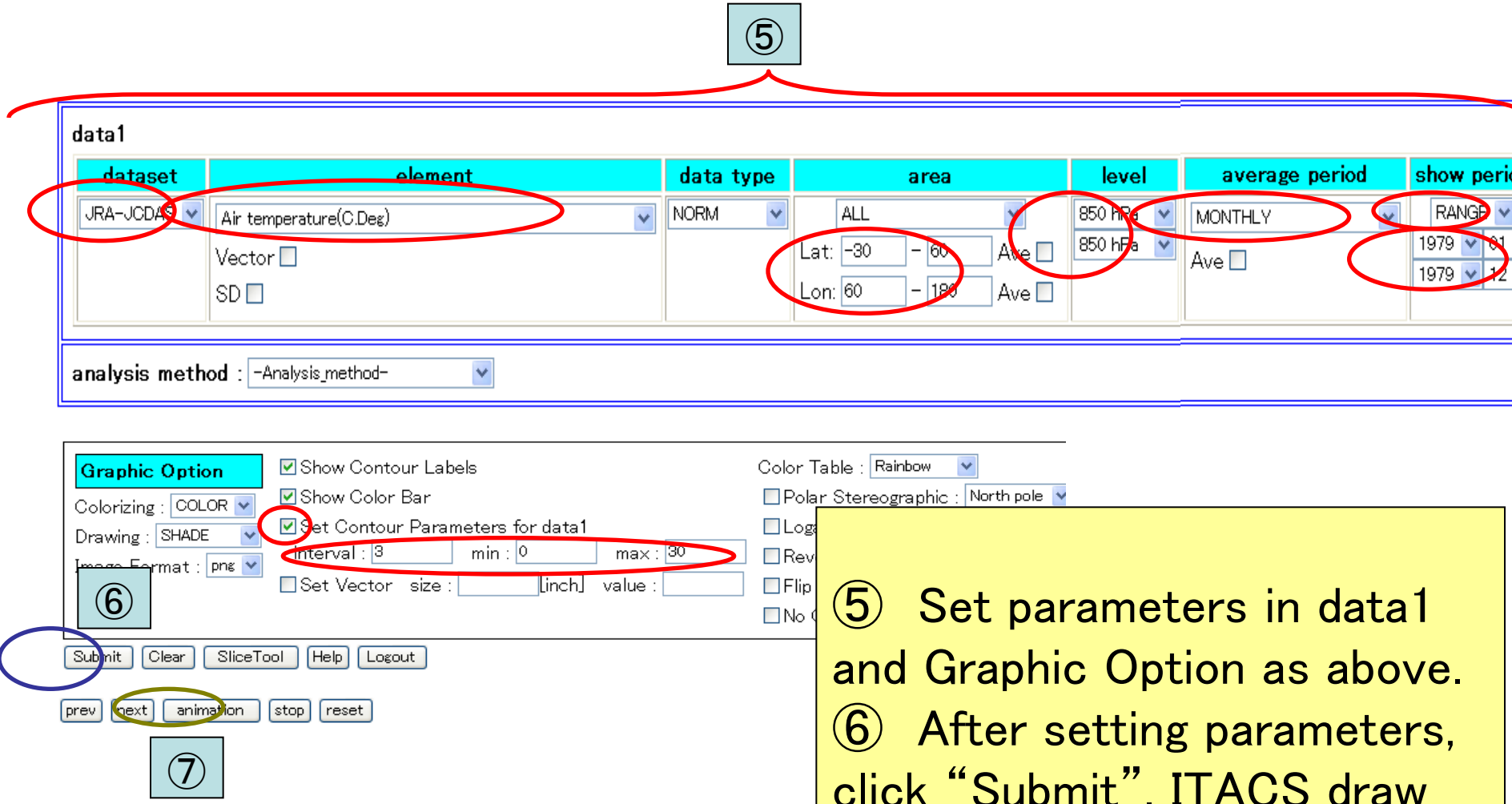


③

④

③Boot up Internet Explorer, and input the URL written in “memo.txt”, and push Enter key.

④You are asked USER NAME and PASSWORD, input those as written in “memo.txt”, and click “OK”.



⑤ Set parameters in data1 and Graphic Option as above.

⑥ After setting parameters, click “Submit”. ITACS draw the chart according to those parameters.

⑦ Click “animation”