

Operation of iTacs

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Goals of this lecture

- To understand what is iTacs.
- To understand the basic concept and operation.
- To draw some figures such as ...
 - 2D-map (Latitude-Longitude map)
 - Time series
 - Cross section (vertical, Hovmöller diagram etc.)
 - Statistical analysis
- To make a *physical interpretation* of the map made by iTacs.

Basic operation of iTacs

Contents

1. What's iTacs?

2. Application for using iTacs

3. Basic operations

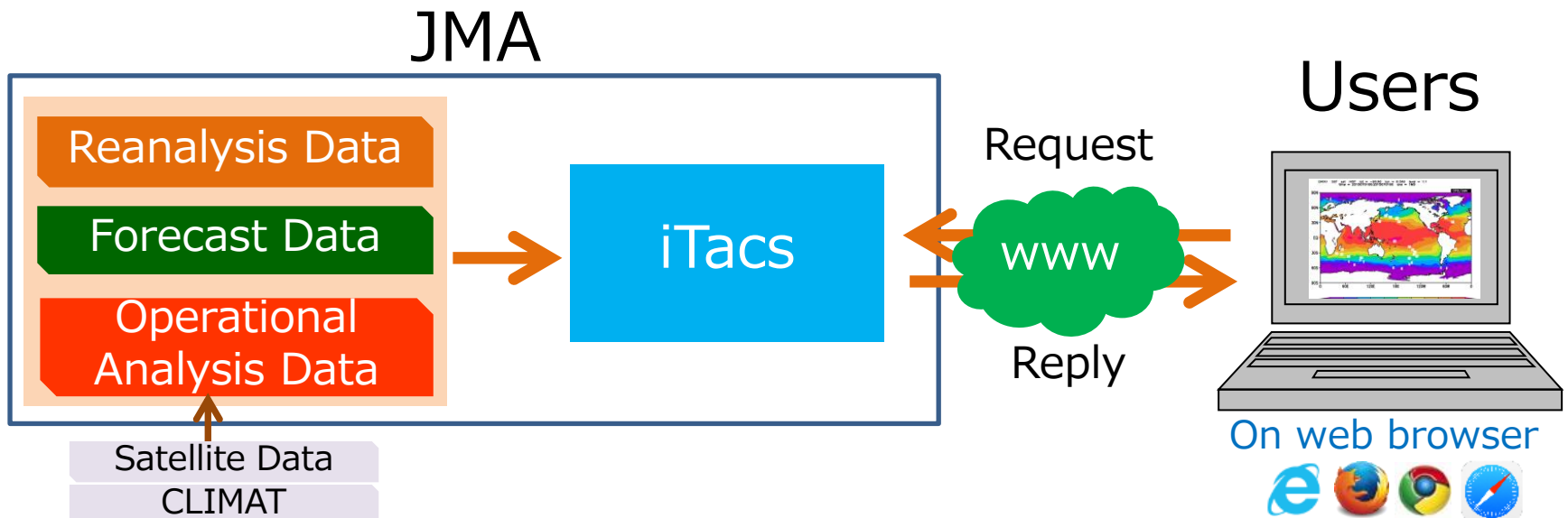
- ❑ Longitude-latitude map
- ❑ Overlaying two data
- ❑ Mapping the difference of two data

4. Advanced operations

- ❑ Area-averaged time series
- ❑ Vertical and latitude/longitude profile
- ❑ Cross section diagram
- ❑ Time filter

What's iTacs?

- It stands for “**I**nteractive **T**ool for **A**nalysis of the **C**limate **S**ystem”.
- Available on web browsers through GUI. No additional software or plug-ins are required.
- Persons at NMHS can use iTacs with personal IDs.



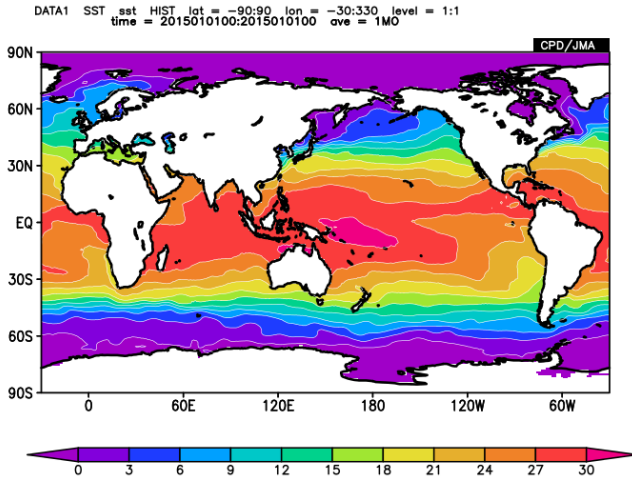
Available data



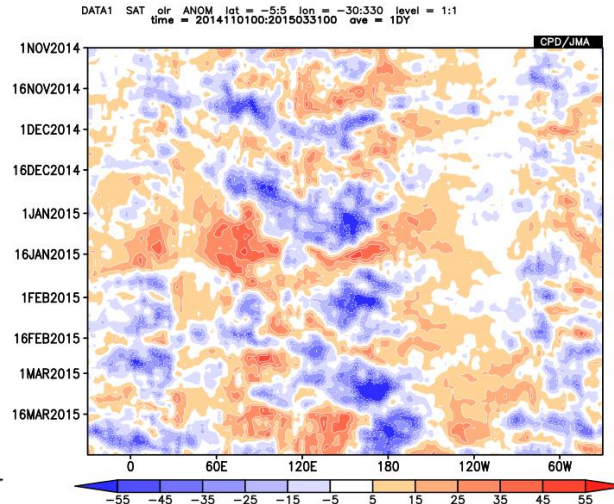
- [Atmospheric analysis data](#)
 - The Japanese 55-year Reanalysis (**JRA-55**) since 1958
 - Outgoing longwave radiation (OLR) data provided by NOAA since 1979 (**SAT**)
- [Oceanic analysis data](#)
 - Sea surface temperature data by COBE-SST since 1891 (**SST**)
 - Oceanographic condition analyzed by MOVE/MRI.COM-G2 since 1958 (**MOVE-G2**)
- [Forecast data](#)
 - Outputs of JMA's one-month prediction model
- [Others](#)
 - Major SST Indices, **CLIMAT** reports, and user-input data (CSV format)

Samples of charts

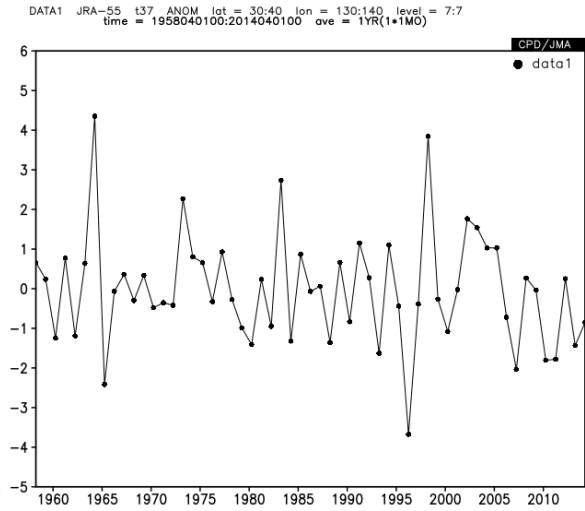
- Various types of charts and statistical evaluation are available.



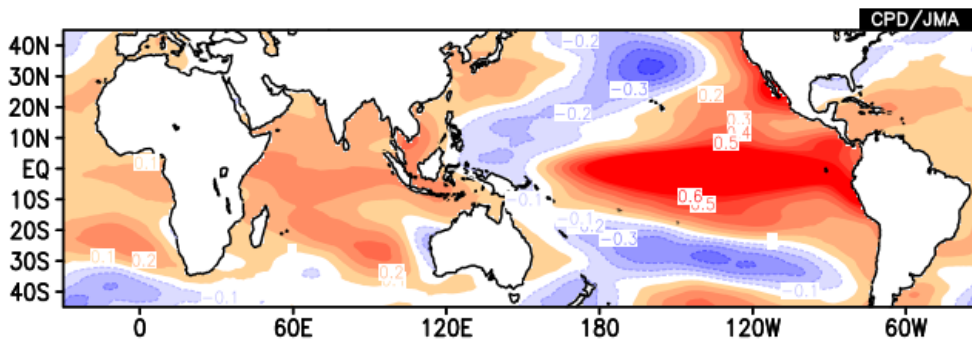
2-D map



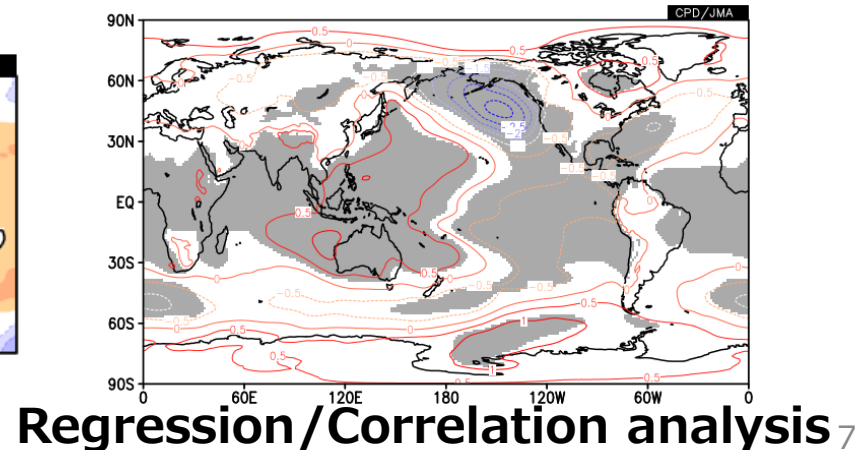
Longitude-time cross section diagram



Time series graph



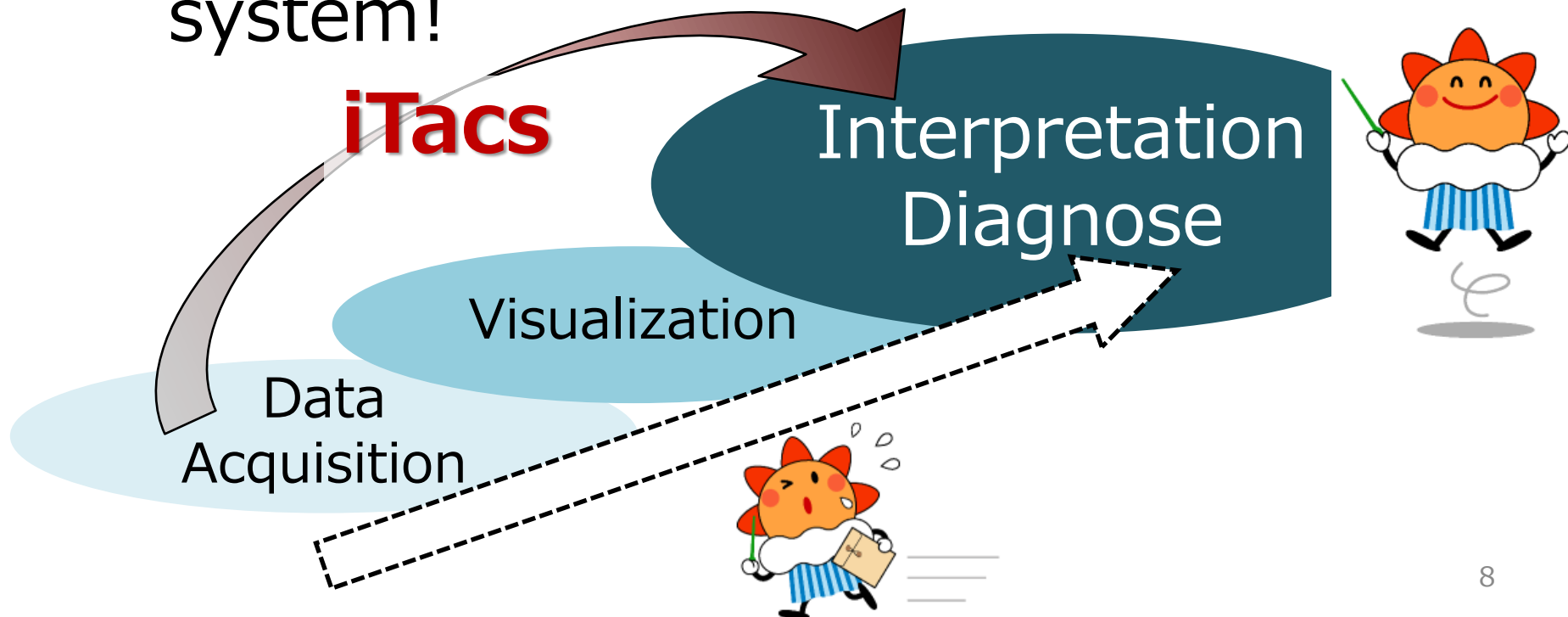
EOF analysis



Regression/Correlation analysis

What's iTacs?

- iTacs is one of the most useful tool and it will strongly help you in the climate system monitoring.
- It costs less time to visualize the data, more time to diagnose the climate system!



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- ❑ Time filter

Application for using iTacs

- Registered users can access iTacs at the Tokyo Climate Center (TCC) website.

TCC website (<http://ds.data.jma.go.jp/tcc/tcc/index.html>)

The image illustrates the user journey to access iTacs. It starts with the Tokyo Climate Center (TCC) website, which features a navigation menu and various climate-related sections. A red box highlights the 'Entrance' link in the 'Main Products' section. An arrow points to the 'iTacs (Interactive Tool for Analysis) Announcement' page, where another red box highlights the 'iTacs v5.0' link. A second arrow points to the 'iTacs Login' page, which includes fields for 'User Name' and 'Password', and a 'Login' button. A final arrow points to the 'iTacs' analysis interface, which displays a table of analysis parameters and options for data selection and analysis.

Entrance

iTacs (Interactive Tool for Analysis) Announcement

14 October 2015 - iTacs version 4.0 will terminate
28 February 2014 - iTacs version 3.0 terminated

iTacs v5.0

iTacs Login

User Name:
Password:
Login

iTacs

Dataset	Element	Data type	Area	Level	Time unit	Showing period
55	Pressure Levels	HST	ASIA	850hPa	MONTHLY	RANGE
T (Temperature) [C]						
Lat: 10	-85	Ave	☑ Ave ☐ Year-to-year		2014	1
Lon: 90	-190	Ave	☐ Time filter		2014	3

Analysis method: [Analysis method]

Analysis Data Submit

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Standard procedure (1)

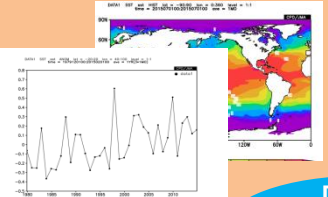
Select Analysis or Forecast dataset

Setting Data parameters

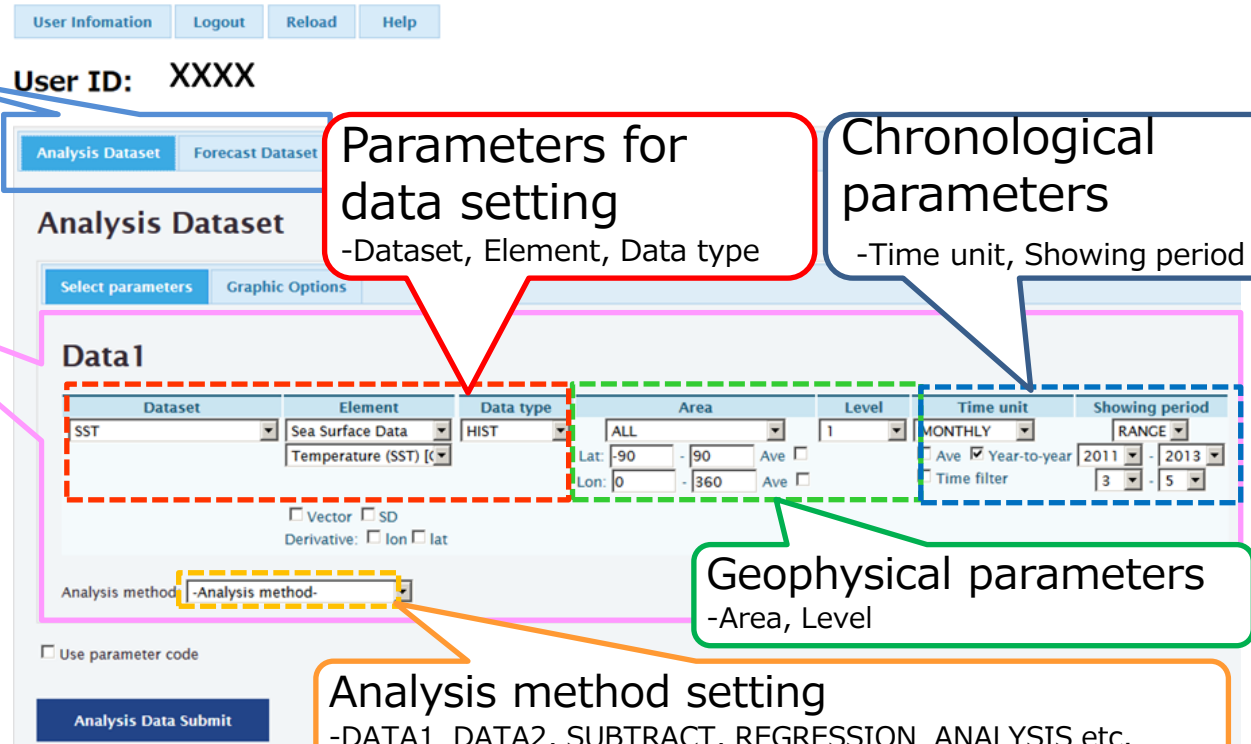
Setting Graphic Options

Data Submit

Draw map



Data download



User Information Logout Reload Help

User ID: XXXX

Analysis Dataset Forecast Dataset

Analysis Dataset

Select parameters Graphic Options

Data1

Dataset: SST Element: Sea Surface Data Data type: HIST Area: ALL Level: 1 Time unit: MONTHLY Showing period: RANGE

Temperature (SST) [C] Lat: -90 - 90 Ave Lon: 0 - 360 Ave

Time filter: Ave Year-to-year 2011 - 2013 Time filter 3 - 5

Analysis method: -Analysis method-

Use parameter code

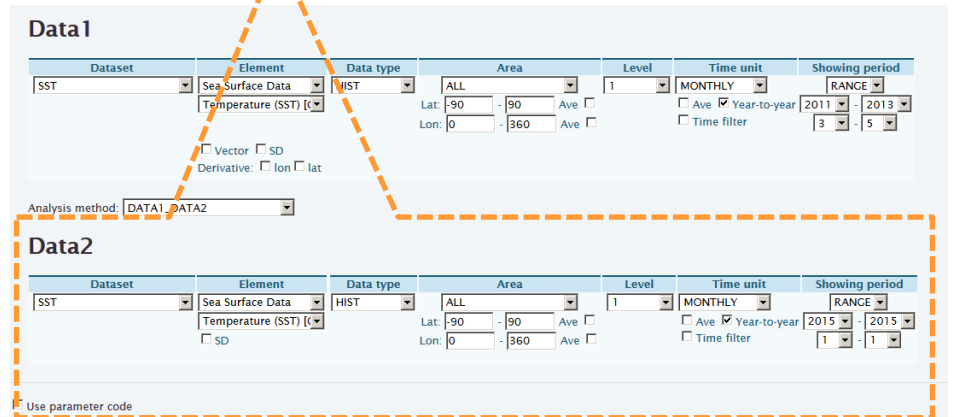
Analysis Data Submit

Parameters for data setting
-Dataset, Element, Data type

Chronological parameters
-Time unit, Showing period

Geophysical parameters
-Area, Level

Analysis method setting
-DATA1_DATA2, SUBTRACT, REGRESSION_ANALYSIS etc.



Data1

Dataset: SST Element: Sea Surface Data Data type: HIST Area: ALL Level: 1 Time unit: MONTHLY Showing period: RANGE

Temperature (SST) [C] Lat: -90 - 90 Ave Lon: 0 - 360 Ave

Time filter: Ave Year-to-year 2011 - 2013 Time filter 3 - 5

Analysis method: DATA1_DATA2

Data2

Dataset: SST Element: Sea Surface Data Data type: HIST Area: ALL Level: 1 Time unit: MONTHLY Showing period: RANGE

Temperature (SST) [C] Lat: -90 - 90 Ave Lon: 0 - 360 Ave

Time filter: Ave Year-to-year 2015 - 2015 Time filter 1 - 1

Use parameter code

In some cases, Data2 setting needed.

Standard procedure (2)

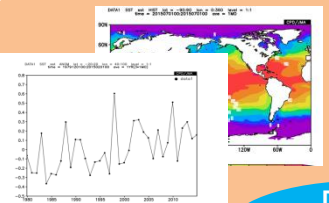
Select Analysis or Forecast dataset

Setting Data parameters

Setting Graphic Options

Data Submit

Draw map



Data download

Select this tab

Graphic Options
-Contour, Shade, Color Bar, Axes

Select parameters **Graphic Options**

Graphic Options

Colorizing: COLOR
Drawing: SHADE
Image Format: png
Font: default
Color Table: Rainbow

Show Contour Labels
 Show Color Bar
 Set Contour Parameters for data1
interval: min: max:
 Set Contour Parameters for data2
interval: min: max:
 Set Vector size: [inch] value: skip: 1

Polar Stereographic: North pole
 Logarithmic Coordinates
 Reverse the Axes
 Flip the X-axis
 Flip the Y-axis
 No Scale Labels
 Draw Credit Inside
 Apply All Pics
picture size %

Detailed Options for Image x

Check here, Detailed Options field are shown

Analysis Data Submit

Detailed Options for Image x
-Graphics, Axis, Map

Detailed Options for Image 1

For Image 1: lower layer apply apply Default

About Graphics

contour Style: default Color: rainbow
label format: thickness: 1 size: 0.09 skip interval:
contour line thickness: 3
levels: color:
thin contour:
not to draw: -:

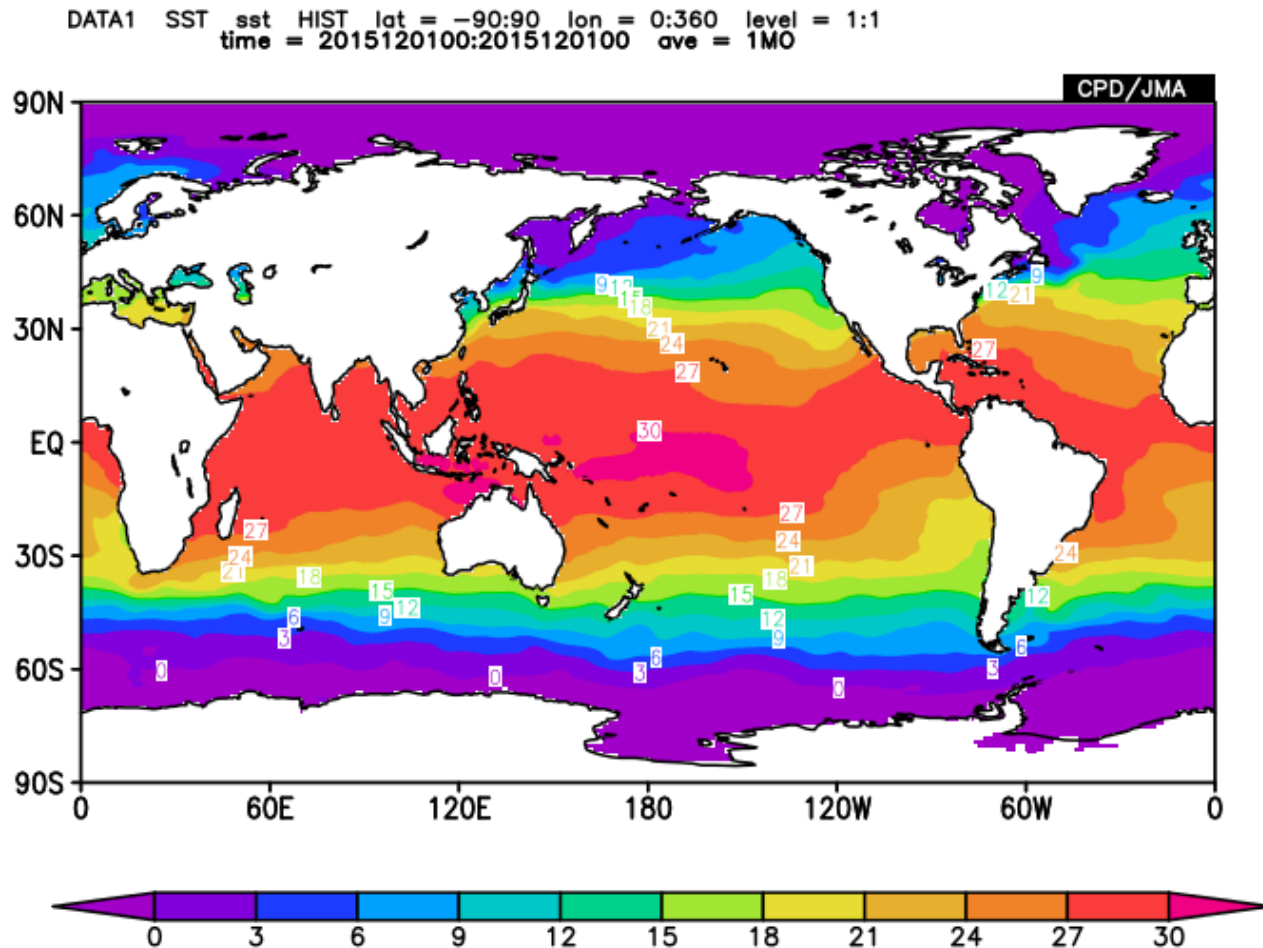
marker type: closed circle
line style: solid color: black thickness: 6
grid style: none color: orange
vector label vector head size:
define rainbow color:
color bar portrait X: Y: scale: 1.0

About Axis
About Map

For Image 1 apply

Latitude-longitude map (1)

- Let's chart monthly **sea surface temperature** (SST) in **December 2015**.



Latitude-longitude map (2)

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data Temperature (SST) [C	HIST	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2015 12

Vector SD
Derivative: lon lat

Analysis method: -Analysis method-

- Set each item in “Data1” as follows.
 - Dataset SST
 - Element Sea Surface Data > Temperature (SST)
 - Data type HIST (meaning historical data)
 - Area ALL
 - Level 1 (i.e. surface data)
 - Time unit MONTHLY
 - Showing period “RANGE”; 2015 12; 2015 12

Latitude-longitude map (3)

Dataset	Element	Data type	Area
SST	Sea Surface Data	HIST	ALL
	Temperature (SST) [C]		Lat: -90 - 90 Ave <input type="checkbox"/>
	-element2-		- 360 Ave <input type="checkbox"/>
	Temperature (SST) [C.Deg.]		
	Ice concentration (ice=1 no_ice=0) [fraction]		

Derivative: lon lat

Analysis method: -Analysis method-

Elements and their units

1. Select "SST" in the "dataset" field.

- Various datasets are available;
CLIMAT, INDEX, JRA-55, K1EM, OCEAN-DATA, SAT, SST, USER-INPUT etc.

2. Select "Sea Surface Data" for "element1" and "Temperature" for "element2".

- Available elements and their units will be shown in a listbox.

Latitude-longitude map (4)

Data 1

Dataset	Element	Data type	Area	Level	Time unit
SST	Sea Surface Data	HIST	ALL	1	MONTHLY
	Temperature (SST) [C	-Data_type-	Lat: -90 - 90 Ave <input type="checkbox"/>		<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year
	<input type="checkbox"/> Vector <input type="checkbox"/> SD	HIST	Lon: 0 - 360 Ave <input type="checkbox"/>		<input type="checkbox"/> Time filter
	Derivative: <input type="checkbox"/> lon <input type="checkbox"/> lat	NORM			
		ANOM			
		ANOM_SD			

Analysis method: -Analysis method-

3. Select "HIST" for "Data type" .

Available options are as follows:

- **HIST** : Historical actual analysis or observation data.
- **NORM** : Climatological normal data (averaged from 1981 to 2010).
- **ANOM** : Anomaly data (HIST – NORM: difference from the climatological normal)
- **ANOM_SD** : Anomaly data normalized by their standard deviations.

Latitude-longitude map (5)

The screenshot shows a configuration panel for a map. It includes the following elements:

- Data type:** HIST
- Area:** ALL (highlighted with a red box and labeled '4'). Below it are input fields for Latitude (-90 to 90) and Longitude (0 to 360), each with an 'Ave' checkbox.
- Level:** 1 (highlighted with a yellow box and labeled '5').
- Time unit:** DAILY. Below it are checkboxes for 'Ave', 'Year-to-year', and 'Time filter'.
- Showing period:** RANGE. Below it are two rows of dropdowns for years (2016) and values (1).

An orange callout bubble points to the 'Level' dropdown with the text: "Only '1' level in this case".

4. Select "ALL" for "Area" .

- You can set/change the area more precisely with setting boxes.

5. Select "1" for "Level" .

- Options in the "level" menu will change depending on your selection of "element".

Latitude-longitude map (6)

Data type	Area	Level	Time unit	Showing period
HIST	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2015 12

6. Select "MONTHLY" for "Time unit" .

- There are several styles for range selection: **DAILY**, **PENTAD DAY**, **MONTHLY** and **ANNUAL**

7. Select "RANGE" for "Showing period" and "2015 12", for both upper and lower boxes (left box: year, right box: month).

Available options are as follows:

- **RANGE**: Setting the start and end points of the targeted time period.
- **YEARS**: Setting individual years.
- **INDEX**: Setting a SST index border to pick up years. (e.g. NINO.3)

Latitude-longitude map (7)

8. Finally, click the "Analysis Data Submit" button and the image will be displayed.

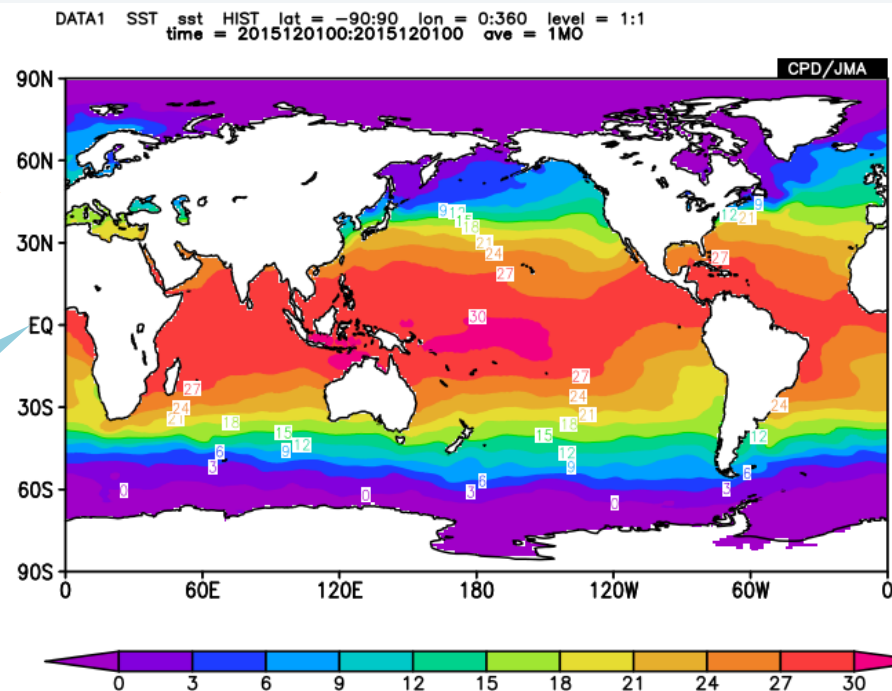
Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data Temperature (SST) [C]	HIST	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2015 12

Vector SD
Derivative: lon lat

Method: -Analysis method-
Parameter code

8 **Analysis Data Submit**



Click!

8

SST in December
2015

Anomaly chart (1)

- You can draw anomaly (i.e. the difference from the climatological normal) chart.

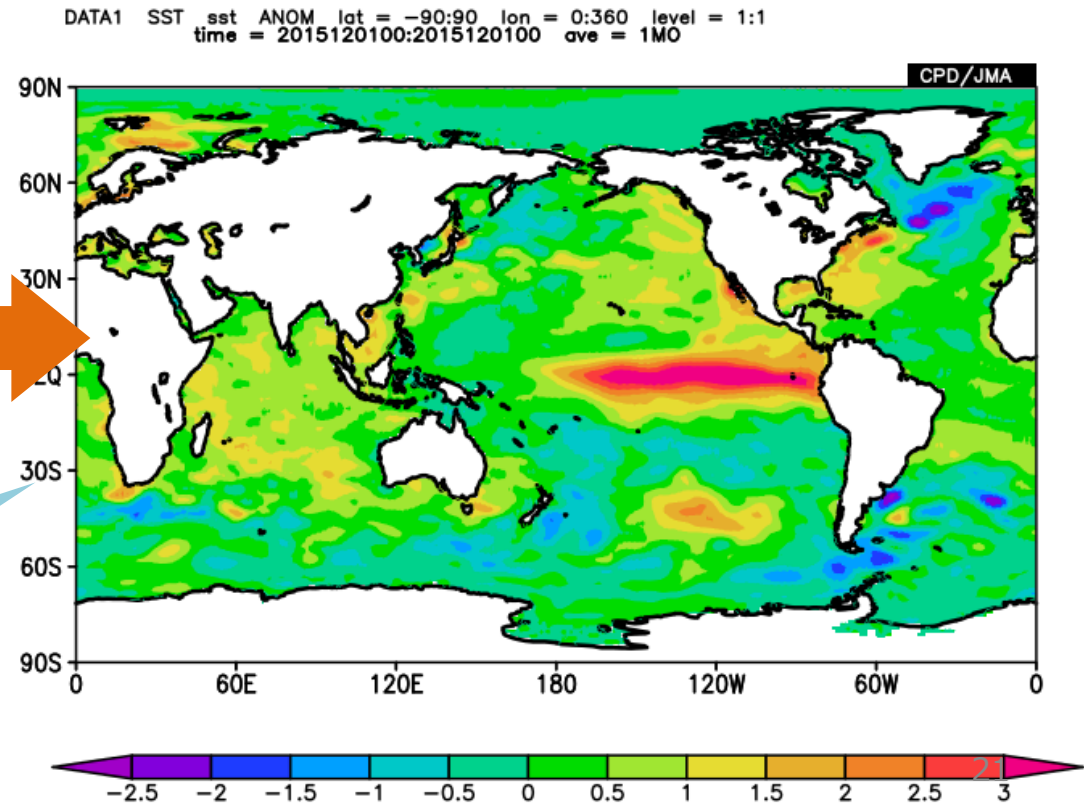
Select "Data type" "ANOM"
Anomaly data (HIST minus NORM)

nt
Data type
Data
(SST) [C]
ALL
Lat: -45
Low: 100

Click!

Analysis Data Submit

SST anomalies in
December 2015



Anomaly chart (2)

- Changing **intervals for contour/shading**, you can easily see the above- and below-normal SST areas.

① Click "Graphic Options"

③ Checking this box

② Select "Blue - Red"

Click!

Analysis Data Submit

④ Set these boxes as follows
interval: 0.5, min: -2.5, max: 2.5

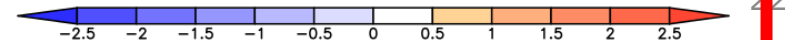
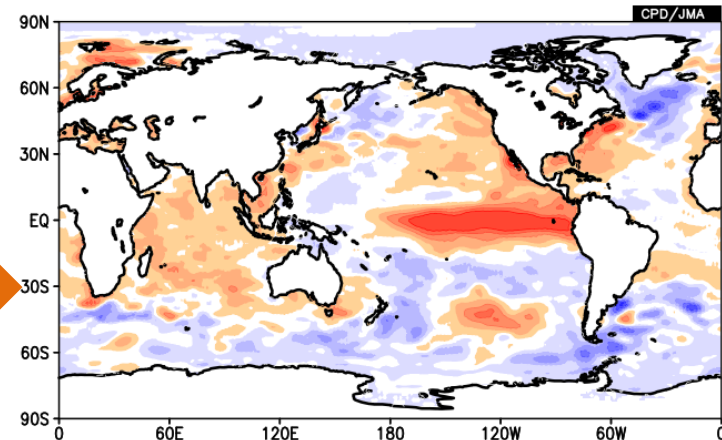
Graphic Options

g: COLOR
SHADE

Font: default
Color Table: Blue - Red

Show Contour Labels
 Show Color Bar
 Set Contour Parameters for data1
interval: 0.5 min: -2.5 max: 2.5
 Set Vector size: [inch] value: skip: 1

Polar Stereog
 Logarithmic
 Reverse the A
 Flip the X-axi
 No Caption



Area setting (1)

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data Temperature (SST) [C]	HIST	ALL	1	MONTHLY	RANGE
			Lat: -90 - 90	Ave <input type="checkbox"/>	<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	2015 7
			Lon: 0 - 360	Ave <input type="checkbox"/>	<input type="checkbox"/> Time filter	2015 7

Vector SD
Derivative: lon lat

Southern border

Northern border

Data type	Area	Level
	ALL	1
Lat: -45 - 55	Ave <input type="checkbox"/>	
Lon: 100 - 300	Ave <input type="checkbox"/>	

Western border

Eastern border

Available options are as follows:

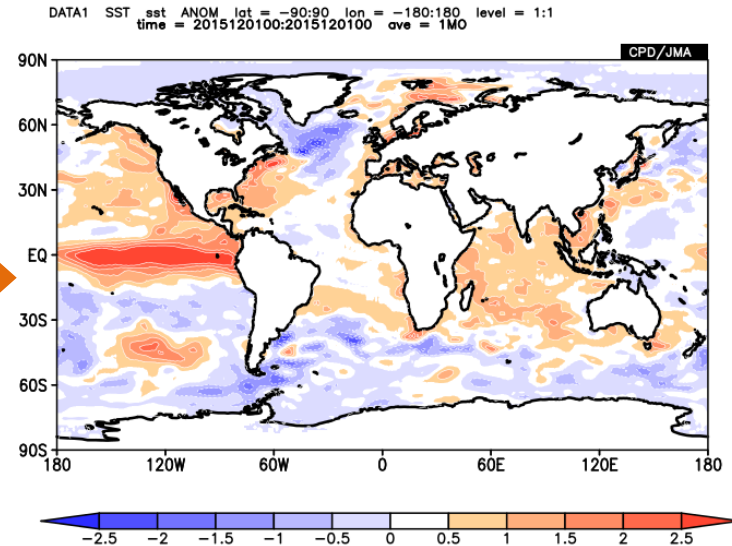
- **ALL**
 - **ASIA**
 - **Tropical Pacific**
 - **Tropics**
 - **Indian Pacific**
- etc.

Setting boxes will appear in the "Area" field and after selection for more precise area adjustment.

Area setting (2)

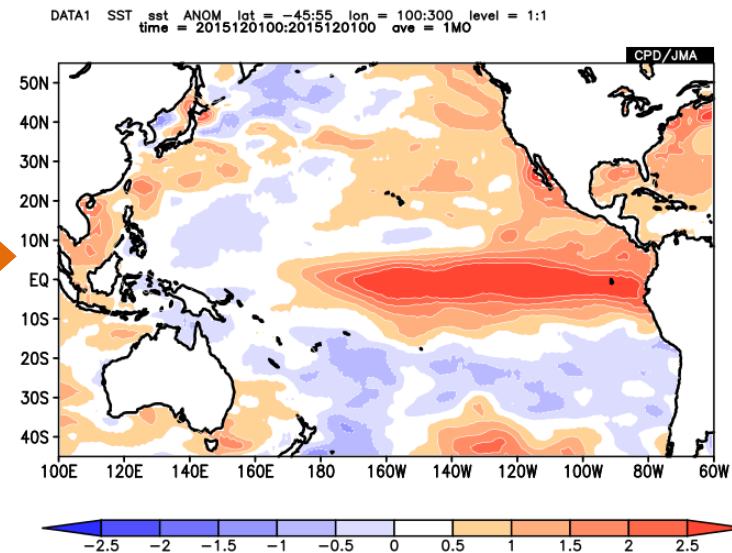
- Change the center

Lat : -90 - 90
(90S) (90N)
Lon: -180 - 180
(180W) (180E)



- Change the area

Lat : -45 - 55
(45S) (55N)
Lon: 100 - 300
(100E) (300E=60W)



You can adjust zonal and meridional range by setting "Lat" and "Lon" parameters in the "Area" field.

Time setting (1)

- Setting for a consecutive period.

<Calendar>

2012 2013
J F M A M J J A S O N D J F M A M J J A S O N D

Time unit: MONTHLY
Showing period: RANGE
Time filter: Ave Year-to-year

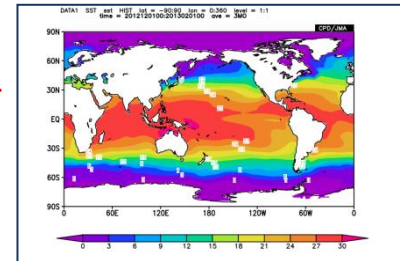
Start month: 2012 12
End month: 2013 2

Check!

Start month

End month

One 3-month averaged map for 2012/12-2013/2



Time unit: MONTHLY
Showing period: RANGE
Time filter: Ave Year-to-year

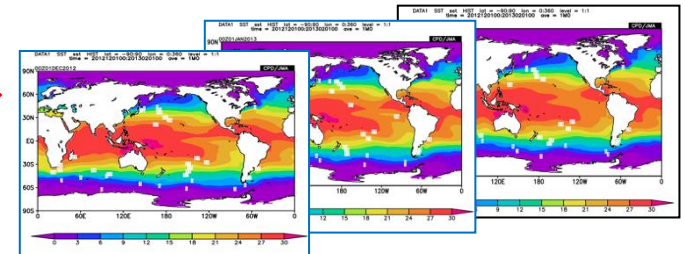
Start month: 2012 12
End month: 2013 2

Uncheck

Start month

End month

Three 1-month maps for 2012/12, 2013/1, 2013/2



prev next animation stop reset

Time setting (2)

- Setting for a specific period of each year.

Target years

<Calendar>

2010	:	J	F	M	A	M	J	J	A	S	O	N	D
2011	:	J	F	M	A	M	J	J	A	S	O	N	D
2012	:	J	F	M	A	M	J	J	A	S	O	N	D
2013	:	J	F	M	A	M	J	J	A	S	O	N	D

Target period

Check "Year-to-year"

Time unit: MONTHLY

Showing period: RANGE

Ave Year-to-year

2010 - 2013

3 - 5

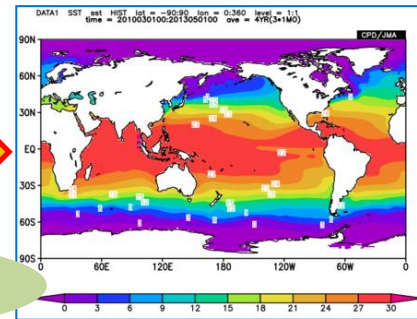
Time filter

Check!

Target years

Target period

One 4-year-MAM averaged map



MAM 2010
MAM 2011
MAM 2012
MAM 2013
} averaged

Time unit: MONTHLY

Showing period: RANGE

Ave Year-to-year

2010 - 2013

3 - 5

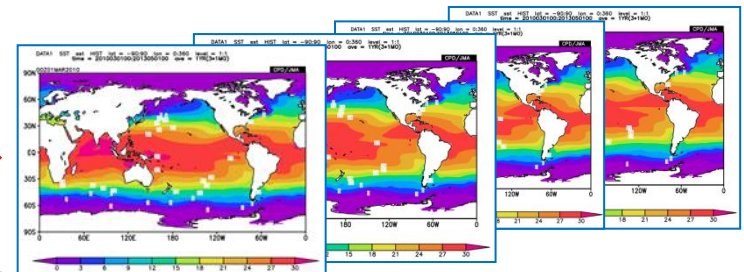
Time filter

Check!

Target years

Target period

Four MAM averaged maps
MAM 2010, MAM 2011, MAM 2012, MAM 2013

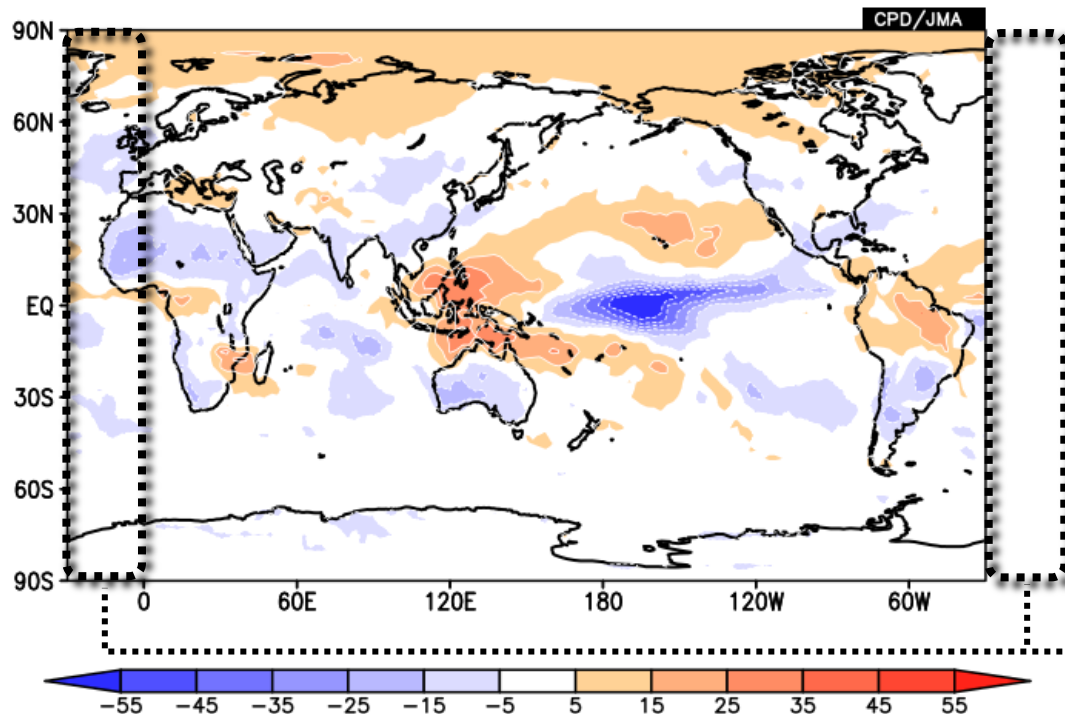


Uncheck

Exercise (1)

- Show OLR anomalies averaged over the period from December 2015 to February 2016 as shown below.
- The dataset “**SAT**” is available to show the OLR field.

DATA1 SAT olr ANOM lat = -90:90 lon = -30:330 level = 1:1
time = 2015120100:2016020100 ave = 3MO



Longitudinal border is set at not 0° but 30°W so as not to get across Africa and Europe.

Answers to Exercise (1)

Analysis Dataset

Select parameters | Graphic Options

Data 1

Dataset	Element	Data type	Area	Time unit	Showing period
SAT	OLR [W/m ²]	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: -30 - 330 Ave <input type="checkbox"/>	MONTHLY <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2016 2

Vector SD
Derivative: lon lat

Lat : -90 – 90
(90S) (90N)
Lon: -30 – 330
(30W) (330E)

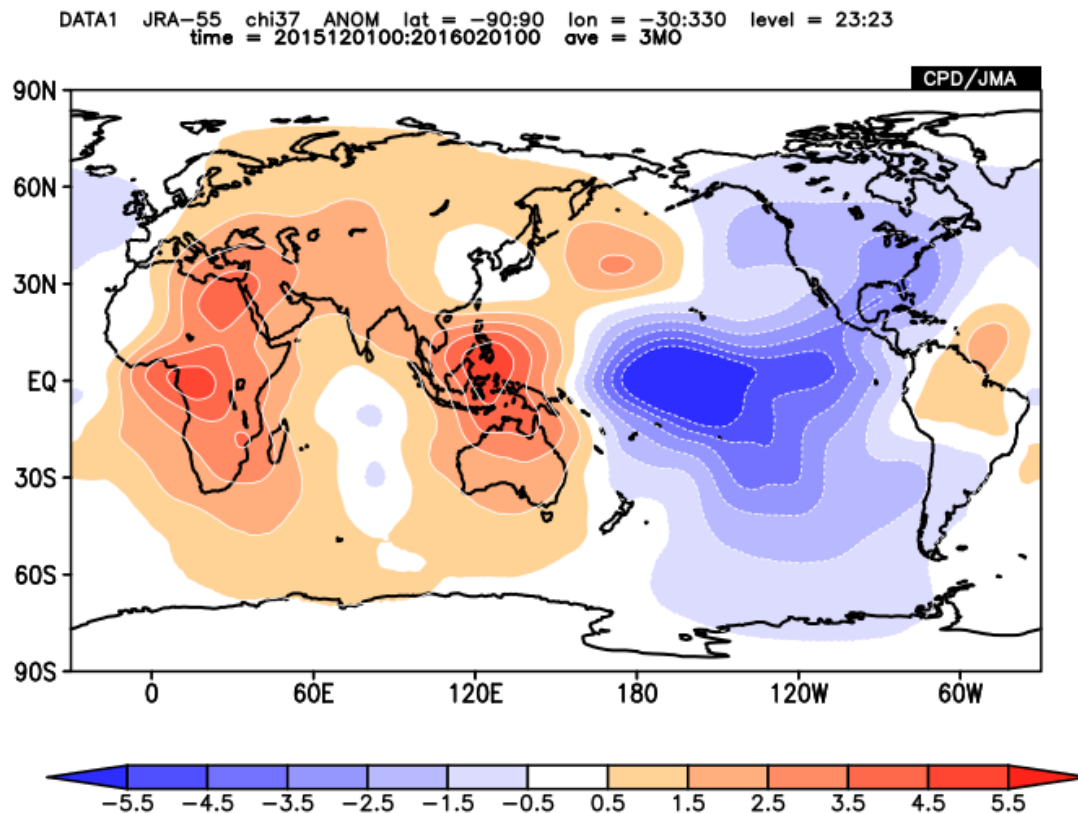
Graphic Options

Colorizing: COLOR Show Contour Labels
Drawing: SHADE Show Color Bar
Image Format: png Set Contour Parameters for data1
Font: default interval: 10 min: -55 max: 55
Color Table: Blue - Red Set Vector size: [] [inch] value: [] size: 1
 Polar Stereographic: North pole No Scale Labels
 Logarithmic Coordinates Draw Credit Inside
 Reverse the Axes Apply All Pics
 Flip the X-axis Flip the Y-axis picture size [] %
 No Caption

Set these boxes as follows
interval: 10, min: -55, max: 55

Exercise (2)

- Show 200-hPa velocity potential anomalies and in DJF 2015/16 (Dec.2015 – Feb.2016) as shown below.
- The dataset “**JRA-55**” is available to draw the velocity potential.



Answers to Exercise (2)

Data1

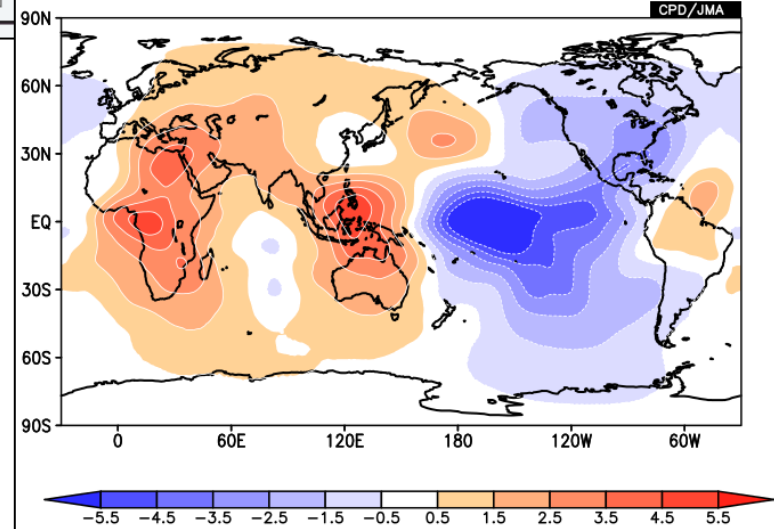
Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels χ (Velocity Potential)	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	200hPa	MONTHLY <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2016 2

χ (Velocity Potential)

Graphic Options

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels	<input type="checkbox"/> Polar Stereographic: North pole	<input type="checkbox"/> No Scale Labels
Drawing: SHADE	<input checked="" type="checkbox"/> Show Color Bar	<input type="checkbox"/> Logarithmic Coordinates	<input type="checkbox"/> Draw Credit Inside
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data1	<input type="checkbox"/> Reverse the Axes	<input type="checkbox"/> Apply All Pics
Font: default	interval: 1 min: -5.5 max: 5.5	<input type="checkbox"/> Flip the X-axis	<input type="checkbox"/> Flip the Y-axis
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [inch] value: skip: 1		

DATA1 JRA-55 chi37 ANOM lat = -90:90 lon = -30:330 level = 23:23
time = 2015120100:2016020100 ave = 3MO



Multiple Data

- **DATA1_DATA2** : Overlay two kinds of items on one map at the same time.
 - Contours are overlaid on a shaded map.
- **SUBTRACT** : Map the difference of two data.
 - This function is mainly used to show time variation or the difference between two levels.

DATA1_DATA2 : Overlaying two data

- The Data1 is mapped as shading, and Data2 is mapped as contours.

*As an exception, Data2 is mapped as shading when Data1 is mapped as the type of vector or streamline.

1 **Data1**

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	Tropical Pacific Lat: -40 - 40 Ave <input type="checkbox"/> Lon: 100 - 300 Ave <input type="checkbox"/>	850hPa	MONTHLY <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2016 2

Vector SD
Derivative: lon lat

2 Analysis method: DATA1_DATA2

3 **Data2**

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels ψ (Stream Function)	HIST	Tropical Pacific Lat: -40 - 40 Ave <input type="checkbox"/> Lon: 100 - 300 Ave <input type="checkbox"/>	850hPa	MONTHLY <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 12 2016 2

SD

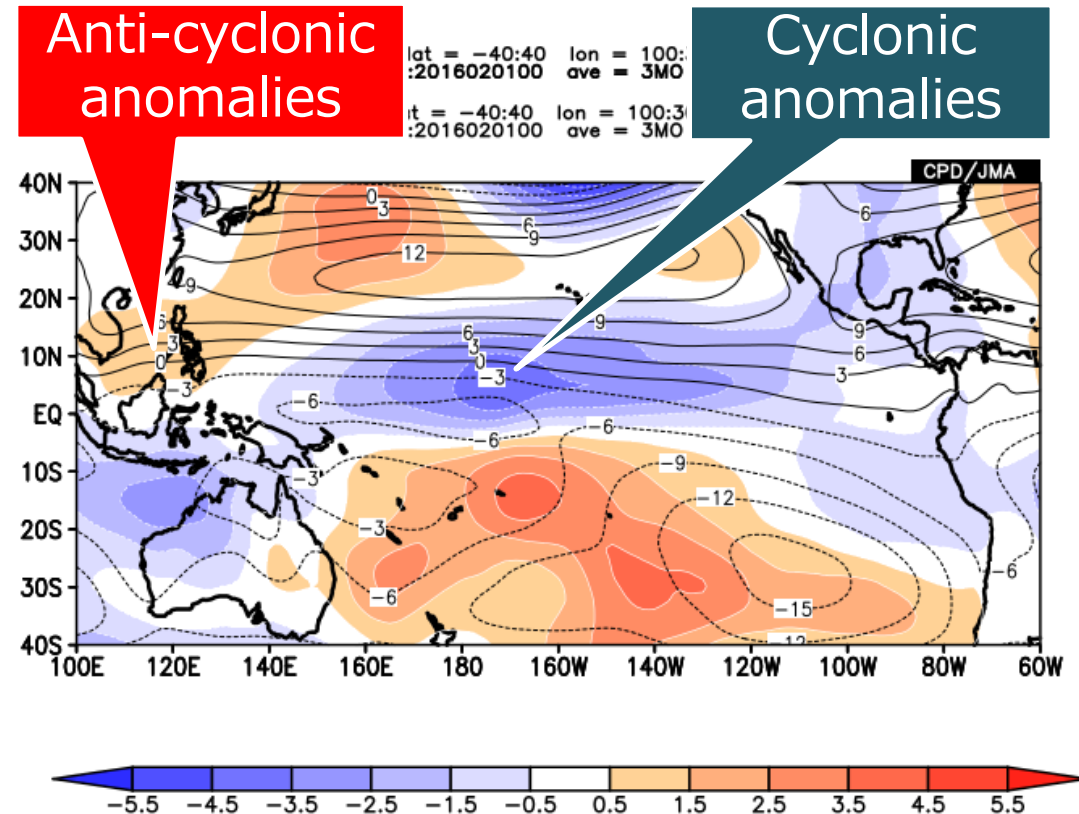
This area will appear after "DATA1_DATA2" is selected.

- Set the "Data1" field.
- Select "DATA1_DATA2" in the "Analysis method" box.
- Set the "Data2" field and submit.

DATA1_DATA2 : Overlaying two data

- The sea level pressure (Data2) is mapped as contour, and its anomalies (Data1) is mapped as shading.

Sea level pressure
in December 2015



SUBTRACT : Data1 minus Data2

The value of "Data1 minus Data2" will be mapped.

1. Set the "Data1" (the base data) .
2. Select "**SUBTRACT**" in the "analysis method" box.
3. Set the "**Data2**" field and submit.

1

Data1

Dataset	Element	Showing period
SST	Sea Surface Data	RANGE
	Temperature (SST) [C	2015 12
		2015 12

Vector SD

Derivative: lon lat

2

Analysis method: SUBTRACT

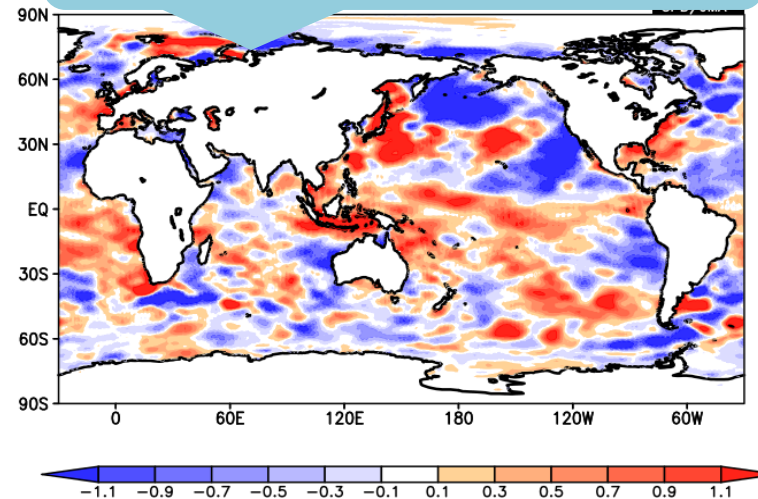
3

Data2

Dataset	Element	Showing period
SST	Sea Surface Data	RANGE
	Temperature (SST) [C	2015 10
		2015 10

SD

SST anomaly difference from Oct. to Dec. 2015.



Data1 minus Data2 is mapped (In this case, December minus October).

Multiple Data

- In a similar way, users can also perform the four basic arithmetic operations of two data by using the corresponding analysis method.

Analysis method	Mapped value	Usage example
ADD	Addition ("Data1" plus "Data2")	–
SUBTRACT	Difference ("Data1" minus "Data2")	Time difference, vertical shear.
MULTIPLY	Multiplication ("Data1" times "Data2")	–
DIVIDE	Division ("Data1" divided by "Data2")	Precipitation ratios ("HIST" divided by "NORM").

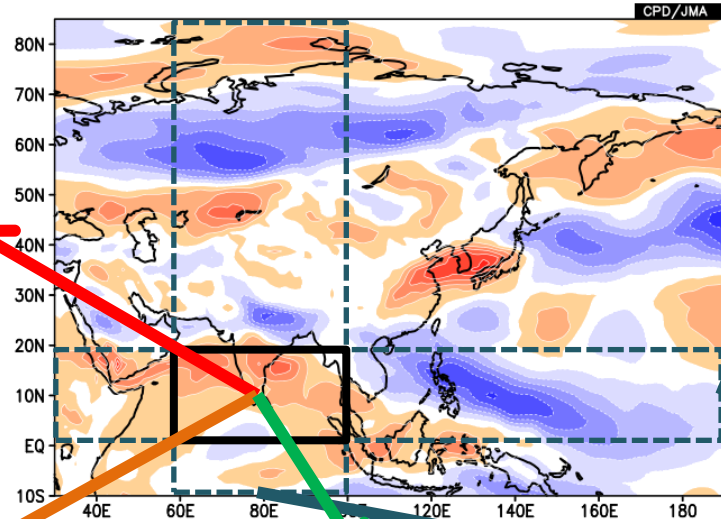
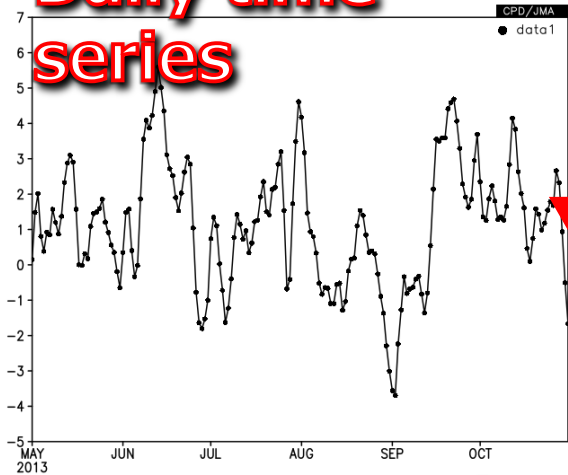
Contents

1. What's iTacs?
2. Application for using iTacs
3. Basic operations
 - ❑ Longitude-latitude map
 - ❑ Overlaying two data
 - ❑ Mapping the difference of two data
4. **Advanced operations**
 - ❑ **Area-averaged time series**
 - ❑ **Vertical and latitude/longitude profile**
 - ❑ **Cross section diagram**
 - ❑ **Time filter**

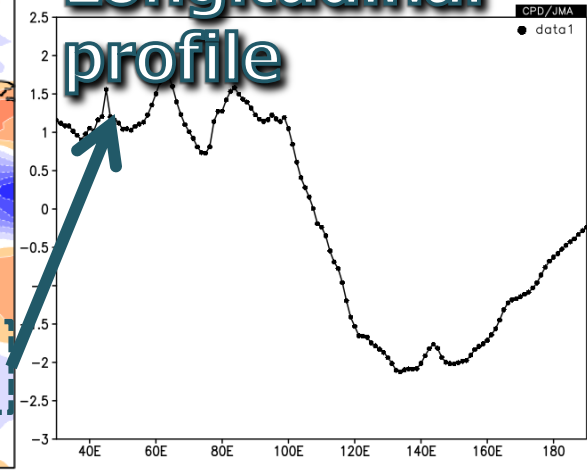
Line graph & Cross section diagram

- Time series and profile graph are useful to see the variability or spatial structure simply.

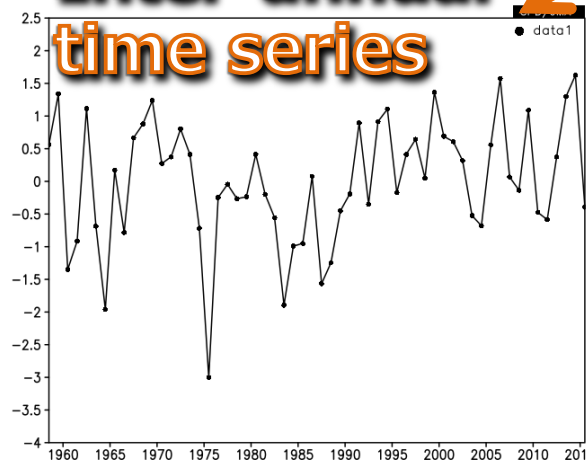
Daily time series



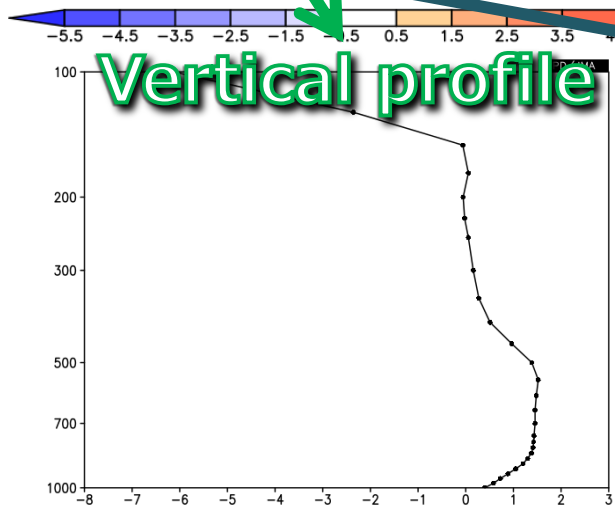
Longitudinal profile



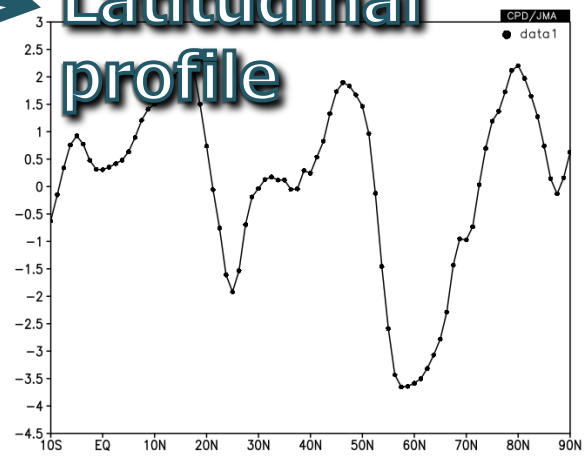
Inter-annual time series



Vertical profile



Latitudinal profile



Daily timeseries

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SAT	OLR [W/m ²]	ANOM	ALL	1	DAILY	RANGE
			Lat: -10 - 10 Ave <input checked="" type="checkbox"/>			
			Lon: 90 - 150 Ave <input checked="" type="checkbox"/>			
<input type="checkbox"/> Vector <input type="checkbox"/> SD						
Derivative: <input type="checkbox"/> lon <input type="checkbox"/> lat						
			<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year		2016 5 1	
			<input type="checkbox"/> Time filter		2016 8 31	

1. Select OLR anomalies for element boxes.

2. Select 10°S–10°N, 90°–150°E for “Area” box.

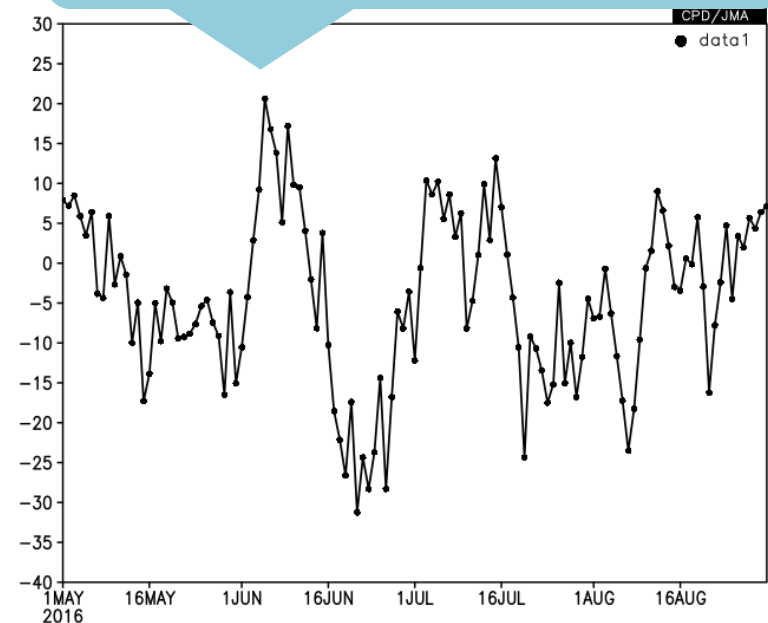
- The area covers the Maritime continent.
- Check “Ave” boxes.

3. Select “DAILY” for time unit, and showing period

- Showing period: 1 May 2016 – 31 Aug. 2016.

- Similarly, you can draw monthly or annual timeseries by setting “Time unit”.

Daily timeseries of OLR anomalies



Inter-annual timeseries

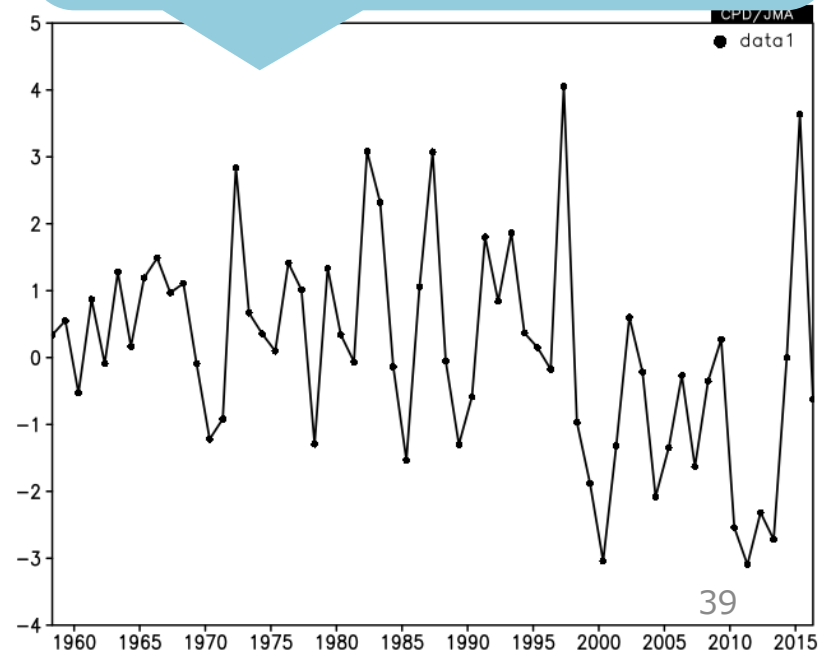
Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels χ (Velocity Potential)	ANOM	ALL Lat: -10 - 10 Ave <input checked="" type="checkbox"/> Lon: 90 - 150 Ave <input checked="" type="checkbox"/>	200hPa 200hPa	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2016 5 - 8

Vector SD
Derivative: lon lat

1. Select 200-hPa velocity potential anomalies for element boxes.
2. Select 10°S–10°N, 90°–150°E for “Area” box.
 - The area covers the Maritime continent.
 - Check “Ave” boxes.
3. Select “MONTHLY” for time unit, and showing period
 - Check “Year-to-year”.
 - Showing period: 1958 – 2016, 5 – 8.

Inter-annual timeseries of 4-month (May – August) mean 200-hPa velocity potential anomalies



Vertical and lat/longitude profile

- Vertical profile

Area		Level		Time unit		Snowing period	
ASIA		1000hPa	MONTHLY	RANGE			
Lat: 25	- 35	1hPa	<input type="checkbox"/> Ave	<input type="checkbox"/> Year-to-year	2015	7	<input type="checkbox"/> Time filter
Lon: 120	- 130		<input checked="" type="checkbox"/> Ave		2015	7	

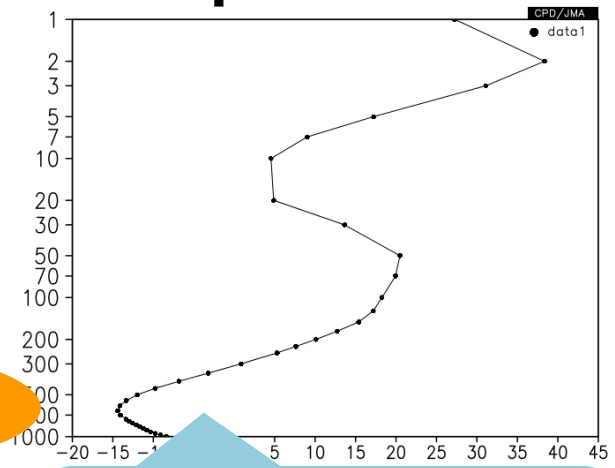
Select bottom and top level

Check (Regional mean)

Set a specific period

“Logarithmic Coordinates” option is recommended in vertical profile graph.

<input type="checkbox"/> Polar Stereographic:	Normal
<input checked="" type="checkbox"/> Logarithmic Coordinates	



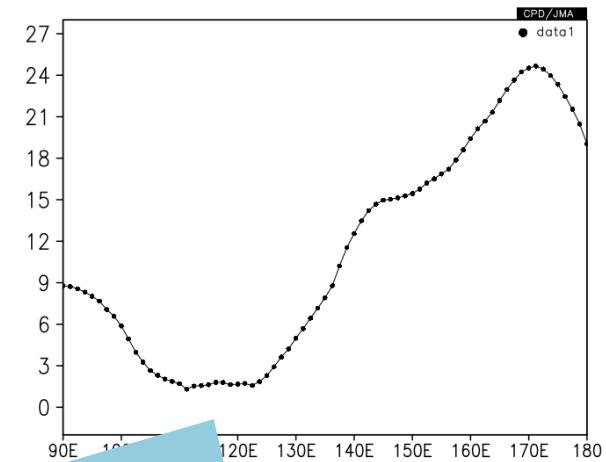
Height anomalies averaged over 25°–35°N, 120°–130°E

- Lat/Longitude profile

Area		Level		Time unit		Showing period	
ASIA		500hPa	MONTHLY	RANGE			
Lat: 25	- 35	500hPa	<input checked="" type="checkbox"/> Ave	<input type="checkbox"/> Year-to-year	2015	6	<input type="checkbox"/> Time filter
Lon: 90	- 180		<input type="checkbox"/> Ave		2015	7	

Check either “Ave” boxes (latitudinal or longitudinal mean)

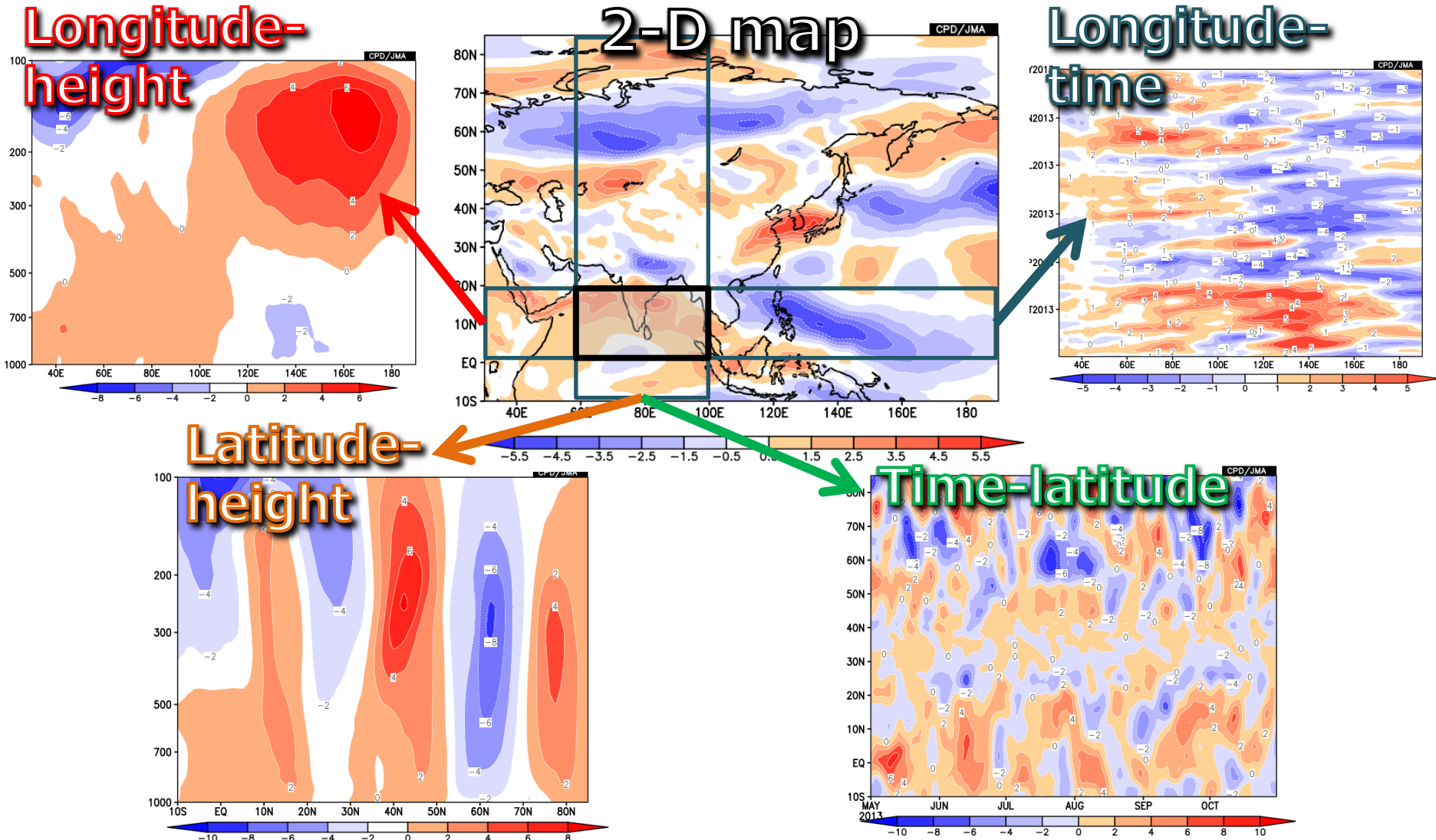
Select a specific level and period



Longitude profile of 500-hPa height anomalies over 25°–35°N

Cross section diagram

- Cross section diagram is also useful to see the variability or spatial structure.



Vertical cross section

- Latitude-height cross section

Data 1

Dataset	Element	Data type	Level	Time unit	Showing period
JRA-55	Pressure Levels ω (Pressure Vertical)	NORM	ALL	MONTHLY	RANGE
			Lat: -60 - 60 Ave <input type="checkbox"/>	1000hPa	2016 6
			Lon: 90 - 150 Ave <input checked="" type="checkbox"/>	100hPa	2016 8
				<input checked="" type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	
				<input type="checkbox"/> Time filter	

Input southern and northern border

Set a specific period

Input western and eastern border and check "Ave" box.

Set bottom and top level

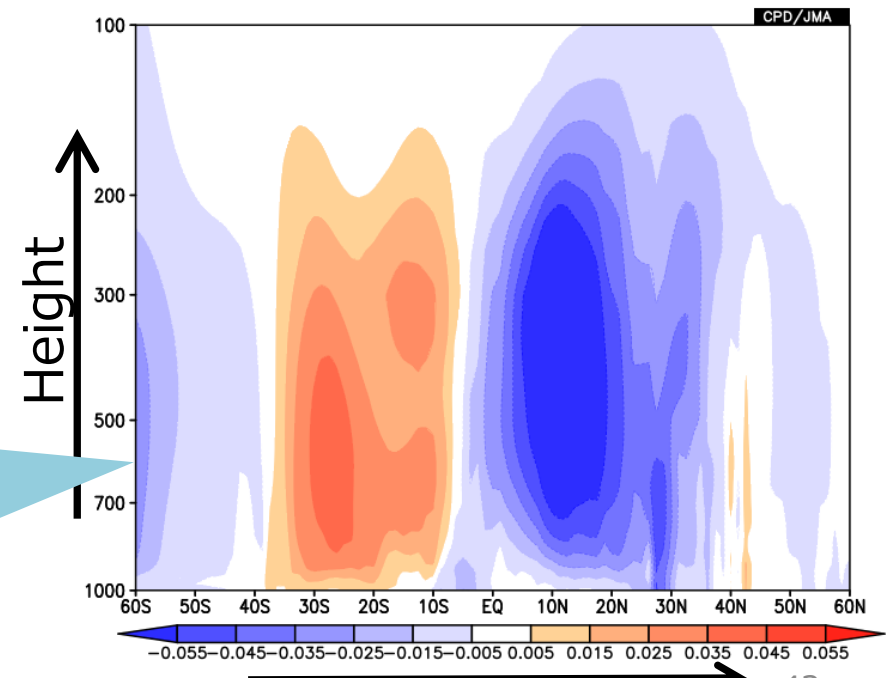
Polar Stereographic: North p

Logarithmic Coordinates

"Logarithmic Coordinates" is recommended to draw vertical profiles.

Latitude-height cross section of normal pressure vertical velocity averaged between 90°E and 150°E in summer 2016

DATA1 JRA-55 omg37 NORM lat = -60:60 lon = 90:150 level = 1:27
time = 2016060100:2016080100 ave = 3MO



Time cross section

- Longitude-time cross section

Data1

5°S–5°N averaged

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels χ (Velocity Potential)	ANOM	ALL Lat: -5 - 5 Ave <input checked="" type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	200hPa 200hPa	DAILY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 2015 5 1 2015 10 31

Vector SD
Derivative: lon lat

200-hPa

Set a specific period

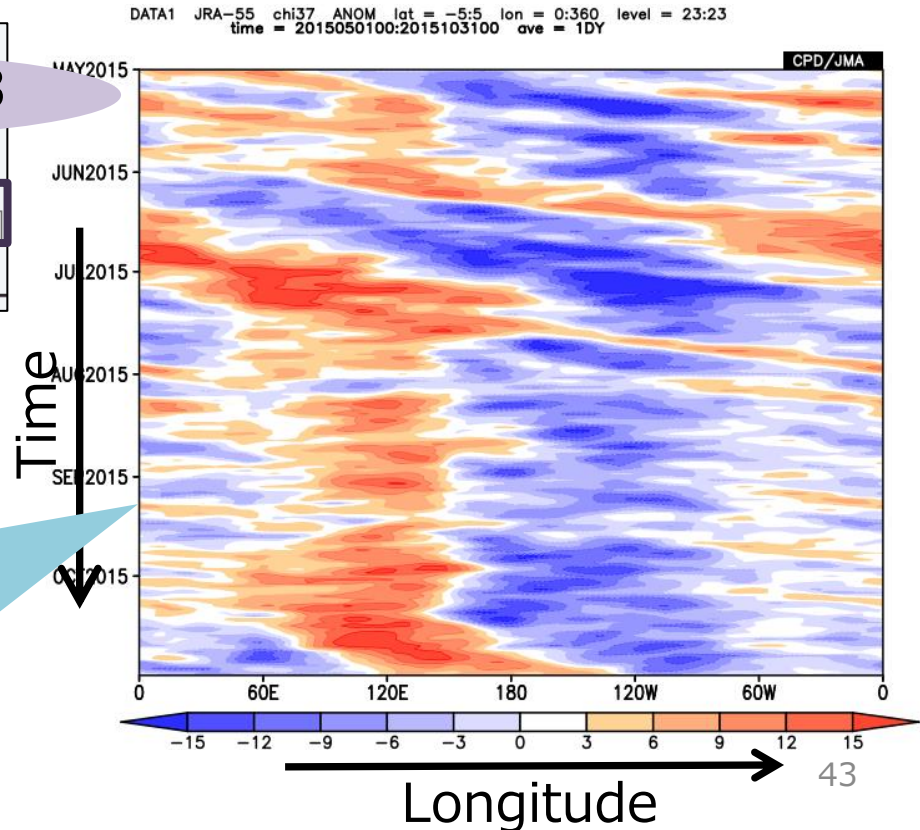
Graphic Options

Contour interval: 3

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour
Drawing: SHADE	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data1
Font: default	Interval: 3 min: -15 max: 15
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [inch] value: skip: 1

Blue-Red colored shading

Longitude-time cross section of 200-hPa velocity potential anomalies averaged over 5°S – 5°N from 1 May to 31 October 2015.

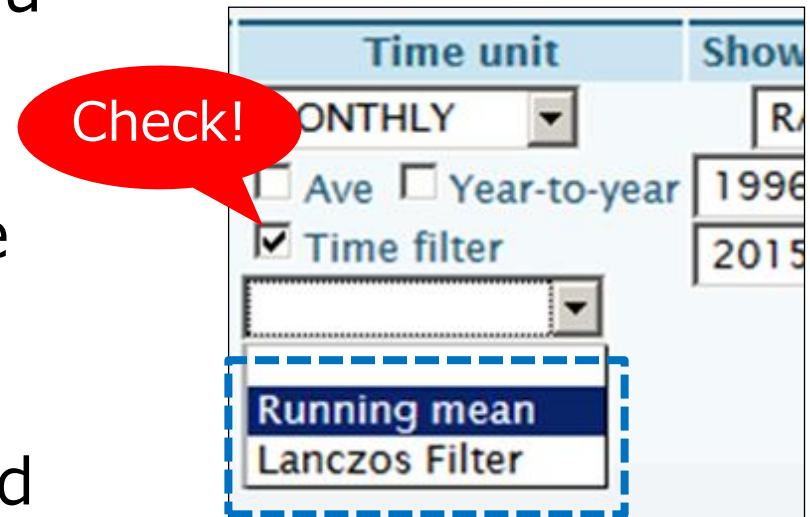


Time filter

- Time filter should be used to create a time series image in the climate analysis.
- Climatological events are emphasized by a time filter, because it can remove high frequency variations.

Checking “Time filter” box, you can select two types of the time-filter.

- ❑ Running mean: Smooth the original data simply.
- ❑ Lanczos filter: Pick up the given period component and mean them based on Duchon (1979).



Running mean daily timeseries

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SAT	OLR [W/m ²]	ANOM	ALL	1	DAILY	RANGE
			Lat: -10 - 10 Ave <input checked="" type="checkbox"/>		<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	2016 5 1
			Lon: 90 - 150 Ave <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Time filter	2016 8 31
					Running mean	
					mean period: 5	

Vector SD
Derivative: lon lat

1. Select OLR anomalies for element boxes.

2. Select 10°S–10°N, 90°–150°E for “Area” box.

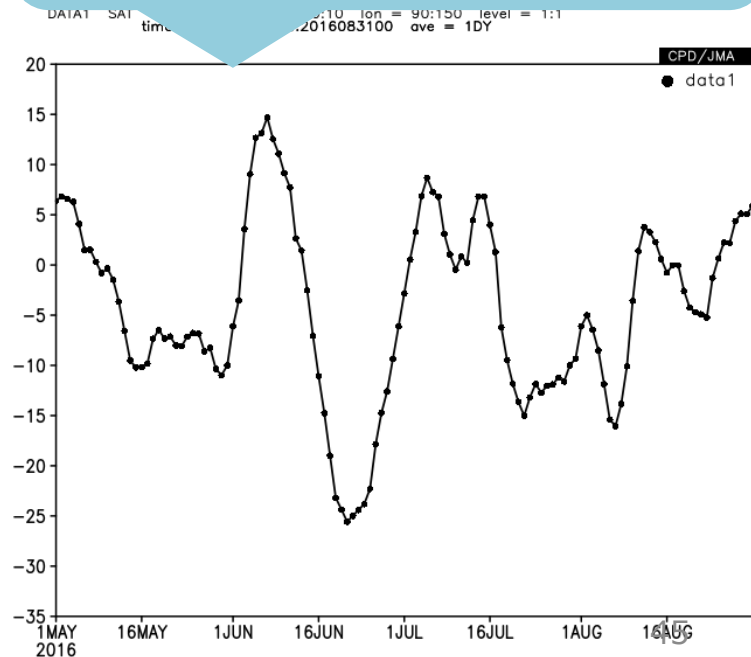
➤ Check “Ave” boxes.

3. Select “DAILY” for time unit, and showing period.

➤ Showing period: 1 May 2016 – 31 Aug. 2016.

➤ Check “Time filter” in time unit box, and select “Running mean” and “5(day)” in “mean period” box.

5-day running mean daily timeseries of OLR anomalies



Time cross section

- Running mean longitude-time cross section

Data1

5°S–5°N averaged

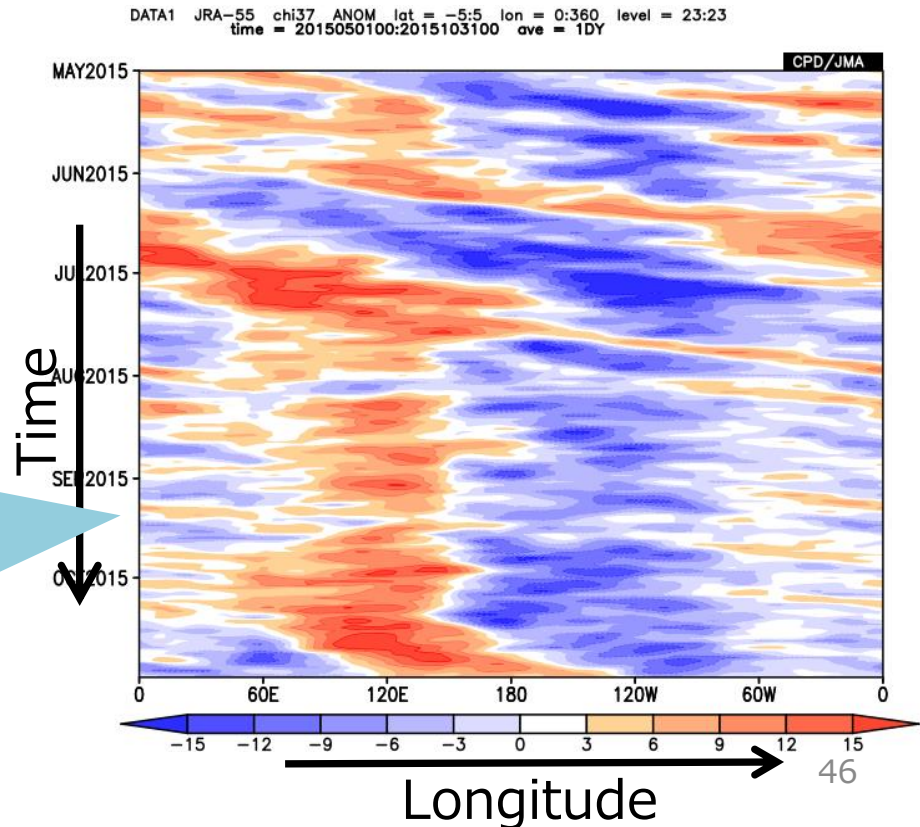
Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels χ (Velocity Potential)	ANOM	ALL Lat: -5 - 5 Ave <input checked="" type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	200hPa 200hPa	DAILY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input checked="" type="checkbox"/> Time filter Running mean mean period 5	RANGE 2015 5 1 2015 10 31

Vector SD
Derivative: lon lat

200-hPa

- Select 5°S–5°N mean 200-hPa velocity potential anomalies.
- Set 5-day running mean in "Time unit" box.

Longitude-time cross section of 5-day running mean 200-hPa velocity potential anomalies averaged over 5°S–5°N from 1 May to 31 October 2015.

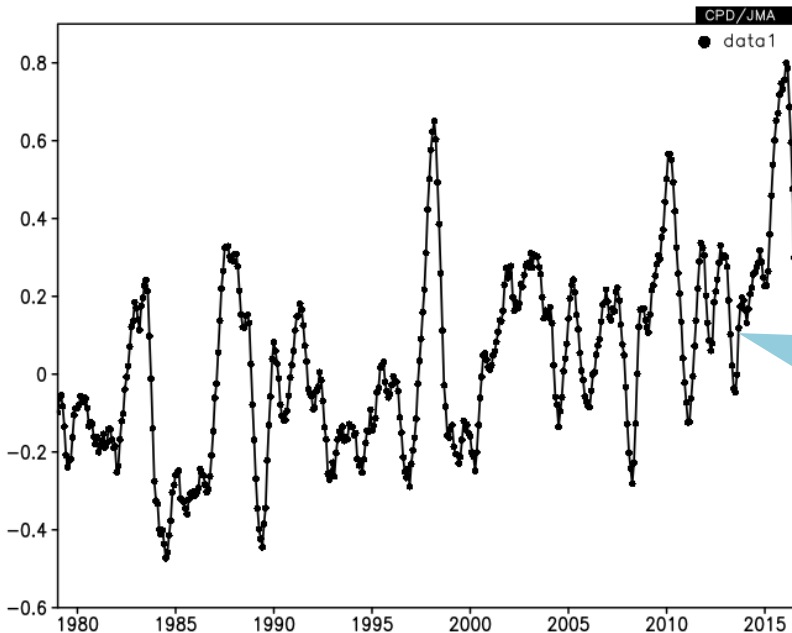


Exercise (3)

- Show a time series of 5-month running mean monthly SST anomalies averaged over the Indian Ocean (20°S–20°N, 40°–100°E) from January 1979 to July 2016.



DATA1 SST_sst ANOM lat = -20:20 lon = 40:100 level = 1:1
time = 1979010100:2016070100 ave = 1MO



Monthly timeseries of 5-month running mean SST anomalies averaged over the Indian Ocean

Answers to Exercise (3)

Data1

SST anomalies

Don't forget to check!

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data	ANOM	ALL	1	MONTHLY	RANGE
	Temperature (SST) [t		Lat: -20 - 20 Ave <input checked="" type="checkbox"/>		<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	1979 1
			Lon: 40 - 100 Ave <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Time filter	2016 7
					Running mean	
					mean period 5	

Vector SD
Derivative: lon lat

Analysis method: -Analysis method-

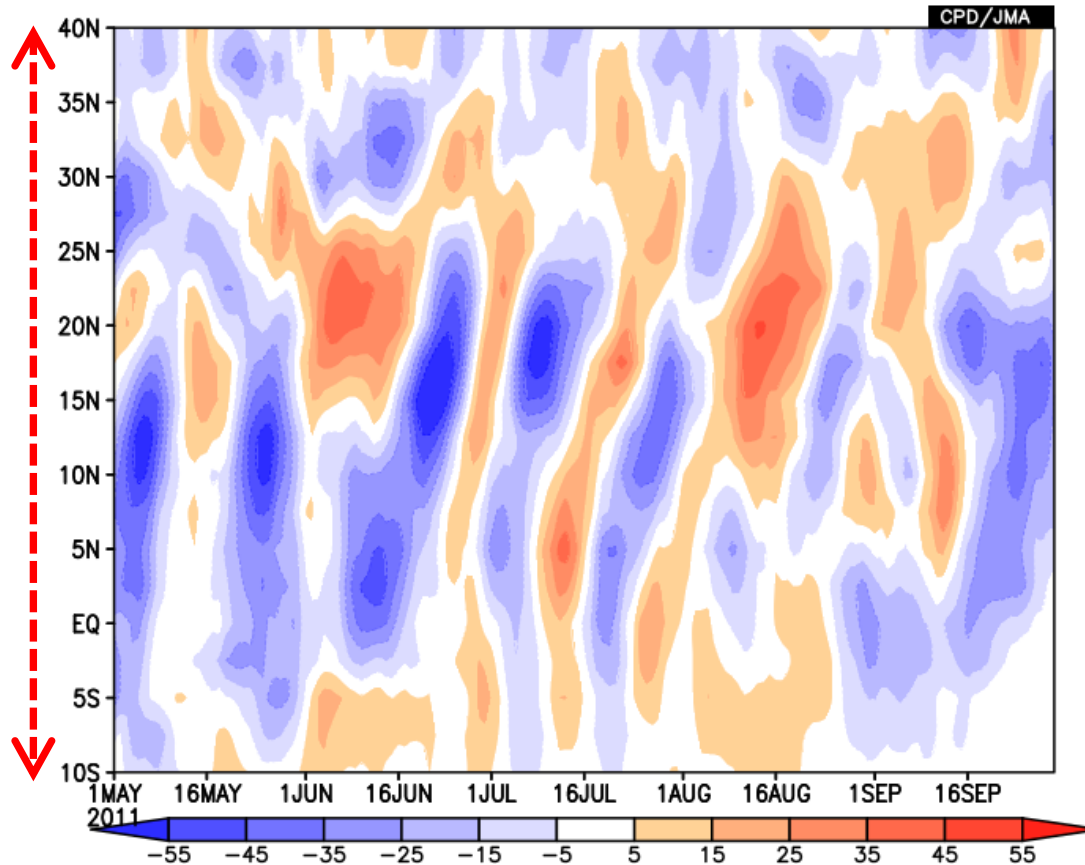
Area average in the Indian Ocean

5-month running mean from Jan. 1979 to Jul. 2016

Exercise (4)

- Show a time-latitude cross section of 7-day running mean OLR anomalies averaged over 115°–135°E from 1 May to 30 September 2011.

DATA1 SAT olr ANOM lat = -10:40 lon = 115:135 level = 1:1
time = 2011050100:2011093000 ave = 1DY



Latitude range is 10°S–40°N.

Answers to Exercise (4)

OLR anomalies

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SAT	OLR [W/m ²]	ANOM	ALL	1	DAILY	RANGE
			Lat: -10 - 40 Ave <input type="checkbox"/>		<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	2011 5 1
			Lon: 115 - 135 Ave <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Time filter	2011 9 30
					Running mean	
					mean period 7	

Vector SD
Derivative: lon lat

115°–135°E mean
From 10°S to 40°N

7-day running mean from
1 May to 30 Sep. 2011

Contour
interval: 10

Graphic Options

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels	<input type="checkbox"/> Polar Stereographic: North pole	<input type="checkbox"/> No Scale Labels
Drawing: SHADE	<input checked="" type="checkbox"/> Show Color Bar	<input type="checkbox"/> Logarithmic Coordinates	<input type="checkbox"/> Draw Credit Inside
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data 1	<input checked="" type="checkbox"/> Reverse the Axes	<input type="checkbox"/> Apply All Pics
Font: default	interval: 10 min: -55 max: 55	<input type="checkbox"/> Flip the X-axis <input checked="" type="checkbox"/> Flip the Y-axis	picture size <input type="text"/> %
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [inch] value: skip: 1	<input type="checkbox"/> No Caption	

Blue-Red
colored shading

To adjust axis setting,
check "Reverse the Axes"
and "Flip the Y-axis".

Advanced operation of iTacs

Contents

1. Statistical Analysis in iTacs

- ❑ Introduction
- ❑ Regression / Correlation Analysis
- ❑ Composite Analysis

2. Other Advanced operations

- ❑ Data download
- ❑ User data input

3. Integrated Exercise

Statistical analysis in iTacs

- iTacs can do some types of statistical analysis.
 - Regression/correlation analysis
 - Composite analysis
 - Single/multi EOF, SVD analysis
 - FFT analysis
 - Wavelet analysis
- They can be powerful tools to consider and understand climate system.



- But, remember that the results produced by them do **NOT** always mean the existence of physical system or structures in targeted data, because it just indicates mathematically calculated value and consideration based on physics isn't included.

Contents

1. Statistical Analysis in iTacs

- Introduction
- Regression / Correlation Analysis
- Composite Analysis

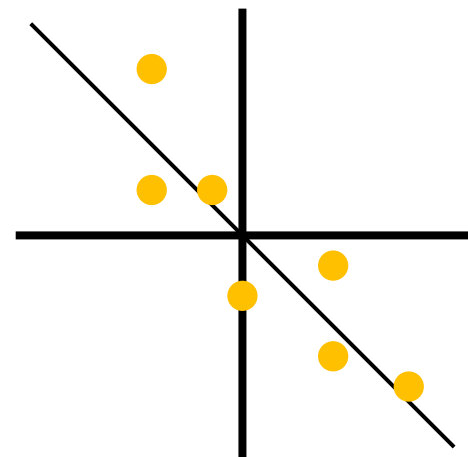
2. Other Advanced operations

- Data download
- User data input

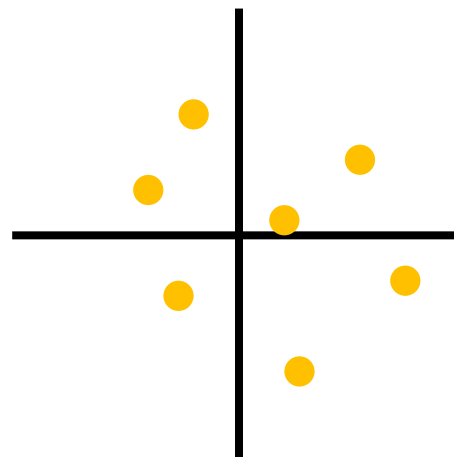
3. Integrated Exercise

Regression and correlation analysis

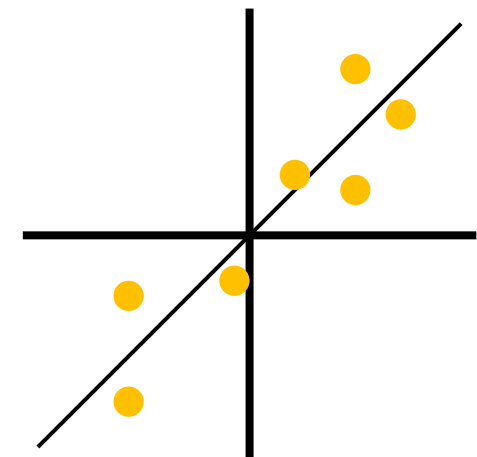
- Regression and correlation analysis are often used to examine the circulation pattern related to the focused one-dimensional timeseries.
- **Correlation coefficient means the degree of the correlation**, and **the regression coefficient means the gradient of the regression line**.
 - Correlation coefficient close to +1 or -1 means there is a clear linear relation between the targeted data pair, and that around zero means there is a few (or weak) relation between them.



Negative correlation



No correlation



Positive correlation

Regression analysis (1)

- Let's chart a regression map of three-month mean **sea level pressure (SLP)** onto **SST anomaly in NINO.3** for DJF from 1958/1959 to 2010/2011.
- For a regression analysis, "Data1" is a responsible (dependent) variable, and "Data2" is an explanatory (independent) variable.
- In this case, "Data1" is SLP and "Data2" is SST anomaly in NINO.3.
- NINO.3 region is defined as 5°S–5°N, 150°–90°W.
- The element "NINO.3" in dataset "INDEX" is also available.

Regression analysis (2)

- Setting "Data1" and "Data2".

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Surface SLP (Sea Level Pressi	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2010 12 - 2

"Year-to-year" must be checked in regression and correlation analysis.

Although the end of the range may appear to be February 2010, this setting means DJF average from 1958/1959 (December 1958 to February 1959) to 2010/2011 (December 2010 to February 2011). Consider the setting for year and month separately.

Analysis method: REGRESSION_COEFFICIENT

Data2

Dataset	Element	Data type	Time unit	Lag	Significance
INDEX	NINO.3 <input type="checkbox"/> SD	HIST	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year	0 YEAR	95%(two side)

Select "REGRESSION_COEFFICIENT".

"Data2" lags set period behind "Data1".

Select options indicate confidence level indicated by t-testing.

Regression analysis (3)

- Setting Graphic Options.

Set "Drawing"
"CONTOUR" to shade
the grids exceeding
confidence level.

Set contour line (i.e.,
regression coefficient)
properties.

Graphic Options

Colorizing: COLOR Show Contour Labels

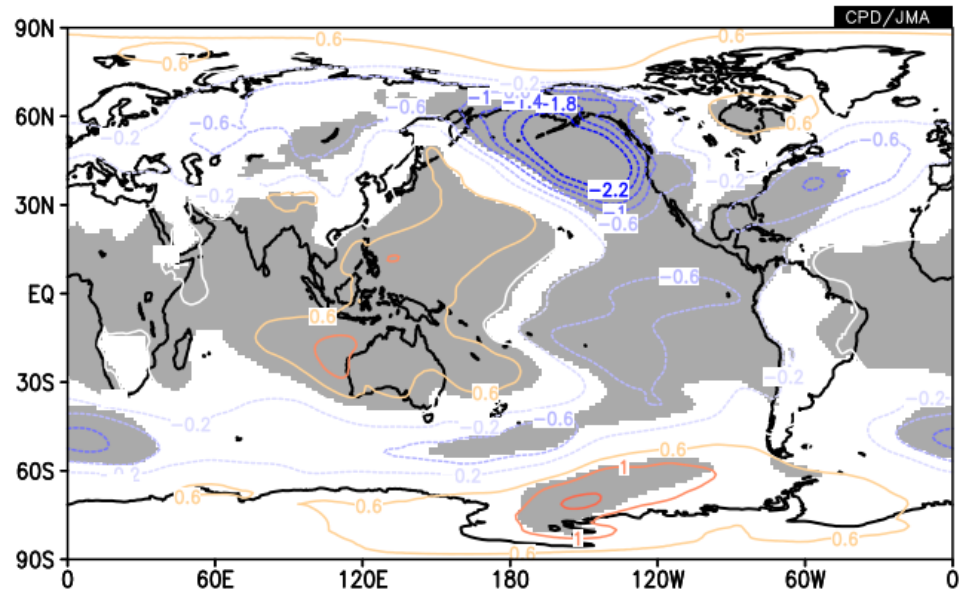
Drawing: CONTOUR Show Color Bar

Format: png Set Contour Parameters for data1

Font: default interval: 0.4 min: -2.2 max: 2.2

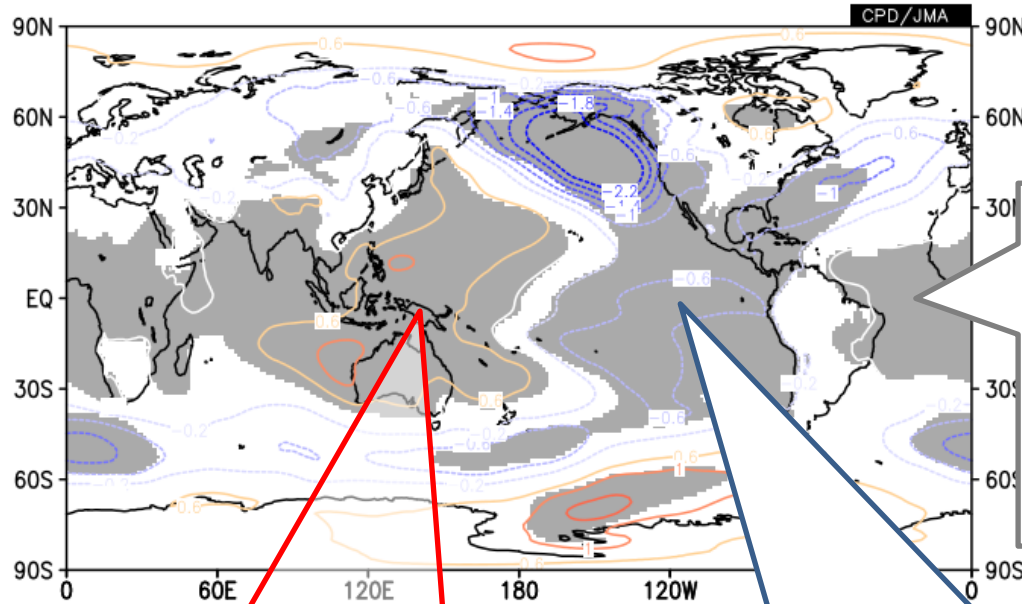
Color Table: Blue - Red Set Vector size: [] [inch] value: [] skip: 1

Don't forget!



Regression analysis (4)

Regression coefficient between NINO.3 index and SLP in DJF from 1958/59 to 2010/11.



The gray shading indicates a 95% confidence level as indicated by t-testing.

SLPs tend to increase associated with positive NINO.3. The red contours indicate positive values of regression coefficients.

SLPs tend to decrease associated with positive NINO.3. The blue contours indicate negative values of regression coefficients.

Correlation analysis

- Performing correlation analysis, select “CORRELATION_COEFFICIENT” analysis.
- Parameter settings are similar to regression analysis.

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Surface SLP (Sea Level Pressi	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2010 12 - 2

Vector SD
Derivative: lon lat

Analysis method: **CORRELATION_COEFFICIENT**

Select
“CORRELATION_COEFFICIENT”

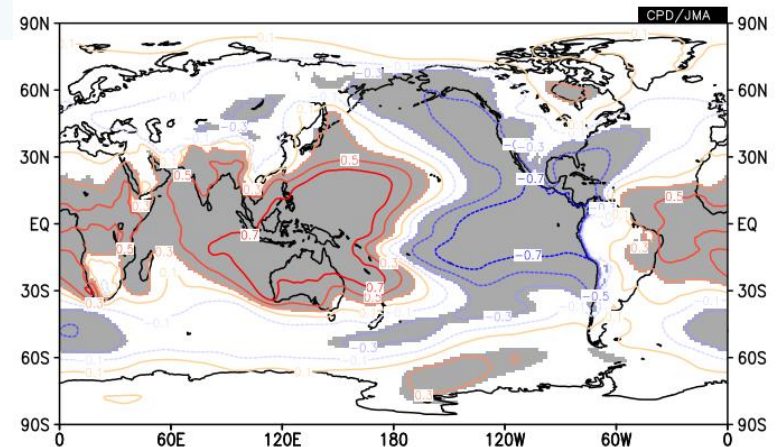
Data2

Dataset	Element	Data type	Area	Level	Time unit	Lag	Significance
INDEX	NINO.3 <input type="checkbox"/> SD	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	0 YEAR	95%(two side)

Correlation coefficients
takes value from -1 to 1

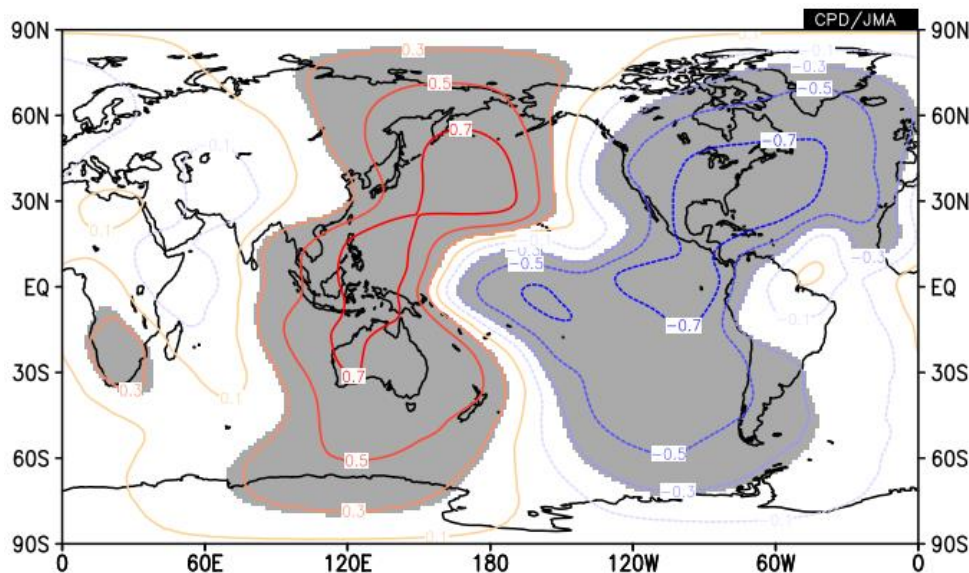
Graphic Options

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels
Drawing: CONTOUR	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data1
Font: default	interval: 0.2 min: -0.7 max: 0.7
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [] [inch] value: [] skip: 1



Exercises (6)

- Show a correlation coefficients map between 200-hPa velocity potential anomalies and SST averaged in NINO.3 area in DJF.
 - Set the statistical period from 1958/59 to 2010/11.
 - Velocity potential can be found in Dataset of “JRA-55”, Element of “Pressure Levels”.
 - NINO.3 is defined as the area in 5°S–5°N,150°–90°W.
 - Set the confidence level **95% (two side)**.



Correlation coefficient
between χ_{200} and SSTA in
NINO.3 in DJF.

Answers to Exercises (6)

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels χ (Velocity Potential)	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	200hPa	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2010 12 - 2

Select "CORRELATION COEFFICIENT"

Analysis method: CORRELATION_COEFFICIENT

Set "showing period" DJF from 1958/59 to 2010/11.

Data2

Dataset	Element	Data type	Area	Level	Time unit	Lag	Significance
SST	Sea Surface Data Temperature (SST) [i] <input type="checkbox"/> SD	ANOM	ALL Lat: -5 - 5 Ave <input checked="" type="checkbox"/> Lon: 210 - 270 Ave <input checked="" type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	0 YEAR	95%(two side)

Average in NINO.3 region

Select confidence level as "95% (two side)".

Graphic Options

Colorizing: COLOR	Don't forget!
Drawing: CONTOUR	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data1
Font: default	interval: 0.2 min: -0.7 max: 0.7
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [] [inch] value: [] skip: 1

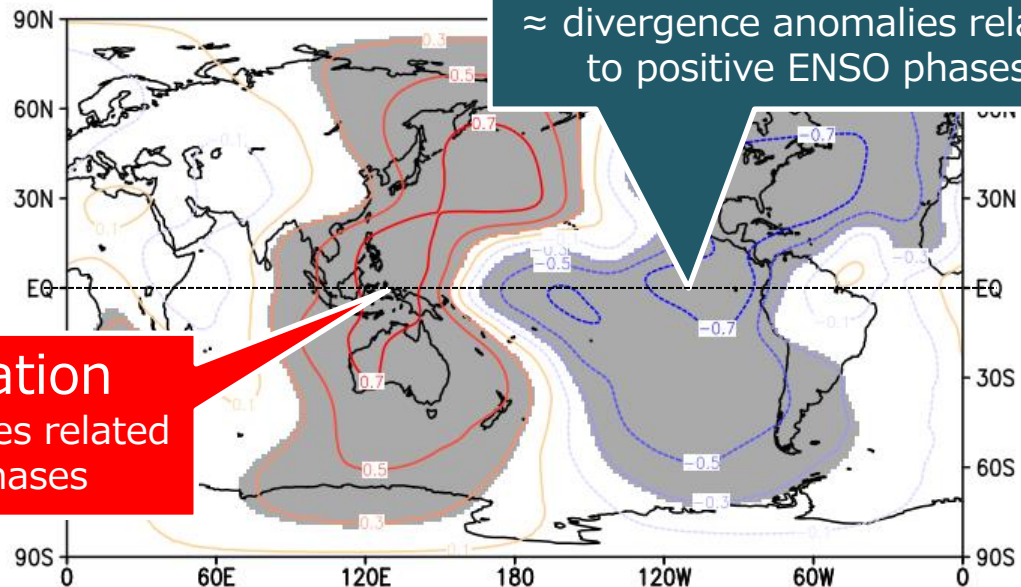
Topics: upper-tropospheric divergence associated with ENSO

- The correlation map of χ_{200} indicates that upper-tropospheric divergence (convergence) seen over the central – eastern (western) Pacific in association with El Niño conditions (i.e. positive NINO.3).

Correlation coefficient between χ_{200} and SST in NINO.3 in DJF.

Positive correlation
≈ convergence anomalies related to positive ENSO phases

Negative correlation
≈ divergence anomalies related to positive ENSO phases



Contents

1. Statistical Analysis in iTacs

- ❑ Introduction
- ❑ Regression / Correlation Analysis
- ❑ **Composite Analysis**

2. Other Advanced operations

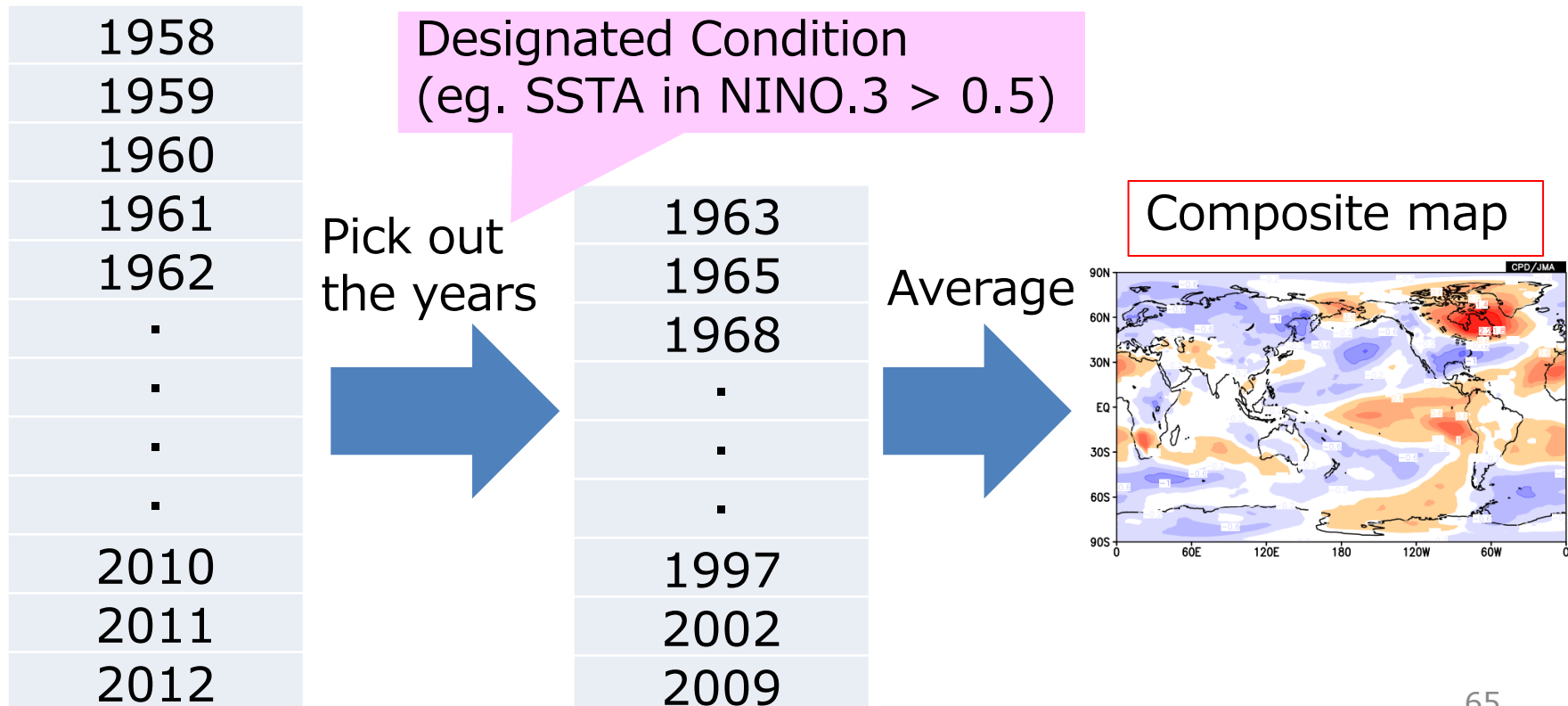
- ❑ Data download
- ❑ User data input

3. Integrated Exercise

Composite analysis (1)

- In composite analysis, the composited Data1 with the condition set in Data2 will be mapped as shown below.

Full set of data Subset of data



Composite analysis (2)

Let's chart composite map for 850-hPa temperature in January when NINO.3 SSTA > 0.5.

1. Set the "Data1".
2. Select "COMPOSITE" in the "analysis method" box.
3. Set the "Data2" (composite condition).

Select a element to composite

1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels T (Temperature) [C.I]	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	850hPa	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2010 1 - 1

Vector SD
Derivative: lon lat

Check "Year-to-year"

2

Analysis method: COMPOSITE

Composite condition must be one-dimensional value.

3

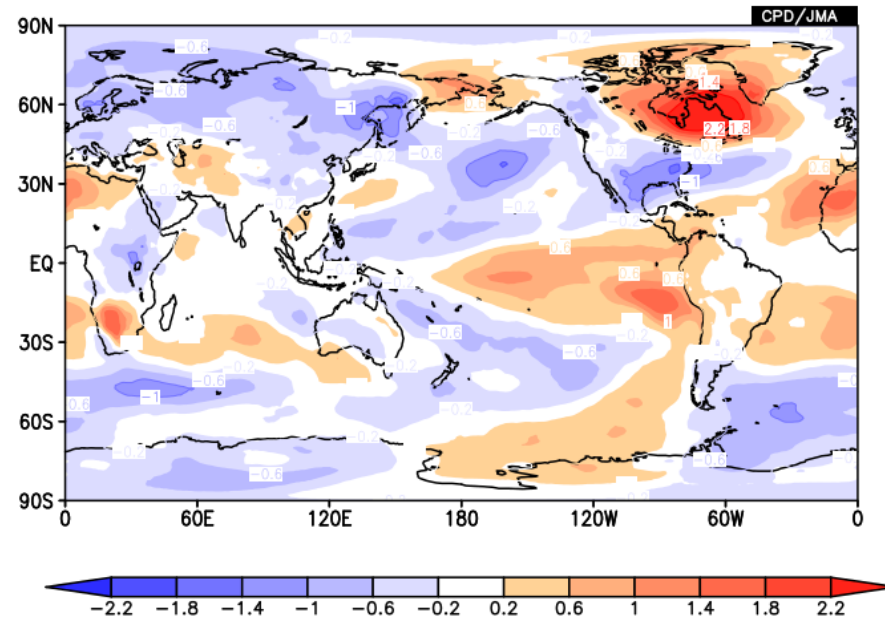
Dataset	Element	Data type	Area	Level	Time unit
SST	Sea Surface Data Temperature (SST) [i <input type="checkbox"/> SD	ANOM > 0.5	ALL Lat: -5 - 5 Ave <input checked="" type="checkbox"/> Lon: 210 - 270 Ave <input checked="" type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter

Composite analysis (3)

Let's chart composite map for 850-hPa temperature in January when NINO.3 SSTA > 0.5.

Graphic Options

Colorizing: COLOR ▾	<input checked="" type="checkbox"/> Show Contour Labels
Drawing: SHADE ▾	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png ▾	<input checked="" type="checkbox"/> Set Contour Parameters for data1
Font: default ▾	interval: 0.4 min: -2.2 max: 2.2
Color Table: Blue - Red ▾	<input type="checkbox"/> Set Vector size: [inch] value: skip: 1



Composite analysis (4)

- If target years in the composite analysis are already decided, select “YEARS” and input the years and months in “Showing period”.

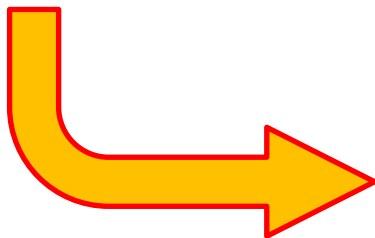
Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	850hPa	MONTHLY <input checked="" type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	YEARS input years directly (comma-separated or space-separated) 1964,1966,1969,1970,1973,1977,1983,1987,1988,1992,1998,2003,2010 7 - 7

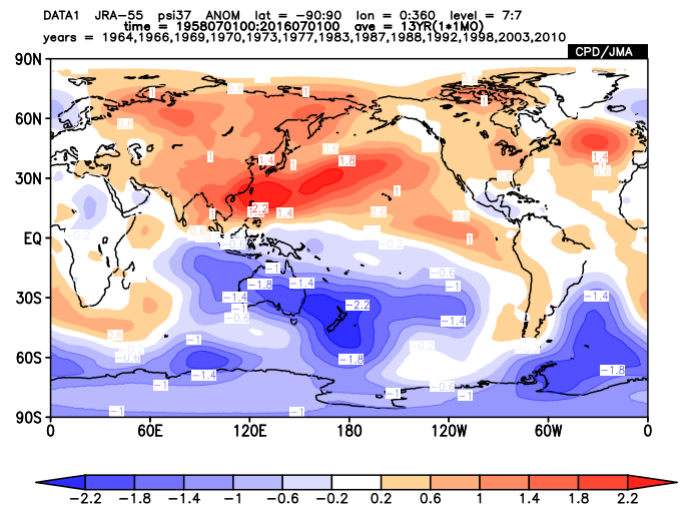
Vector SD

Check “Ave” and “Year-to-year”

Input the target years and/or months



Composite of 850-hPa stream function anomalies in July for “post-El Niño” years.



Composite analysis (5)

- If target years in the composite analysis are already decided, composite map can be drawn by average of “Data1” for target years.
- For example, let’s chart composite map for 850-hPa stream function anomaly in July in post-El Niño years.
 - Select “YEARS” in Showing period.
 - Input target years below. In this case, target years are 1964,1966,1969,1970,1973,1977,1983,1987,1988,1992,1998,2003, and 2010.

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	850hPa	MONTHLY <input checked="" type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	YEARS

Vector SD

input years directly
(comma-separated or space-separated)
1964,1966,1969,1970,1973,1977,1983,1987,1988,1992,1998,2003,2010
7 - 7

Select “YEARS”

Check “Ave” and “Year-to-year”

Input the target years and/or months to small boxes or in a large box with comma-separated format.

Composite analysis (6)

Composite map for 850-hPa stream function anomaly in July in post-El Niño years.

Graphic Options

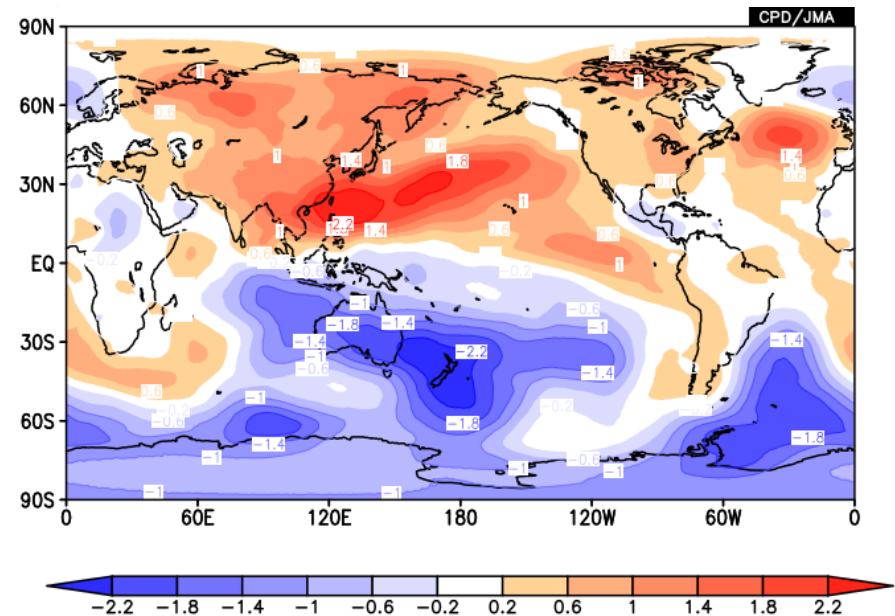
Colorizing: COLOR ▾ Show Contour Labels

Drawing: SHADE ▾ Show Color Bar

Image Format: png ▾ Set Contour Parameters for data1

Font: default ▾ interval: 0.4 min: -2.2 max: 2.2

Color Table: Blue - Red ▾ Set Vector size: [inch] value: skip: 1



Composite analysis (7)

- If you want to draw composite map using anomaly relative to default (1981-2010 mean) climatology, significance of the composite anomaly can be drawn using "SIGNIFICANCE_TEST" analysis

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	850hPa	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	YEARS input years directly (comma-separated or space-separated) 1964,1966,1969,1970,1973,1977,1983,1987,1988,1992,1998,2003,2010 7 - 7

Analysis method: SIGNIFICANCE_TEST

Data2

Dataset	Element	Data type	Level	Time unit	Showing period	Significance
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	850hPa	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1981 - 2010 7 - 7 remove data1 period <input type="checkbox"/>	95%(two side)

Annotations:

- Check "Year-to-year" CAUTION : Do NOT check "ave"
- Select "SIGNIFICANCE_TEST"
- Input the composite years and months
- Select "ANOM"
- Select "RANGE" for 1981-2010

Composite analysis (8)

- If you want to draw composite map using anomaly relative to default (1981-2010 mean) climatology, significance of the composite anomaly can be drawn using "SIGNIFICANCE_TEST" analysis

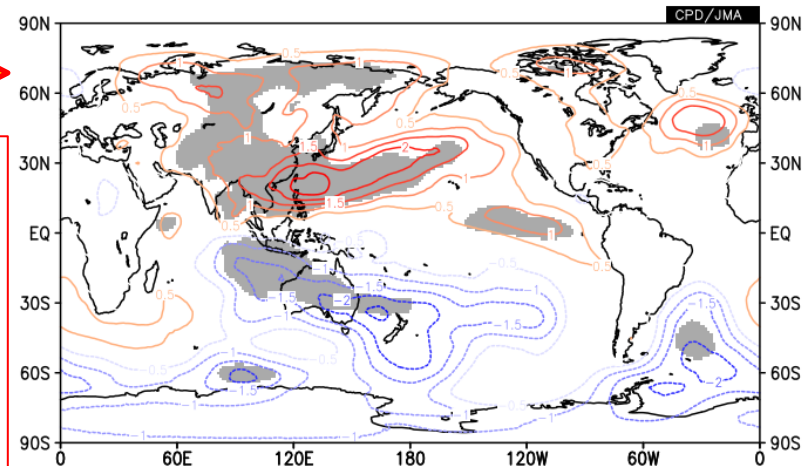
Graphic Options

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels
Drawing: CONTOUR	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png	<input type="checkbox"/> Set Contour Parameters for data1
Font: default	interval: <input type="text"/> min: <input type="text"/> max: <input type="text"/>
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: <input type="text"/> [inch] value: <input type="text"/> skip: <input type="text"/>

Contour : Composite anomaly
Shading : 95% confidence level

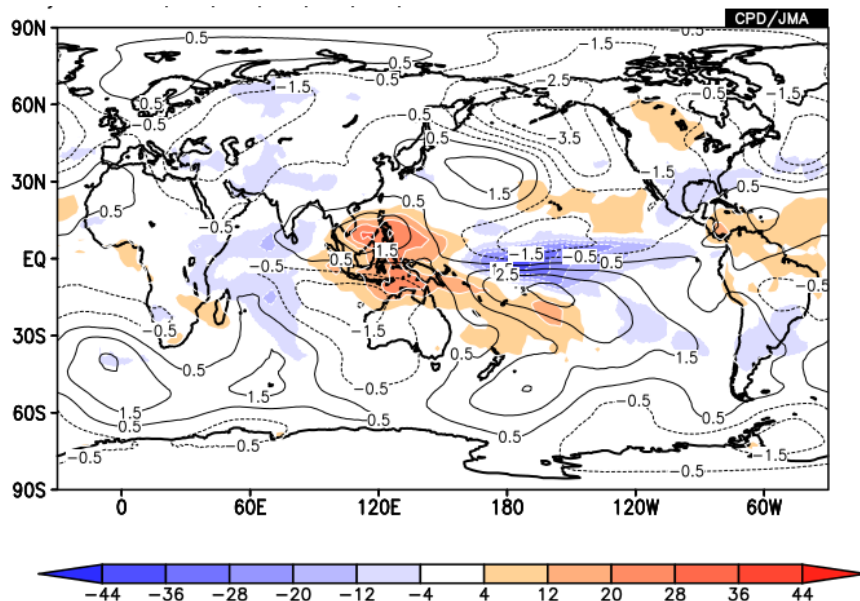
[CAUTION]

Contour indicates composite of "DATA1", not "difference between DATA1 and DATA2". Therefore, this method is valid only for anomaly based on default climatology (1981-2010 mean).



Exercise (7)

- Show the composite map of 850-hPa stream function anomalies (contour) and OLR anomalies (shading) in December during the El Niño years from 1979 to 2010.
 - The El Niño years are **1982, 1986, 1987, 1991, 1997, 2002, 2009** as listed in the JMA/TCC website.
(http://ds.data.jma.go.jp/tcc/tcc/products/el_nino/ensoevents.html)



* Set longitudinal border at not 0° but 30°W (-30°) so as not to get across Africa and Europe.

Composite of 850-hPa stream function anomalies and OLR anomalies in December during El Niño years.

Answers to Exercise (7)

Data1

Dataset	Element	Data type	Area	Level	Time unit
SAT	OLR [W/m ²]	ANOM	ALL	1	MONTHLY

Lat: -90 - 90 Ave
Lon: -30 - 330 Ave

Analysis method: DATA1_DATA2

Data2

Dataset	Element	Data type	Area	Level	Time unit
JRA-55	Pressure Levels ψ (Stream Function)	ANOM	ALL	850hPa	MONTHLY

Lat: -90 - 90 Ave
Lon: -30 - 330 Ave

Showing period

YEARS				
1982	1986	1987	1991	1997
2002	2009			

input years directly (comma-separated or space-separated)

12 - 12

OLR anomalies

Set longitudinal border at 30°W

ψ 850 anomalies

December during El Niño years

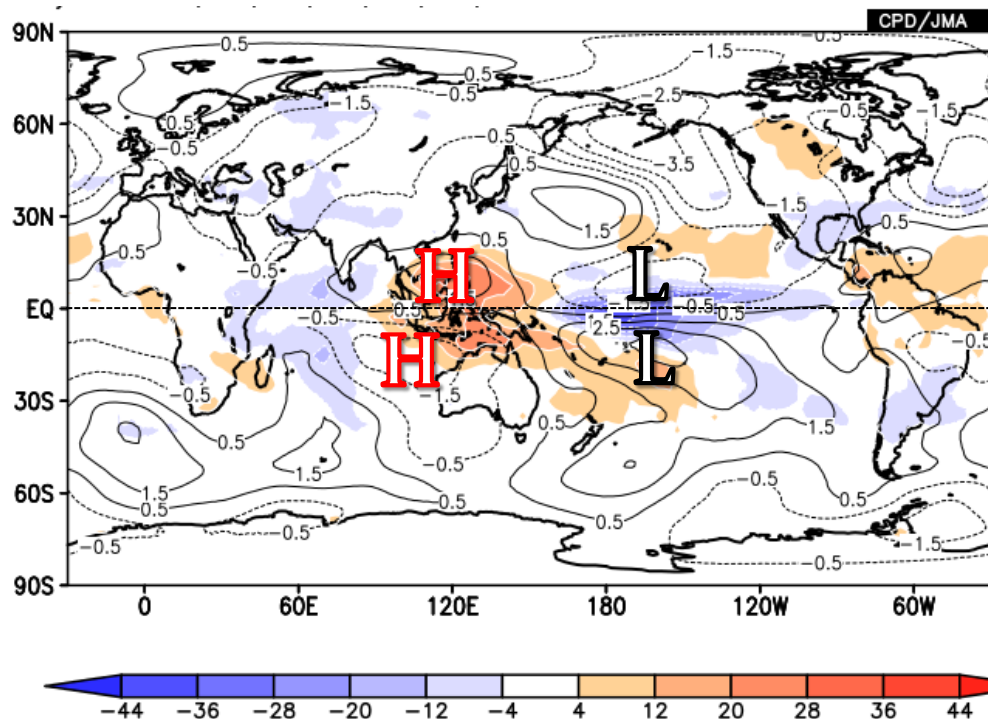
- Contour Parameters setting

Set Contour Parameters for data1
interval: 8 min: -44 max: 44

Set Contour Parameters for data2
interval: 1 min: -5.5 max: 5.5

Topics: Convection and circulation anomalies straddling the equator

- In El Niño years, circulation anomalies straddling the equator are dominant over the area from the Maritime Continent to the Pacific, indicating the Matsuno–Gill response to tropical convection anomalies.



Composite of 850-hPa stream function anomalies and OLR anomalies in December during El Niño years.

Contents

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- ❑ Composite Analysis

2. Other Advanced operations

- ❑ Data download
- ❑ User data input

3. Integrated Exercise

Using user input data (1)

- The time series data made by individual users is available in a dataset name "USER_INPUT".
 - The data must be one element.
 - For example, a correlation or regression coefficient map between single station data or user's original index and another dataset like JRA-55 can be created by this function.
- There are two ways to set data.
 - **UPLOAD_TXT** : Data are given by an uploaded text file.
 - **INPUT_DATA** : Data are directly input to the box.

Sample text file

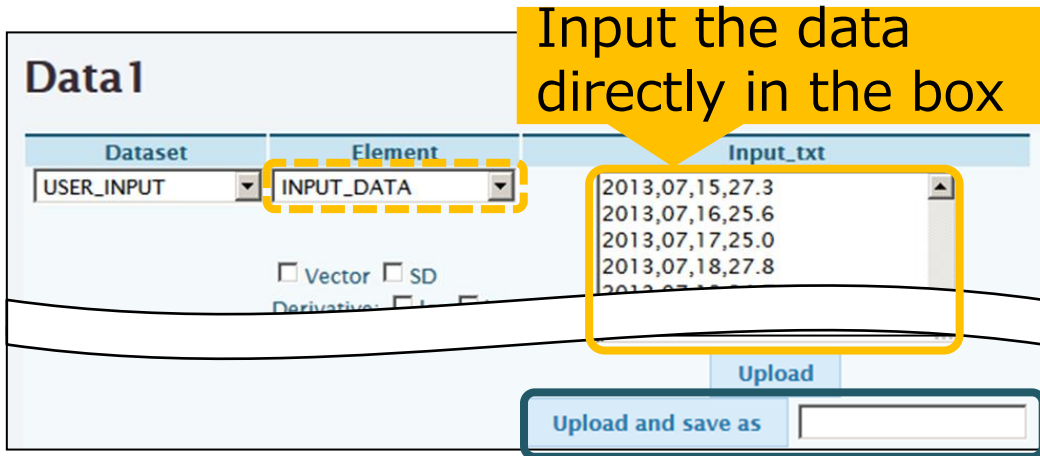
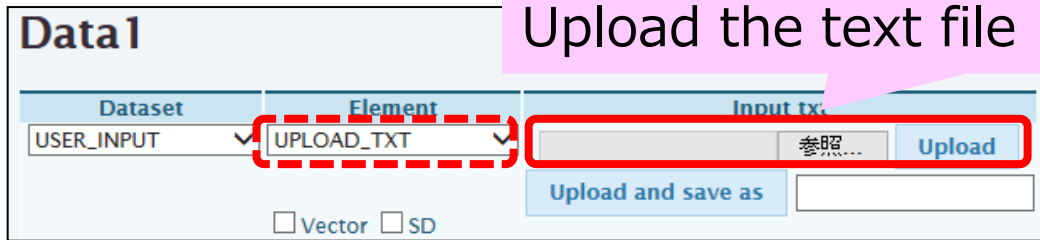
```
#Daily temperature
#undef = 9999
#element = Daily Ts
2013,07,01,23.6
2013,07,02,24.3
2013,07,03,24.5
2013,07,04,9999
2013,07,05,27.4
2013,07,06,28.9
```

<Data format>

- Data must be separated by comma and must be given by specified format as "year, month, day, value". In case of monthly data, "day"s are always given as "1".
- Sentences beginning with "#" have special meanings.
 - # : Comment (except for two cases shown below).
 - #undef = : Definition of missing data (default is -9999).
 - #element = : Data name used to save them on the server.

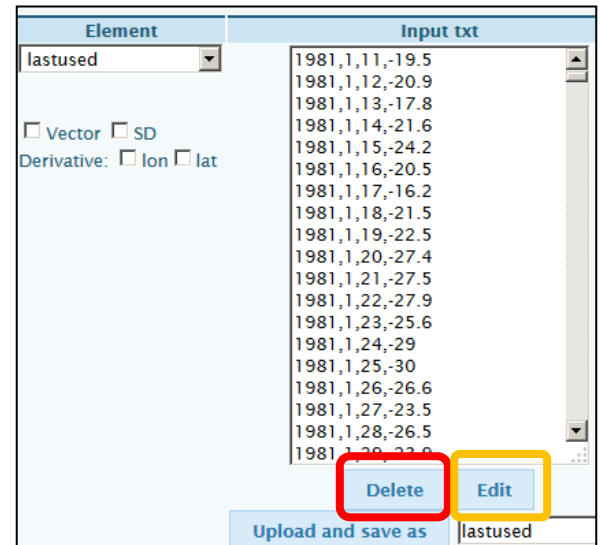
Using user input data (2)

- Upload/input the data



Input the name to save them on the server, and click the "upload and save as" button.

- Control the uploaded data



- Select the data name and click "Delete" button to delete the data from the server.
- Click "Edit" button to edit the data in the box.

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1. Statistical Analysis in iTacs

- ❑ Introduction
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- ❑ Composite Analysis

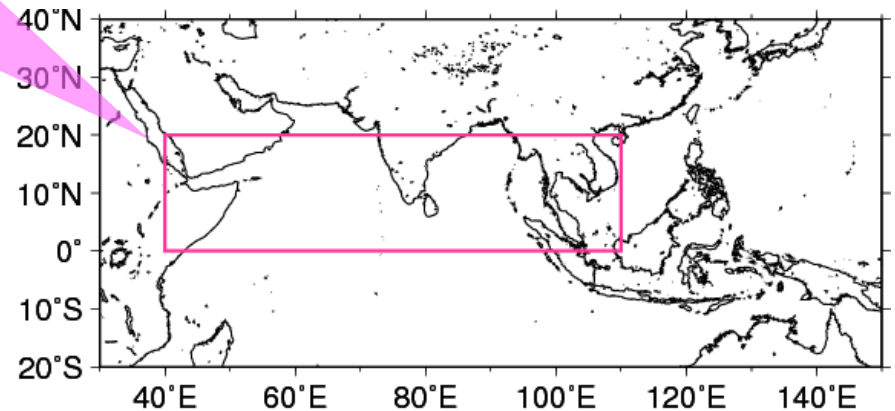
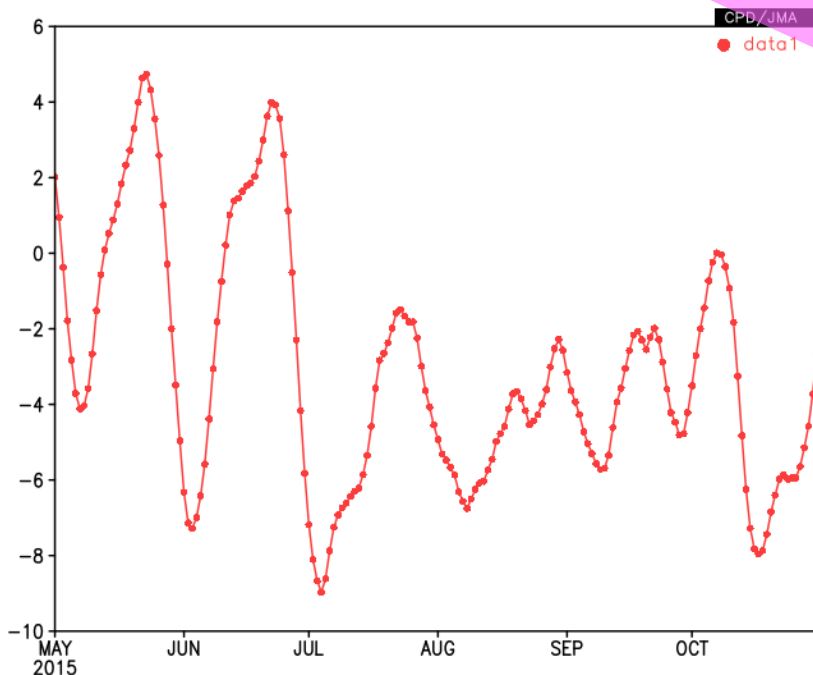
2. Other Advanced operations

- ❑ Data download
- ❑ User data input

3. Integrated Exercise

Integrated Exercise (1)

- Show a daily time series of **7-day running mean anomalies** of Asian monsoon indices defined by Webster and Yang (1992) during the period from 1 May to 31 October 2015.
 - The monsoon indices are defined as the zonal wind shear (**difference**) between **850 hPa** and **200 hPa** over the area of **equator–20°N, 40°–110°E**.



Positive (negative) anomalies of the index indicate stronger (weaker)-than-normal monsoon circulation.

Answers to Integrated Exercise (1)

ANOM minus ANOM
= index anomalies

7-day running mean

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels	ANOM	ALL	850hPa	DAILY	RANGE
	U (Zonal Wind) [m/s]		Lat: 0 - 20 Ave <input checked="" type="checkbox"/>	850hPa	<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	2015 5 1
			Lon: 40 - 110 Ave <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Time filter	2015 10 31
	<input type="checkbox"/> Vector <input type="checkbox"/> SD				Running mean	
	Derivative: <input type="checkbox"/> lon <input type="checkbox"/> lat				mean period 7	
Analysis method: SUBTRACT						

U850

Data2

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Pressure Levels	ANOM	ALL	200hPa	DAILY	RANGE
	U (Zonal Wind) [m/s]		Lat: 0 - 20 Ave <input checked="" type="checkbox"/>	200hPa	<input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year	2015 5 1
	<input type="checkbox"/> SD		Lon: 40 - 110 Ave <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> Time filter	2015 10 31
					Running mean	
					mean period 7	

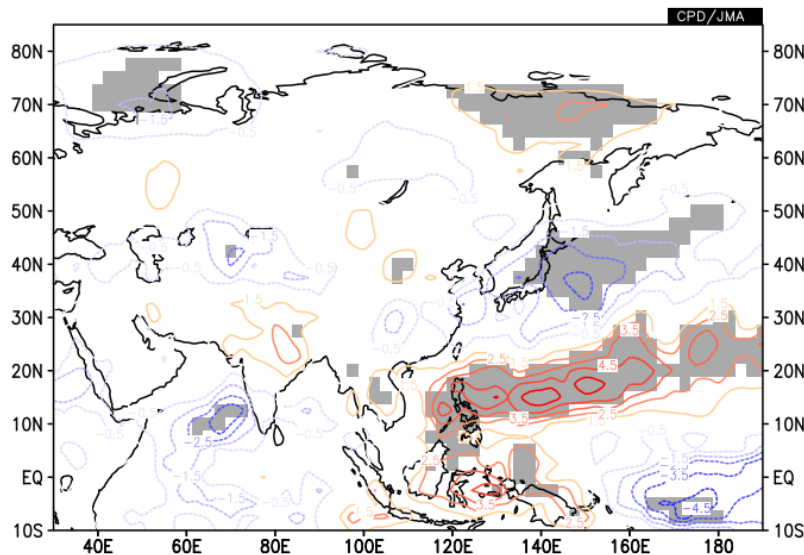
U200

Shear: the difference
of two level data

Integrated Exercise (2)

- Show a regression map of OLR anomaly over the “ASIA” area onto IOBW index in June – August period.
 - Set the statistical period from 1979 to 2010.
 - Set the confidence level **95% (two side)**.
 - Use “USER_INPUT” to analyze IOBW index.
CSV file is available here.
(<http://extreme.kishou.go.jp/tool/share/iobw.csv>)

* IOBW is defined as the area in the Indian Ocean basin-wide ($20^{\circ}\text{S}-20^{\circ}\text{N}, 40^{\circ}-100^{\circ}\text{E}$).



Regression coefficient
between OLR and IOBW
index in JJA.

Answers to Integrated Exercise (2)

Data1

Set area "ASIA".

Full dataset of OLR is available since 1979.

Dataset	Element	Data type	Area	Time unit	Range
SAT	OLR [W/m^2]	ANOM	ASIA	MONTHLY	1979 - 2010

Lat: -10 - 85 Ave
Lon: 30 - 190 Ave

Ave Year-to-year Time filter

Vector SD
Derivative: lon lat

Analysis method: REGRESSION_COEFFICIENT

Analysis method is "REGRESSION_COEFFICIENT"

Data2

Dataset	Element	Input_txt	Time unit	Lag	Significance
USER_INPUT	INPUT_DATA	2015,8,1,0.40 2015,9,1,0.42 2015,10,1,0.46 2015,11,1,0.35 2015,12,1,0.52 2016,1,1,0.62 2016,2,1,0.45 2016,3,1,0.72 2016,4,1,0.65 2016,5,1,0.50 2016,6,1,9999 2016,7,1,9999 2016,8,1,9999 2016,9,1,9999	MONTHLY	0 YEAR	95%(two side)

SD

Ave Year-to-year Time filter

Use "USER_INPUT" to input a text file.

Select confidence level as "95% (two side)".

Graphic Options

Don't forget!

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels
Drawing: CONTOUR	<input checked="" type="checkbox"/> Show Color Bar
Image Format: png	<input checked="" type="checkbox"/> Set Contour Parameters for data1
Font: default	interval: 1 min: -5.5 max: 5.5
Color Table: Blue - Red	<input type="checkbox"/> Set Vector size: [] [inch] value: [] skip: 1

To learn more about iTacs

- Online help page and tutorial manual are available on the iTacs website.

❑ Tutorial: <http://extreme.kishou.go.jp/tool/itacs-tcc2015/>

❑ Help page:

<http://extreme.kishou.go.jp/itacs5/assets/help.html>

iTacs (Interactive Tool for Analysis of the Climate System)

Announcement

- ▶ 30 September 2016 - Isentropic potential vorticity of JRA-55 is available on iTacs.
- ▶ 12 February 2016 - iTacs version 4.0 service has terminated. The new version of iTacs is available.

iTacs version 5.0

Tools

- ▶ iTacs v5.0

Tutorial Manual

- ▶ Sea surface temperature (SST) and anomalies
- ▶ Daily mean SST anomalies
- ▶ 850-hPa stream function
- ▶ 850-hPa stream function and anomalies
- ▶ Difference of monthly mean SST anomalies
- ▶ 500-hPa height and anomalies
- ▶ Time-longitude cross section of 200-hPa velocity potential
- ▶ 925-hPa water vapor flux anomalies and specific humidity anomalies
- ▶ Interannual variation of monthly mean 850-hPa temperature
- ▶ Composite of SST anomalies in La Nina years
- ▶ Regression and correlation analysis
- ▶ One-month prediction
- ▶ Map options
- ▶ Edit user information

What is iTacs?

iTacs stands for Interactive Tool for Analysis of the Climate System. It is a

Online help for iTacs

[top](#) | [Select parameters](#) - [Dataset](#) - [Element](#) - [Data type](#) - [Area](#) - [Level](#) - [Average period](#) - [Showing period](#) | [Analysis method](#) | [color bar sample](#)
[Graphic Option](#) - [Detailed Options for Image x](#) | [number of grid points for dataset](#) | [format for USER INPUT](#)

Dataset

データセットを選択します。選択したデータセットによって「element」が変化します。

USER_INPUTを用いたユーザー作成データの利用について

USER_INPUTを選択すると、ユーザーが用意したデータを取り込んで描画することが出来ます。データをテキスト形式のファイルで用意する場合は、「element2」でUPLOAD.TXTを選択します。その後「UPLOAD.TXT」でファイルを選択して、uploadボタンを押すと、データを取り込み事が出来ます。

直接iTacsにデータを打ち込む場合は、「element2」でINPUT DATAを選択します。その後「input.txt」にデータを行打ち込み、uploadボタンを押すと、データを取り込み事が出来ます。

USER_INPUTのフォーマットに関しては[こちら](#)を参照してください。

Select the "Dataset" pull-down menu. JRA-55, SST and a variety of other datasets are available.

Using "USER INPUT"

Any time series data can be uploaded and used. There are two ways to set data.

- UPLOAD.TXT: Data come from an uploaded text file.
- INPUT_DATA: Data are directly entered in the box.

See [format for USER INPUT](#).

Element

データ要素を選択します。

要素が多い場合、大きなカテゴリとしてelement1、そのカテゴリ内で詳細な要素をelement2としています。

Vectorボックスをチェックすると、2つめのプルダウンリストが表示され、ベクトルを描くことができます。その際、X方向は上のプルダウンリスト、Y方向は下のプルダウンリストとなります。さらに、Stream lineボックスをチェックすると、流線を描くことができます。

また、「x」の欄にあるテキストボックスに任意の数字を入れることにより、Yの値にその指定した数値をかけた値を表示します。

SDボックスをチェックすると表示期間での指定要素の標準偏差差を描画します。Vector機能とSD機能は同時には使えません。

Derivativeの、lonボックスにチェックを入れると東西微分、latボックスにチェックを入れると南北微分値を描画します。

Select "element1" or "element2". Available choices will be shown in each pull-down menu depending on the dataset selected.

To enable vector map drawing, the "Vector" box must be checked. Another pull-down menu is then displayed to allow selection of another element. Select the X and Y components of the vector from the first and second menus, respectively. Stream-line is available except when the map area contains a pole.

The value in the "x" box is the multiple scale of the coefficient for the Y component. The default setting is 1.0.

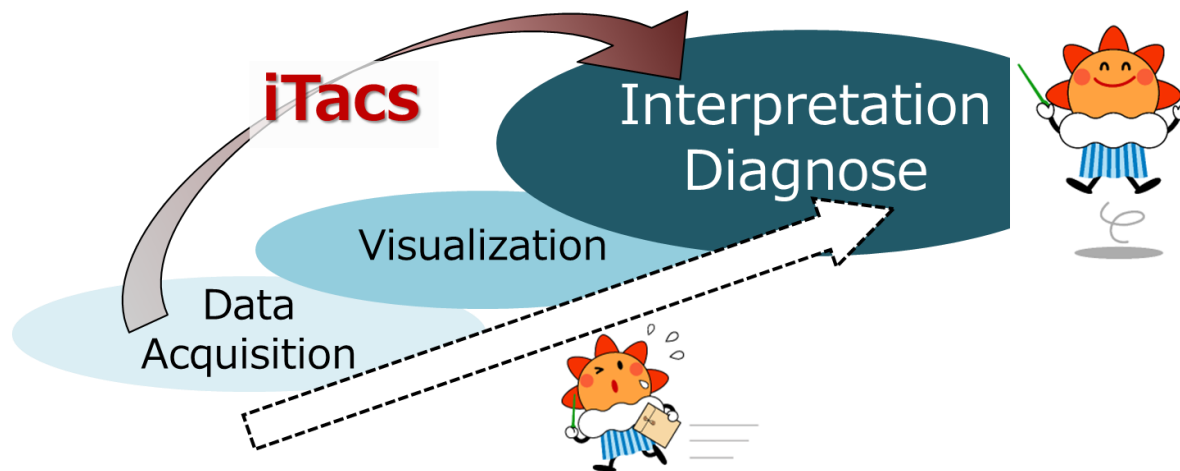
If the "SD" box is checked, a standard deviation map is provided to show the variability of the selected element. The "SD" and "Vector" boxes cannot be set at the same time.

A derivative map is also provided to show the derivative (rate of variability or gradient) for the meridional ("lat") or zonal ("lon") direction of the selected element.

Thank you for your attention!

If you are interested or have any questions, please feel free to contact us.

- TCC Web Site:
<http://ds.data.jma.go.jp/tcc/tcc/index.html>
- TCC E-mail: [tcc\[at\]met.kishou.go.jp](mailto:tcc@met.kishou.go.jp)



References

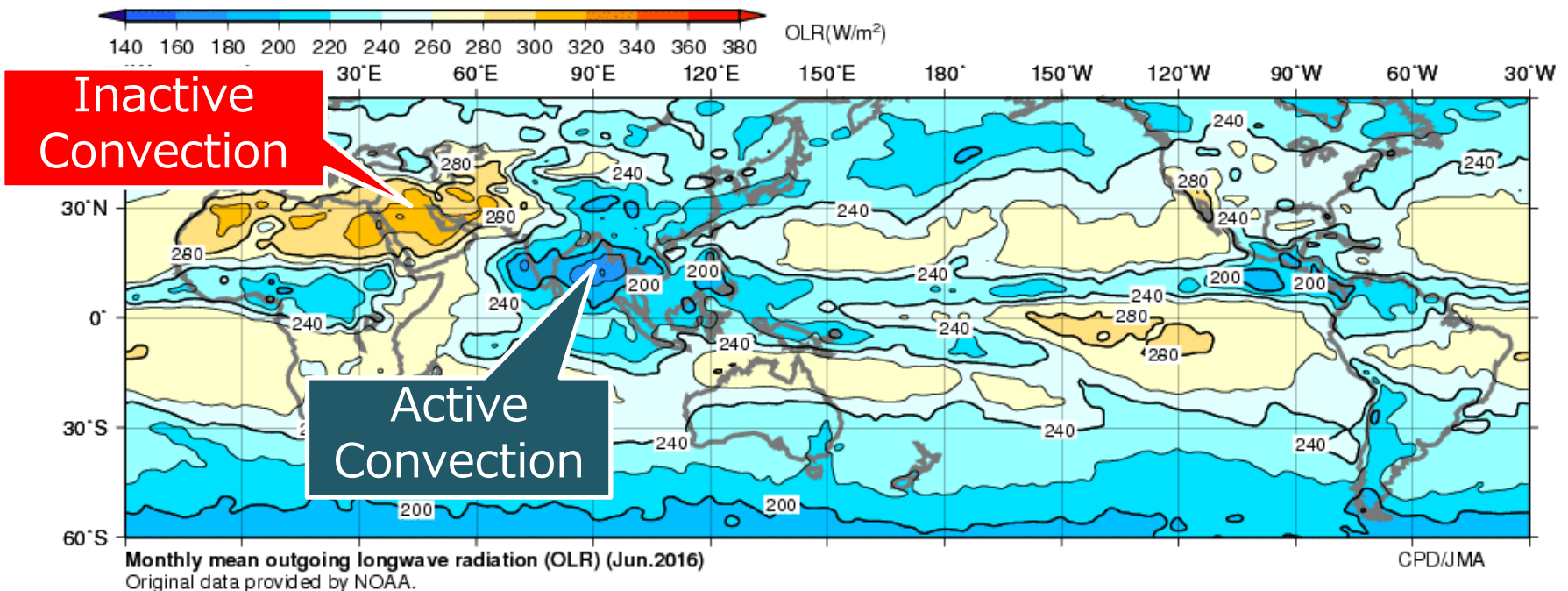
- Duchon, 1979: Lanczos Filtering in One and Two Dimensions, *J. Applied Met.*, **18**, 1016-1022.
- Ishii et al., 2005: Objective Analyses of Sea-Surface Temperature and Marine Meteorological Variables for the 20th Century using ICOADS and the Kobe Collection. *Int. J. Climatol.*, **25**, 865-879.
- Kobayashi et al., 2015: The JRA-55 Reanalysis: General Specifications and Basic Characteristics. *J. Meteorol. Soc. Japan*, **93**, 5-48.
- Toyoda et al., 2013: Improved Analysis of Seasonal-Interannual Fields Using a Global Ocean Data Assimilation System, *Theoretical and Applied Mechanics Japan*, **61**, 31-48.

Supplemental explanation

Outgoing Longwave Radiation (OLR)

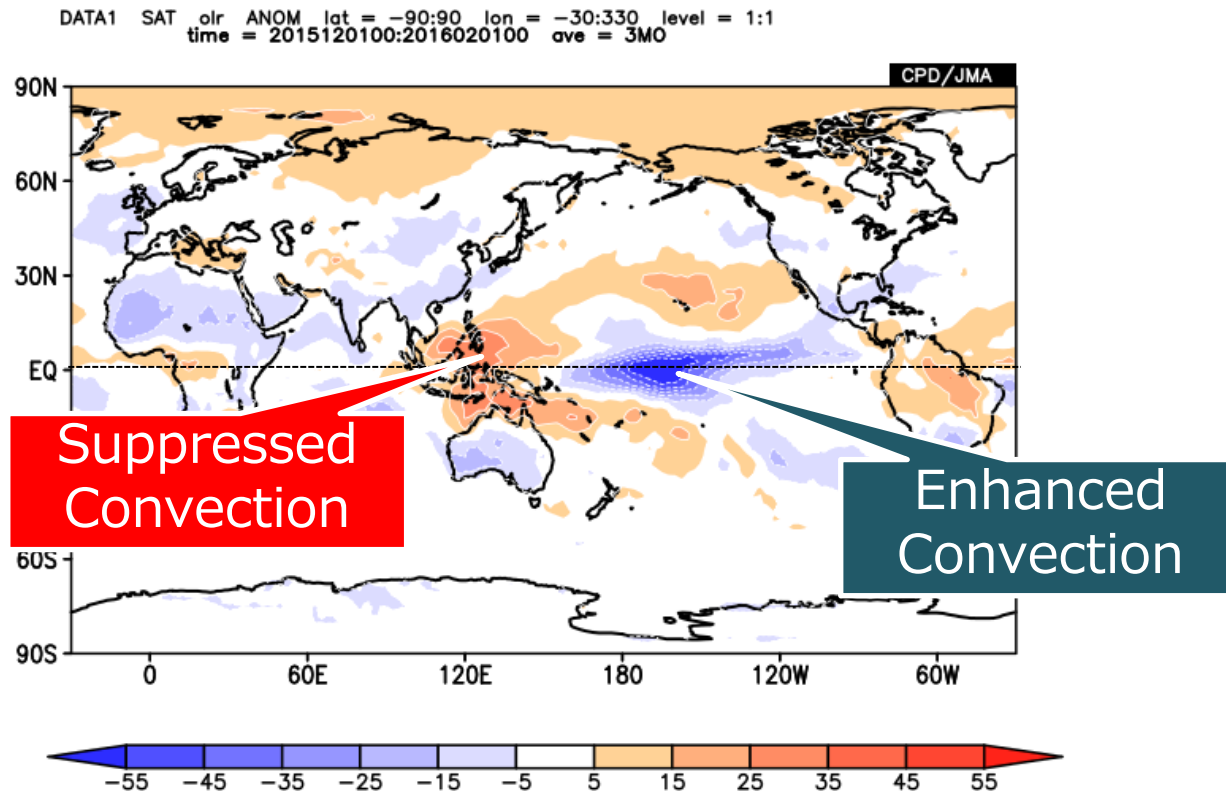
- OLR is an index that represents temperatures of the earth surface as observed from the space by a satellite.
- Lower (higher) OLR indicates a radiation emitted from the top of cumulonimbus clouds (the ground) over the area of active (inactive) convection.

Monthly-mean OLR in June 2016



Topics: Anomalous convective activities associated with the El Niño event

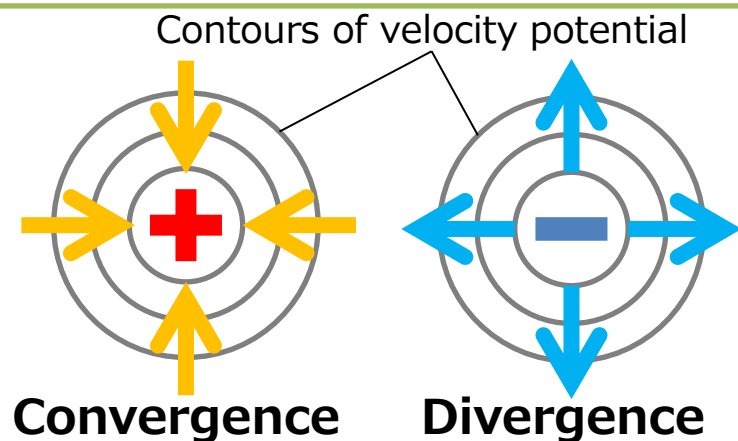
- In the equatorial region, enhanced (suppressed) convective activities were seen over the central to eastern (western) Pacific.
- These anomaly patterns are statistically seen during the El Niño events.



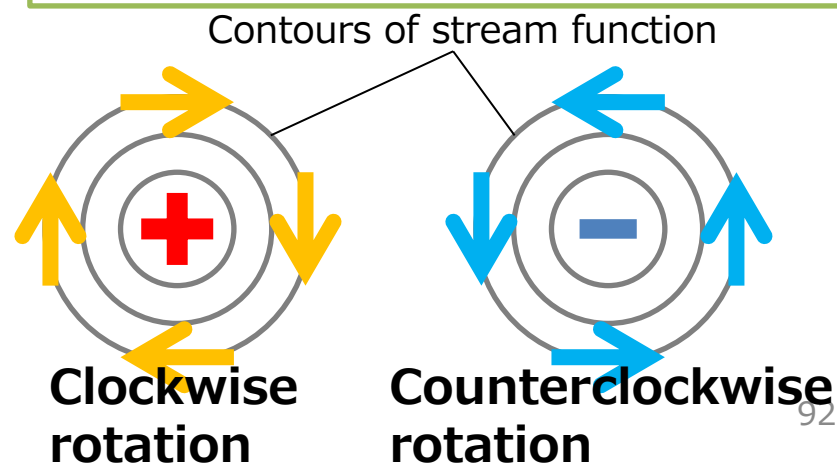
Velocity potential and stream function

- Air flow can be decomposed into a divergent part and a rotational part under the assumption of perfect fluid.
- Velocity potential indicates the divergent part.
 - Divergent wind blows across contours of it, from areas of low to high, regardless of the hemisphere.
 - Strong divergence at upper troposphere corresponds to active convection.
- Stream function indicates the rotational part.
 - Rotational wind blows parallel to contours of it, with low value to the left, regardless of the hemisphere.
 - Air flow around local maximum (i.e. clockwise) corresponds to anti-cyclonic rotation in the N.H. and cyclonic rotation in the S.H.

Velocity potential (divergent part)



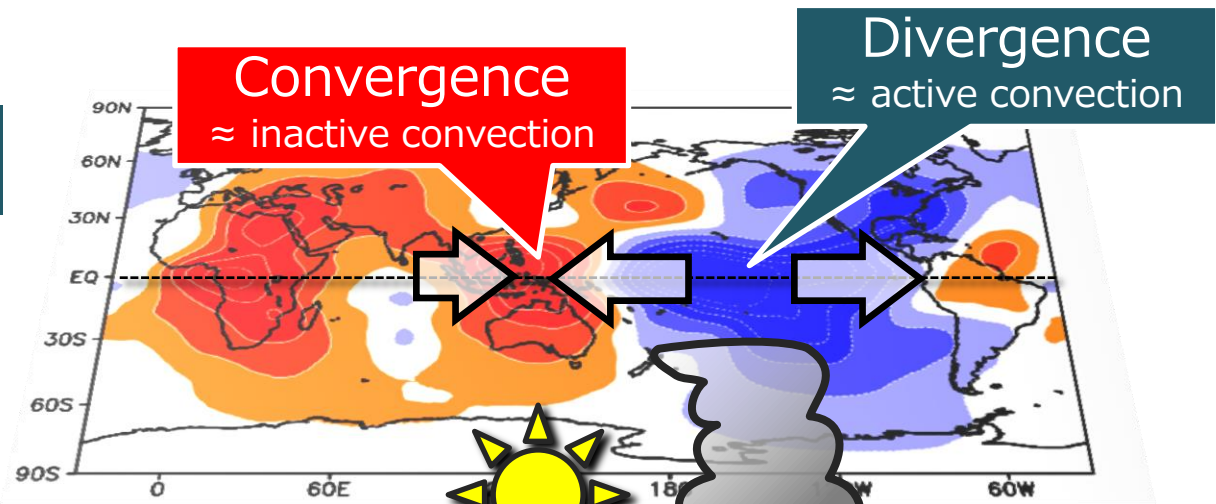
Stream function (rotational part)



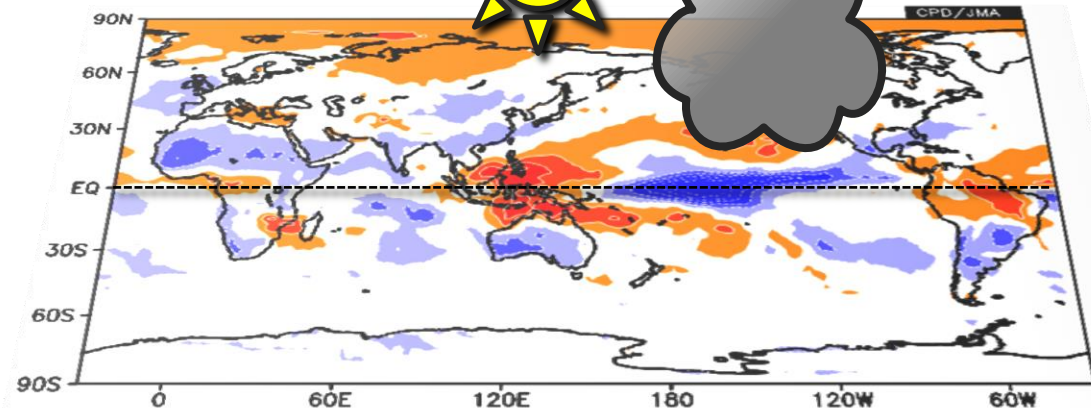
Tropical Convection and divergence

- In association with the enhanced (suppressed) convective activity, upper-tropospheric divergence (convergence) anomalies were seen over the central to eastern (western) during El Niño winter 2015/16.

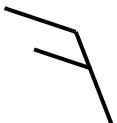

χ_{200} anom.



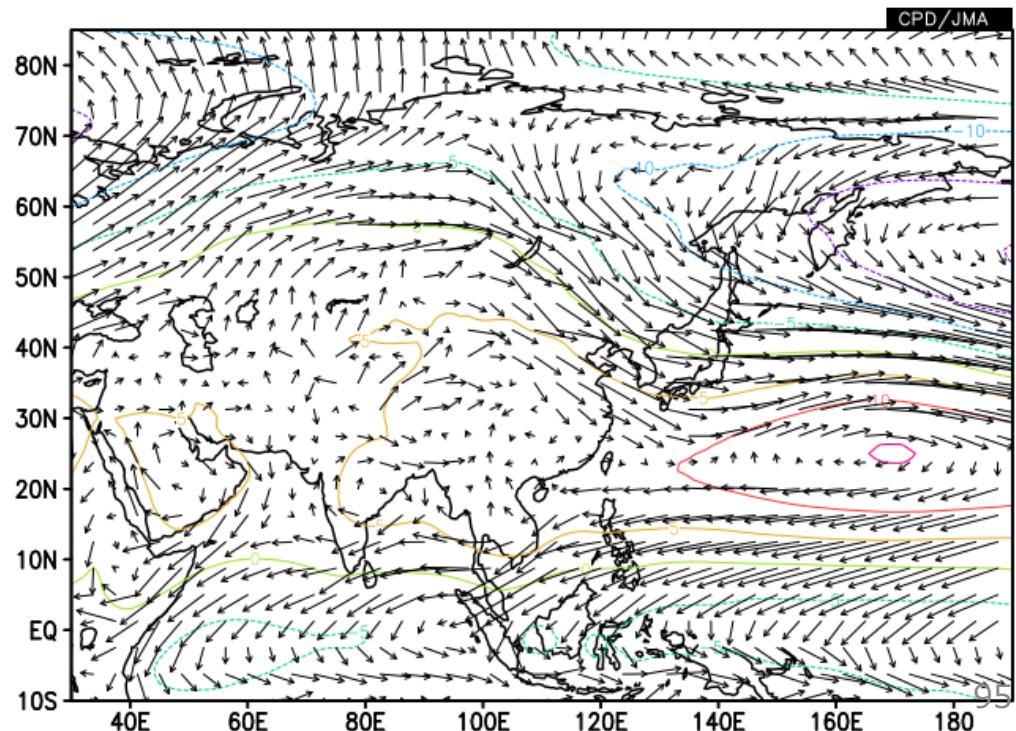
OLR anom.



Vector map

- A vector map is available to see flow or flux.
 - For example, set U and V to see blowing wind.
 - Barbs are not available. (Barb:  and )

850-hPa wind
vector and
stream function
(contour) in
February 2016

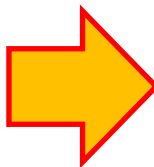


Vector map

Dataset	Element
JRA-55	Pressure Levels
	U (Zonal Wind) [m/s]

Vector SD
Derivative: lon lat

Check!



Dataset	Element
JRA-55	Pressure Levels
	U (Zonal Wind) [m/s]
	V (Meridional Wind)

Vector SD
 Stream line

X-component

Y-component

This area will appear

Graphic Options

Colorizing: COLOR	<input checked="" type="checkbox"/> Show Contour Labels	<input type="checkbox"/> Polar Stereographic: North pole
Drawing: SHADE	<input checked="" type="checkbox"/> Show Color Bar	<input type="checkbox"/> Logarithmic Coordinates
Image Format: png	<input type="checkbox"/> Set Contour Parameters for data1	<input type="checkbox"/> Reverse the Axes
Font: default	interval: [] min: [] max: []	<input type="checkbox"/> Flip the X-axis <input type="checkbox"/> Flip the Y-axis
Color Table: Blue - Red	<input checked="" type="checkbox"/> Set Vector size: 1 [inch] value: 10 skip: 1	<input type="checkbox"/> No Caption

Customize setting in these boxes to change the vector size and interval.

Vector map

- Draw the stream line

- Change the size and interval

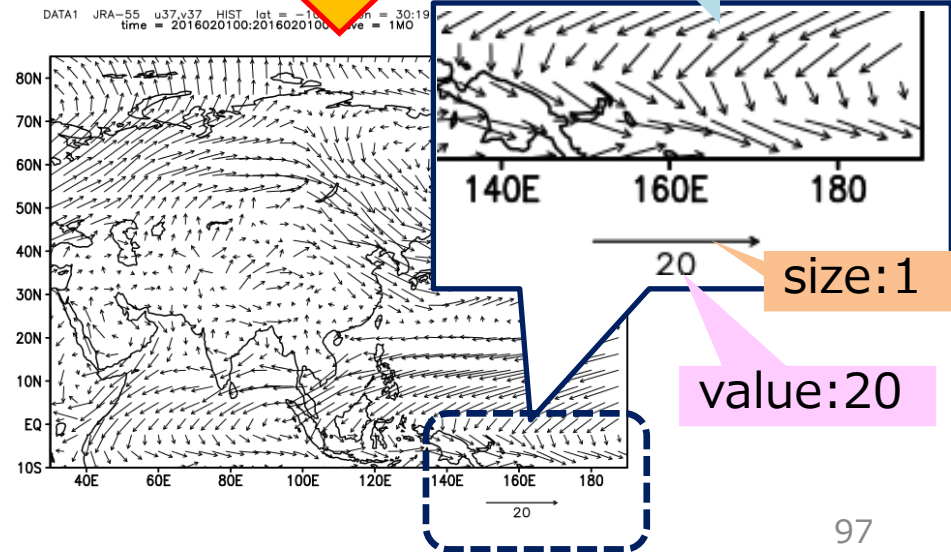
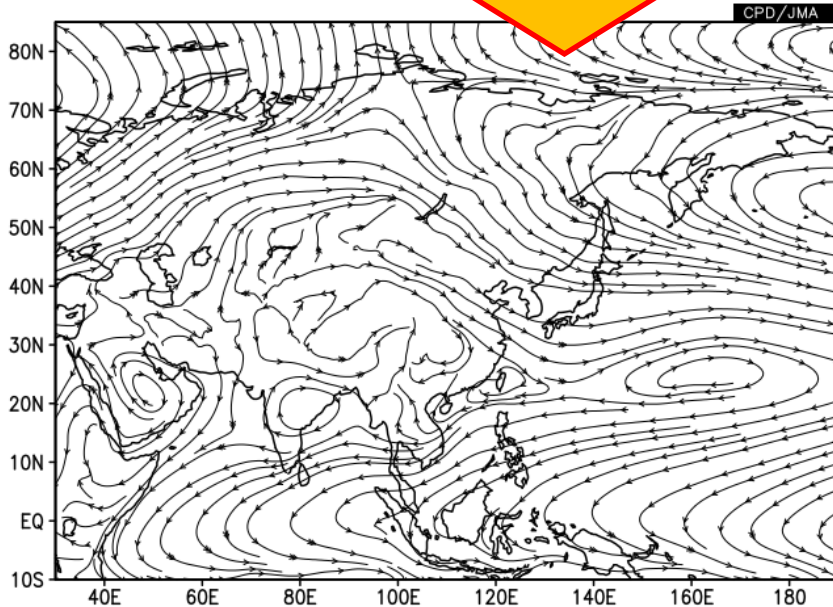
Data1

Dataset	Element
JRA-55	Pressure Levels
	U (Zonal Wind) [m/s]
	Pressure Levels
	V (Meridional Wind)
x: <input type="text"/>	<input checked="" type="checkbox"/> Stream line
<input checked="" type="checkbox"/> Vector	<input type="checkbox"/> SD

tions

Show Contour Labels
 Show Color Bar
 Set Contour Parameters for data1
interval: min: max:
 Set Vector size: 1 [inch] value: 20 skip: 3

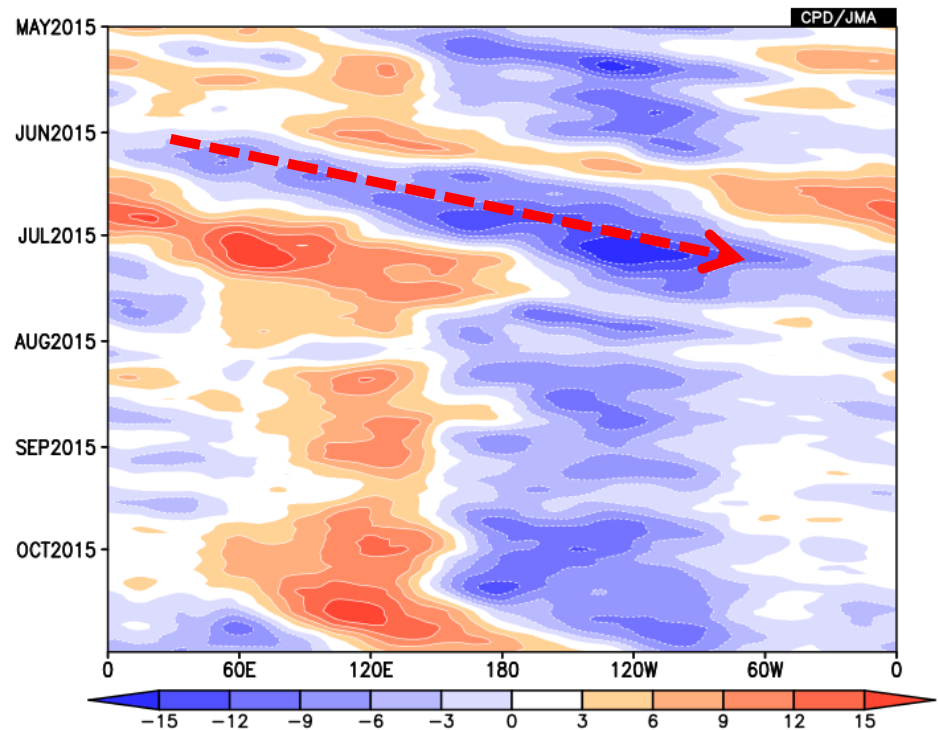
DATA1 JRA-55 u37.v37 HIST lat = -10:85 lon = 40E:180E level = 7:7
time = 2016020100:2016020100 ave =



Topics: Madden-Julian Oscillation

- In the cross-section of χ_{200} anomalies, a distinct active phase of convective activities (i.e. upper-tropospheric divergence) was seen propagating eastward in June 2015, indicating the appearance of the Madden-Julian Oscillation (MJO).

Longitude-time cross section of $5^{\circ}\text{S} - 5^{\circ}\text{N}$ averaged 200-hPa velocity potential anomalies



Standard deviation map

- A standard deviation map is available to see the variability of the selected element over the selected period.

Data1

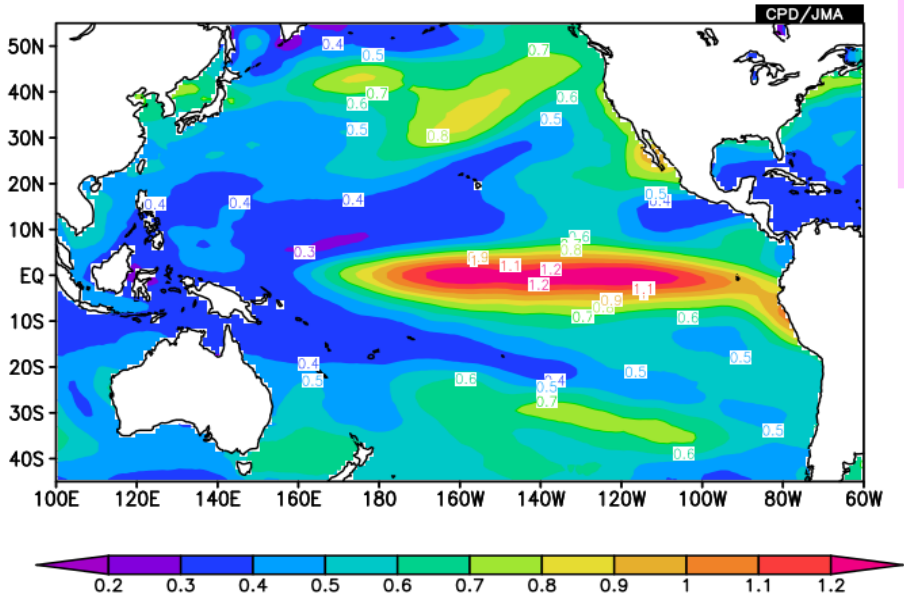
Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data	HIST	ALL	1	MONTHLY	RANGE
	Temperature (SST) [C]		Lat: -45 - 55 Ave <input type="checkbox"/>		<input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year	1958 - 2015
			Lon: 100 - 300 Ave <input type="checkbox"/>		<input type="checkbox"/> Time filter	12 - 2
	<input type="checkbox"/> Vector <input checked="" type="checkbox"/> SD					
	Derivative: <input type="checkbox"/> lon <input type="checkbox"/> lat					

Check!

SD

Year-to-year

For standard deviation, don't check "Ave" box.



The standard deviation of DJF averaged SST from 1958/59 to 2015/16.

Detailed options

Detailed Options

• There are a lot of visual options to create maps.

- Contour : Color, thickness, style, label etc.
- Axis : Color, interval, style and others.
- Map : Color, resolution, style and others.

The image shows two screenshots of a software interface. The left screenshot, titled 'Graphic Options', has a tab 'Graphic Options' selected. It contains several settings: 'Colorizing: COLOR', 'Drawing: SHADE', 'Image Format: png', 'Font: default', 'Color Table: Rainbow', and checkboxes for 'Show Contour Labels', 'Show Color Bar', 'Set Contour Parameters for data1', 'Set Contour Parameters for data2', and 'Set Vector size'. A red box highlights the checkbox 'Detailed Options for Image 1' at the bottom left, with a red speech bubble containing the word 'Check!' and a large yellow arrow pointing to the right. The right screenshot, titled 'Detailed Options for Image 1', shows the expanded settings for 'Image 1' (Lower layer). It includes sections for 'About Graphics' (contour style, color, label format, thickness, size, skip interval, levels, thin contour, not to draw), 'marker type' (closed circle), 'line style' (solid, color: black, thickness: 6), 'grid style' (none, color: orange), 'vector label' (vector head size), 'define rainbow color', and 'color bar portrait' (X, Y, scale: 1.0). At the bottom, there are tabs for 'About Axis' and 'About Map', and an 'apply' button.

Check!

Detailed Options fields are shown

Procedure of setting detailed options

1. Select target

Lower layer: Data1

Upper layer: Data2

In the case of vector map

Lower layer: Data2

Upper layer: Data1

2. Set options

Set contour style, color, thickness, etc.

3. Apply the settings

Click the "apply" button before "Submit" is clicked.



☑ Detailed Options for Image 1

For Image 1 Lower layer apply apply Default

About Graphics

contour Style: default Color: rainbow

label format: thickness: 1 size: 0.09 skip interval:

contour line thickness: 3

levels: color:

thin contour:

not to draw: -

marker type: closed circle

line style: solid color: black thickness: 6

grid style: none color: orange

vector label vector head size:

define rainbow color:

color bar portrait X: Y: scale: 1.0

About Axis

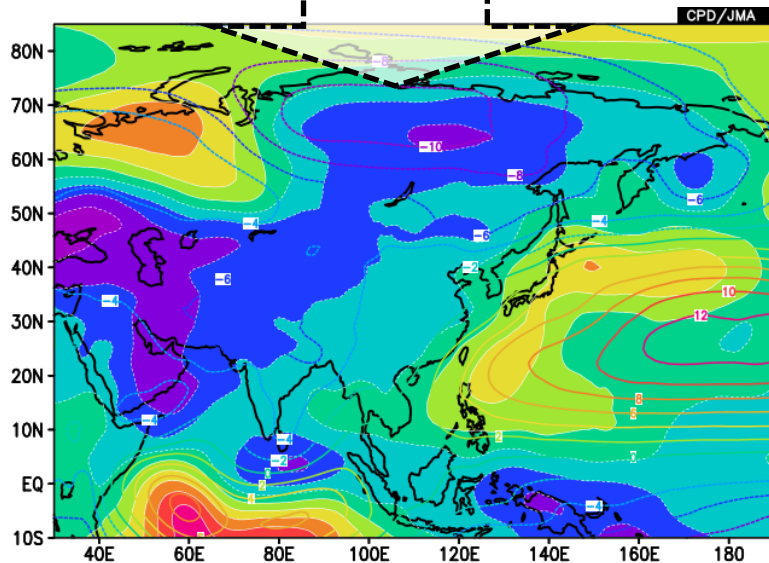
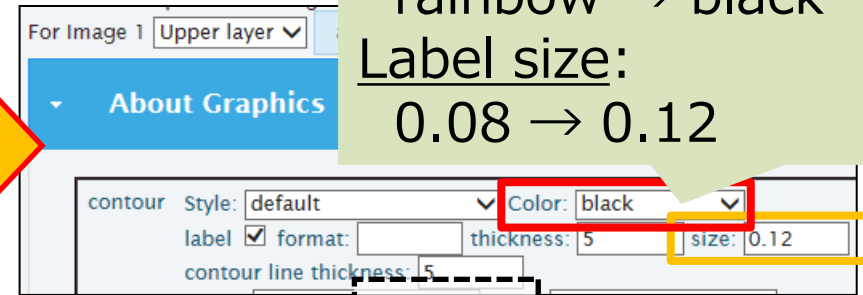
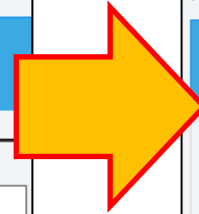
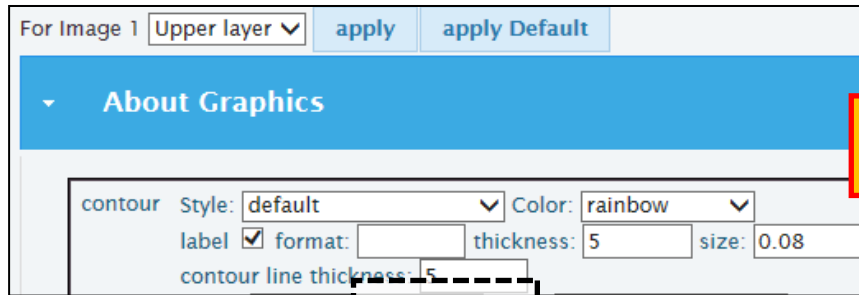
About Map

For Image 1 apply

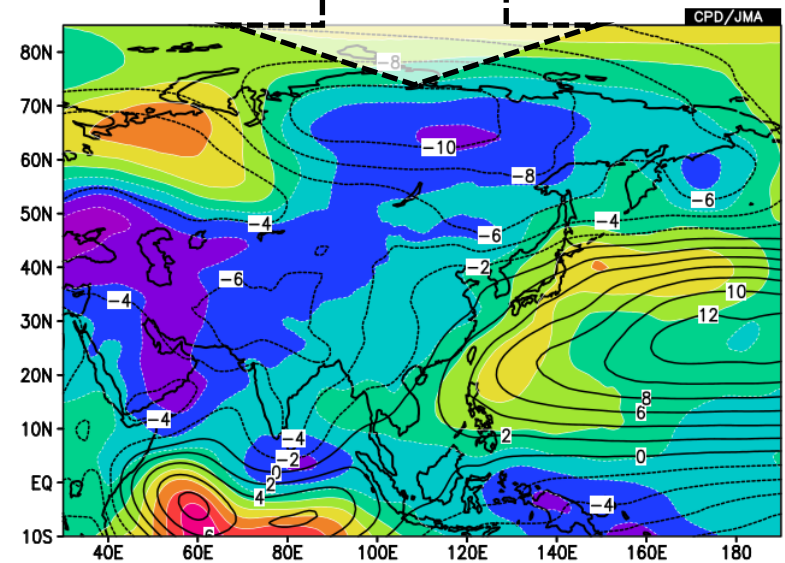
About Graphics: Contour color and label

- After selecting the layer, set color and label to change contour properties.

Color:
rainbow → black
Label size:
0.08 → 0.12



It's hard to see contours and its label because its color is similar to shade color.



The problems are cleared.

About Graphics: Color table

- Set levels and colors separated by comma in the boxes to define the color table by yourself. The color numbers are defined as the right table.

e.g.) levels: -2,-1,0,1,2
color: 4,11,5,7,12,2



white	0	orange	8
black	1	purple	9
red	2	yellow green	10
green	3	medium blue	11
dark blue	4	dark yellow	12
light blue	5	aqua	13
magenta	6	dark purple	14
yellow	7	gray	15

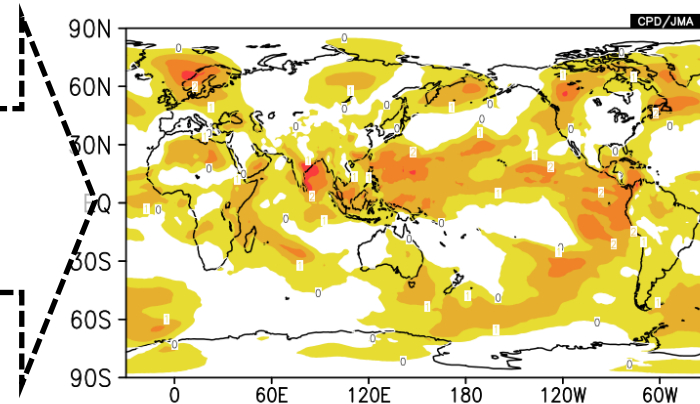
About Graphics

ontour Style: default Color: rainbow

label format: thickness: size:

contour line thickness: 3

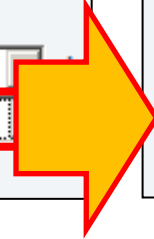
levels: 0,1,2,3 color: 0,7,12,8,2



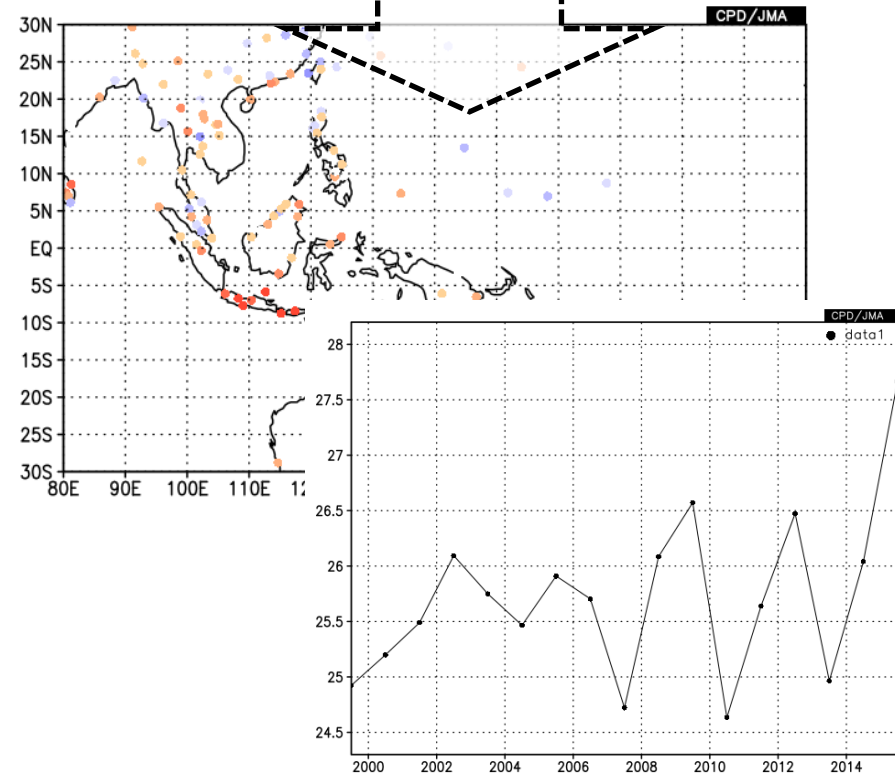
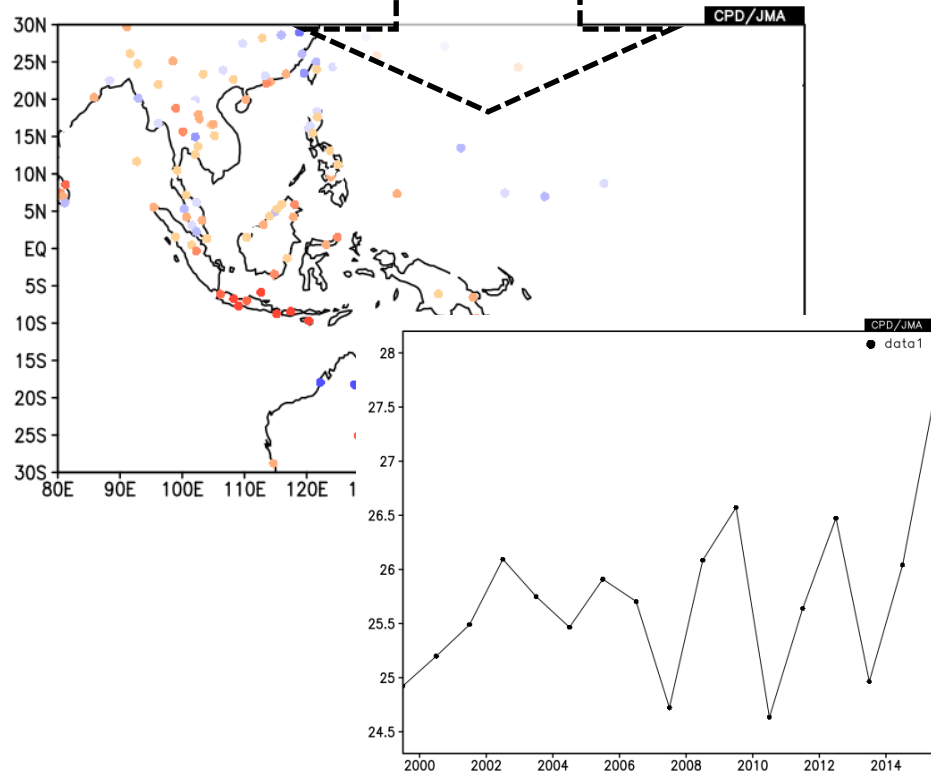
For example, the color setting like the right map is more suitable to focus on the positive value.

About Graphics: grid style

marker type: closed circle
line style: solid color: black
grid style: none color: rainbow
vector label vector head size: []

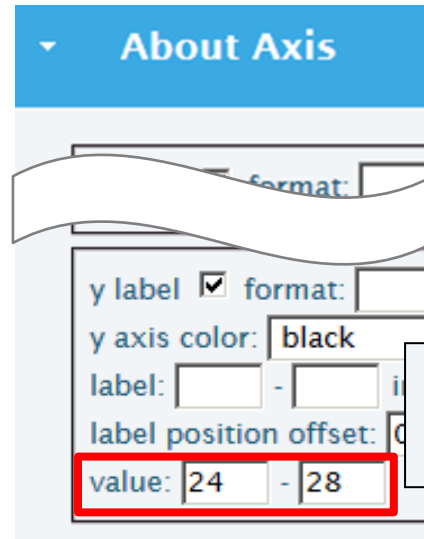


marker type: closed circle
line style: solid color: black
grid style: dotted color: black
vector label vector head size: []

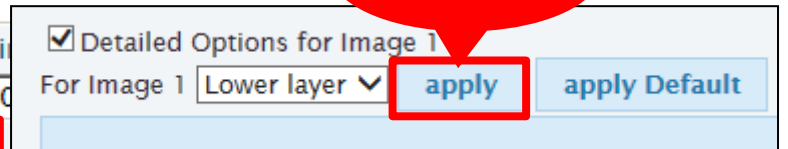


The grid line in the panel like the right map is available.

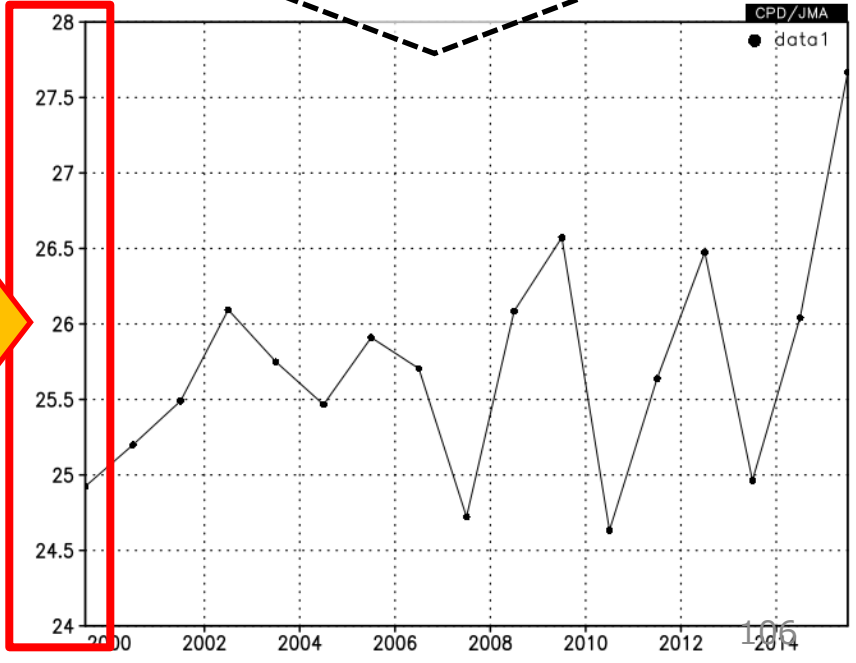
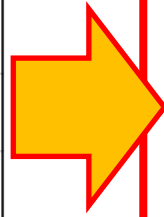
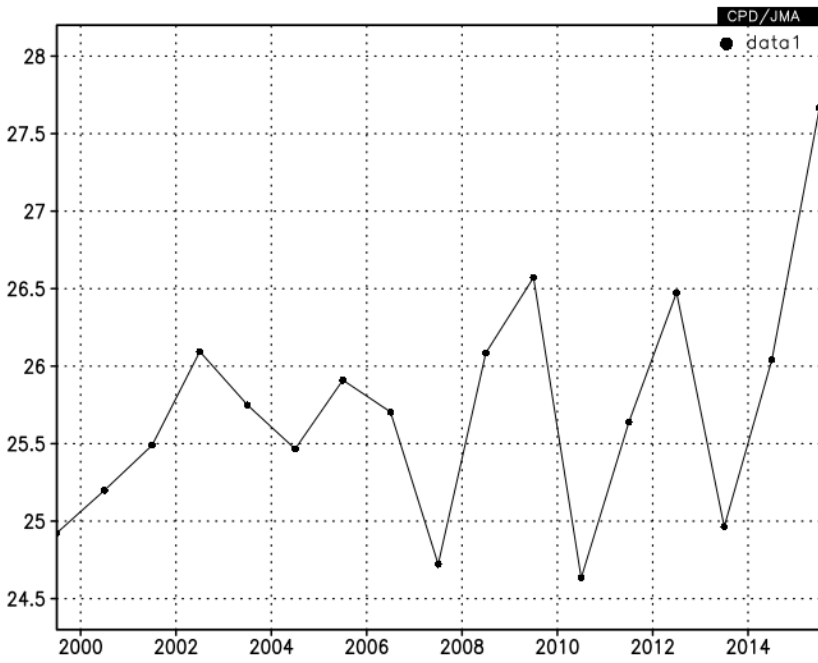
About Axis: value



Click!

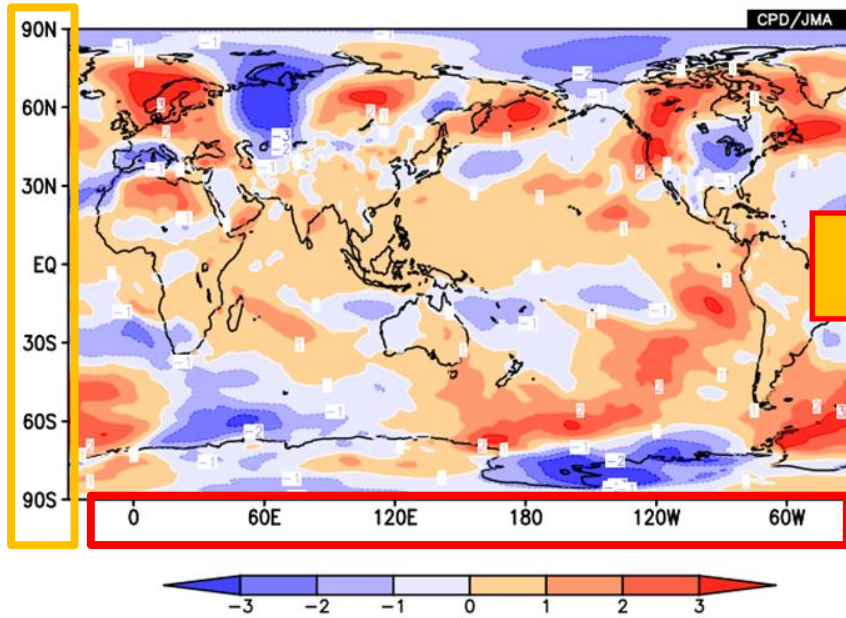


Default

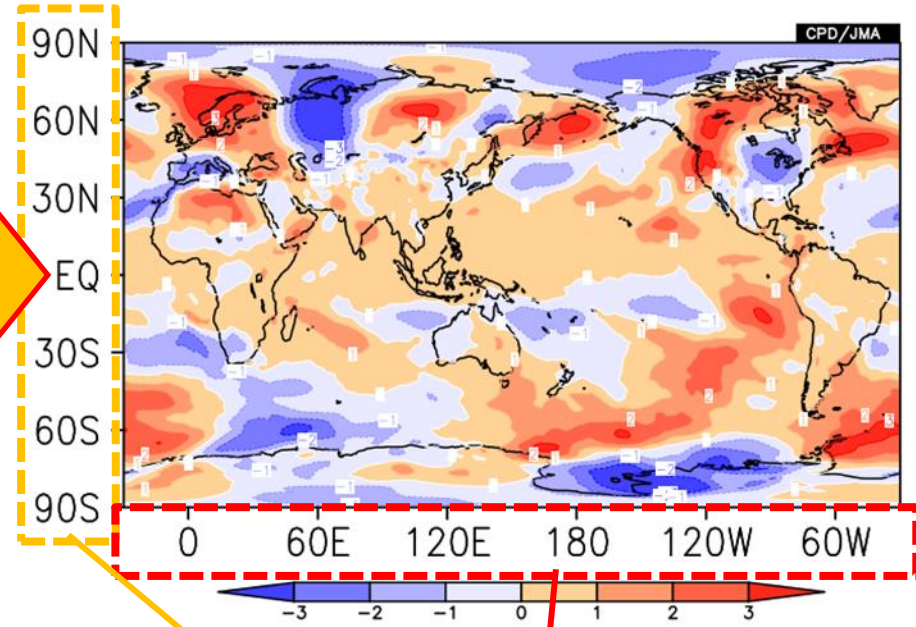


About Axis: Label size

Default size



Label size: 0.3



The label size is customizable in the "About Axis" box.

▼ About Axis

x label format: title:
x axis color: black thickness: 5 size: 0.3
label: - interval: levels:
label position offset: 0 side: bottom
value: -

y label format: title:
y axis color: black thickness: 5 size: 0.3
label: - interval: levels:
label position offset: 0 side: left
value: -

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About Map

- Map resolution, political boundaries are customizable in the “About Map” box.

About Map

map quality **lowres**

coast line style: solid color: black thickness:

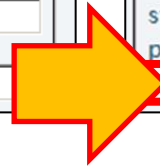
political boundaries (valid in 'mres' and 'hires') style: none color: black thickness:

About Map

map quality **hires**

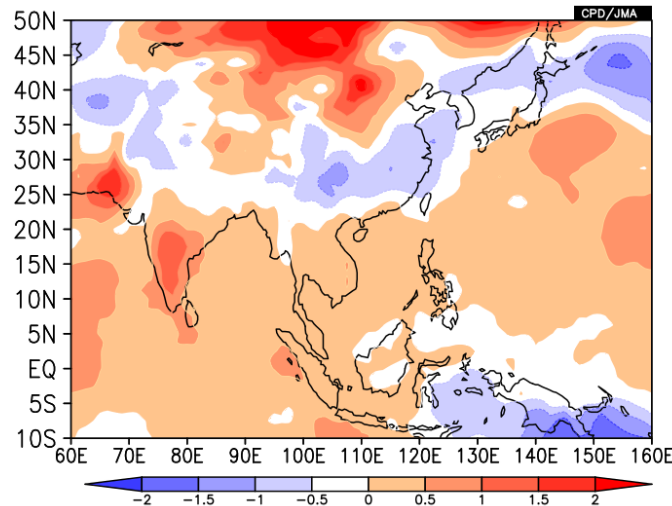
coast line style: solid color: black thickness: **10**

political boundaries (valid in 'mres' and 'hires') style: solid color: dark-blue thickness:

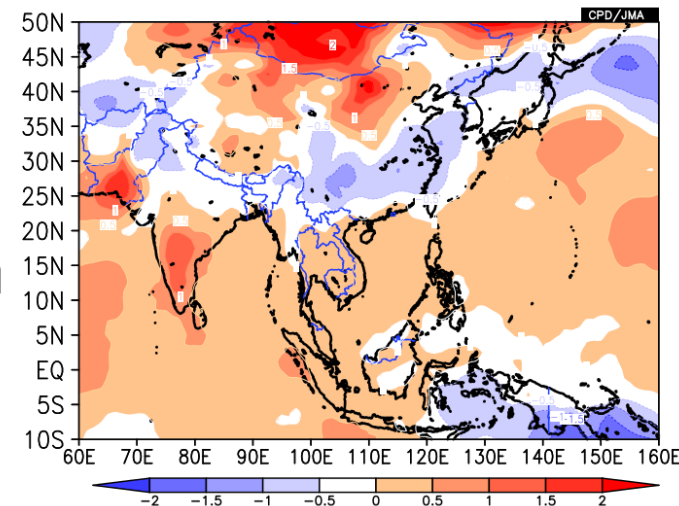


DATA1 JRA-55 t37 ANOM lat = -10:50 lon = 60:160 level = 7:7
time = 2015080100:2015080100 ave = 1MO

DATA1 JRA-55 t37 ANOM lat = -10:50 lon = 60:160 level = 7:7
time = 2015080100:2015080100 ave = 1MO



lowres:
low resolution
mres:
middle resolution
hires:
high resolution



Quality must be set “mres” or “hires” to show political boundaries.

Notice about detailed options

- In iTacs, the detailed options' settings are always saved in the server per individual user IDs. Therefore, the events shown below can occur.
 - When some people use iTacs by the same ID and someone changes the settings, the changes will **influence the other's use.**
 - Users **must explicitly set** them by themselves **to return to the default settings.**
 - Unlike the other settings such as element, period, analysis method, they **cannot be shared by user parameter code.**

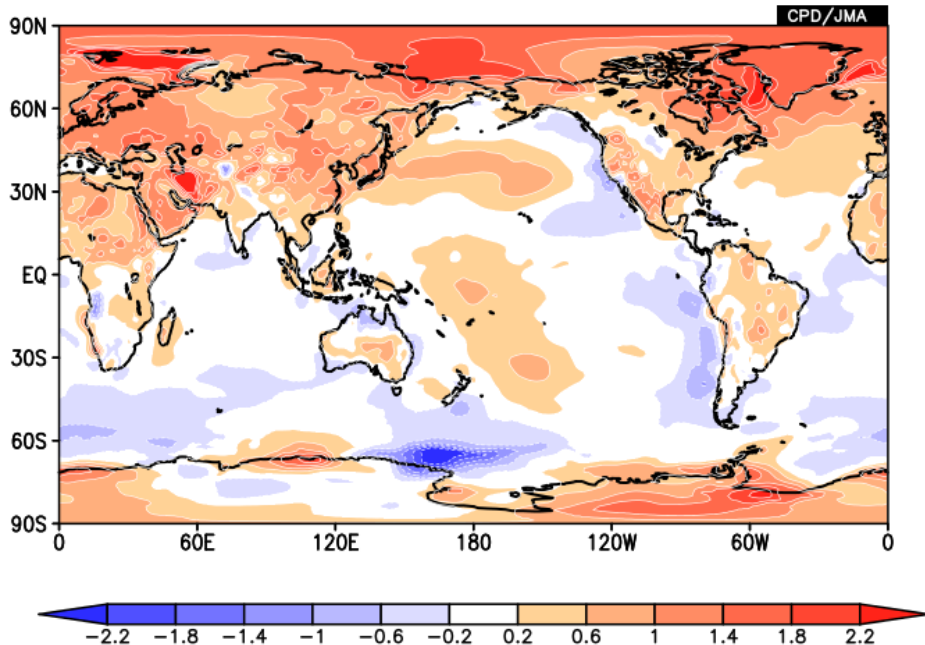
Extra exercises

Exercise (4)

- Show the difference of annual surface temperature from 1980s mean to 2000s mean as shown below.
- Showing the annual mean data, the option “**ANNUAL**” is available in “Time unit” box.

DATA1 JRA-55 t2m HIST lat = -90:90 lon = 0:360 level = 1:1
time = 2000010100:2009010100 ave = 10YR(12*1MO)

DATA2 JRA-55 t2m HIST lat = -90:90 lon = 0:360 level = 1:1
time = 1980010100:1989010100 ave = 10YR(12*1MO) analysis method = SUBTRACT



Level	Time unit	Showing period
1	ANNUAL	RANGE
<input type="checkbox"/>	<input checked="" type="checkbox"/> Ave	2000
<input type="checkbox"/>	<input type="checkbox"/> Time filter	2009

Answers to Exercise (4)

Analysis Dataset

Select parameters

Graphic Options

Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Surface Ts (Surface Tempera	HIST	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	ANNUAL <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Time filter	RANGE 2000 2009

Vector SD
Derivative: lon lat

Analysis method: SUBTRACT

Data2

Dataset	Element	Data type	Area	Level	Time unit	Showing period
JRA-55	Surface Ts (Surface Tempera	HIST	ALL Lat: -90 - 90 Ave <input type="checkbox"/> Lon: 0 - 360 Ave <input type="checkbox"/>	1	ANNUAL <input checked="" type="checkbox"/> Ave <input type="checkbox"/> Time filter	RANGE 1980 1989

Graphic Options

Colorizing: COLOR Show Contour Labels

Drawing: SHADE Show Color Bar

Image Format: png Set Contour Parameters for data1

Font: default interval: 0.4 min: -2.2 max: 2.2

Color Table: Blue - Red Set Vector size: [] [inch] value: [] skip: 1

Other functions

Standard deviation map

- A standard deviation map is available to see the variability of the selected element over the selected period.

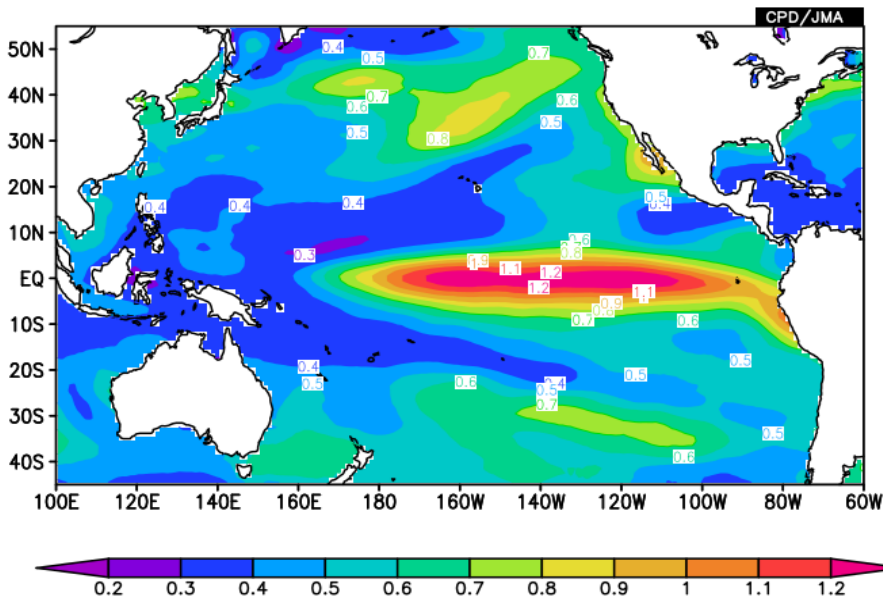
Data1

Dataset	Element	Data type	Area	Level	Time unit	Showing period
SST	Sea Surface Data Temperature (SST) [C]	HIST	ALL Lat: -45 - 55 Ave <input type="checkbox"/> Lon: 100 - 300 Ave <input type="checkbox"/>	1	MONTHLY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter	RANGE 1958 - 2015 12 - 2

Vector SD
Derivative: lon lat

Check!

DATA1 SST_sst HIST lat = -45:55 lon = 100:300 level = 1:1
time = 1958120100:2016020100 ave = 58YR(3+1MO)



For standard deviation,
don't check "Ave" box.

The standard deviation of
DJF averaged SST from
1958/59 to 2015/16.