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#### An introduction to ITACS

- Interactive Tool for Analysis of Climate System -

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  - What's ITACS?
  - Standard operation
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#### General introduction

#### More time to diagnose the climate system, less time to manipulate the data!

- "ITACS" is a shortening of
   <u>Interactive Tool for Analysis of Climate System.</u>
- It's a web-based application for analyzing and monitoring climate.
- It's available on web browsers. No additional software or plug-ins are required.
- Various datasets are available.
- >> It's a very convenient and useful tool and it will strongly help you to understand climate systems.

# What's ITACS What's ITACS What's ITACS

• Various types of charts are available.



• Various statistical analyses are built in.







#### Available data

- Atmospheric analysis data
  - JRA55 since 1958
    - Japanese 55-year Reanalysis



- Outgoing longwave radiation data provided by NOAA since 1974
- Oceanic analysis data
  - Sea surface temperature data by COBE-SST since 1891
  - Oceanic condition analyzed by MOVE/MRI.COM-G since 1958
- Forecast data (experimental product)
  - The latest two forecasts of JMA's 1-month model
- Others
  - Indices, CLIMAT messages and data input by individual users

(See for details)

JRA project <u>http://jra.kishou.go.jp/</u>

 COBE-SST
 http://ds.data.jma.go.jp/tcc/tcc/products/elnino/cobesst\_doc.html

 http://ds.data.jma.go.jp/tcc/tcc/library/MRCS\_SV12/index\_e.htm

MOVE/MRI.COM-G http://ds.data.jma.go.jp/tcc/tcc/products/elnino/move\_mricom\_doc.html



#### How to access

 Registered users can access ITACS from the Tokyo Climate Center (TCC) website.

TCC websit	<b>e (</b> <u>http://ds.data.jma.g</u> c	<u>.jp/tcc/tcc/index.html</u> )
③ 気象庁 Japan Meneodogical Agency	Tolkyo Climate Genter WNO Regional Climate Center in RA II	(Asita) • TCC heme • About TCC • Site Map • Contact us
Hone         World Climate         Climate System Monitoring           IncNE         Whot are WMO RCCs?         Whot's         9 Augus           WWND Regional Climate Conters (RCCs) are centres including long-range forecasts that support regional and andional climate activities, and a data activities.         9 Augus         9 Augus	Entrance Hairing	<b>ITACS</b> ( <u>http://extreme.kishou.go.jp/tool/itacs-tcc2011/</u> )
thereby strengthen the capacity of VMO Members to nationatise to delive better dimate services RCC Functions WMO RCCs perform the following set of mandatory forecasting (RPs), climate monitoring, data services and training. Operational Activities for Long-range Forecasting Operational Activities for Inter Kontering 10 July	Northy Trayy World Dr Scholler Back Tra Back Tra Bach Tra Back Tra Bach Tra Bach Tra Bach Tra Bach Tra	data1     data type     area     level     average period     show period       -Dataset-     element     -Data_type-     -Area-     1000hPa     1000hPa     Mean Period-     RANGE       Vector     SD
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#### **Basic Operation**

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Image Format : png 🎽 Font : default 💌	Set Vector size : [1	3.	Graphic op	tions field		
Submit Clear 4	Help Sample Logout	4.	Control but	ttons		
		5.	Image disp	lay area		
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	•	Second	l, change th	ne setting ir	the 3rd	area if necessary.
output txt file> deta	•	Next, c map w	lick the "Su ill be show	ıbmit" butto n in the 5th	on in the area.	e 4th area, and a created
download data (ctl file and 4by	vte data )>	• ^ ^	ditionally ha	n nago and ca	mnlo ima	tos are available by the buttor

Additionally, help page and sample images are available by the buttons in the 4th field.



### 2D map(1)

- The most basic chart is a 2D map.
- At first, learn the basic operations of ITACS by creating a 2D map of Satellite data (OLR) and lowlevel wind field.
  - The settings of this sample are as follows.
    - Dataset : SATellite data and JRA-55
    - Element
    - Data type
    - Area
    - Level

: Analysis value

: ORL and (u, v)

- : Asia
- : Surface and 850hPa
- Averaged period : Monthly
- Show period : July 2014





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#### 2D map (2)

data1 1	2					
dataset	element	data type	area	level	average period	show period
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		·	
	Calaat	"data at"	"C AT"
-	Select	dataset	SAL.
•	001000	aatabet	0/ 11 1

- Various datasets are available: CLIMAT, INDEX, JRA-JCDAS, K1EM, OCEAN-DATA, SAT, SST and USER-INPUT
- Select "element" "OLR". 2.
  - Available choices corresponding to the selected dataset will be shown in a pop-up menu.



#### 2D map (3)

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dataset	element	data type	area	lev	el	average period	show period
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analysis method : -Analysis_m Graphic Option Colorizing : COLOR Drawing : SHADE	ow Contour Labels ow Color Bar t Contour Parameters for data1		Color Table Polar Sto Logarith	e: Rainbow ereographic : M mic Coordinate	▼ lorth pole ▼	<ul> <li>No Scale Labels</li> <li>Draw Credit Inside</li> <li>Apply All Pics</li> </ul>	
Image Format : png  Font : default	t Vector size : [inch] value	: sk	ip : 1 Reverse	the Axes X-axis  ॑ Flip t tion	the Y-axis	picture size %	
Submit Clear SliceTool H 3. Select Availa	Help Sample Logout "data type" "HI ble options are:	ST".	ANOM = HIS • It means a ANOM_SD =	T – NOI differen ANOM	RM ce from / SD	the climatologi	ical norm

- Historical actual analysis or observation data.
- NORM : Climatological normal data averaged from 1981 to 2010.
- ANOM : Anomaly data.
- ANOM\_SD : Anomaly data normalized by their standard deviations10

# 2D map (4)

1		
1	J	

Submit

Clear

Help

data1									
	dataset	element	data type		area		level	average period	show period
SAT	•	OLR [W/m^2] -	HIST -	ASIA		•	1000hPa ▼ 1000hPa -	-Mean Period- 🗸	RANGE -
		Vector SD Derivative: longitude latitude		Lat: -10 Lon: 30	- 85	Ave		Ave 🗖 time filter 🗖	2014 •
analys	s <b>is method</b> : Analysi	is_method- ▼							
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Graphic Option	🗹 Show Contour Labels	Color Table : Blue - Red 👻	🔲 No Scale Labels
Colorizing : COLOR -	🗹 Show Color Bar	🔲 Polar Stereographic : North pole 👻	🗖 Draw Credit Inside
Drawing : SHADE 👻	Set Contour Parameters for data1	🗖 Logarithmic Coordinates	Apply All Pics
Image Format : png 👻	interval : 20 min : -110 max : 110	Reverse the Axes	
Font : default 👻	Set Vector size : [inch] value : skip : 1		picture size %
		🗖 No Caption	

4. Select "area" "Asia".

Sample

- After your selection, setting boxes will appear in the "area" field and you can adjust the area more precisely.
- 5. Select "level" "1000hPa".

Logout

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

		2	Dn	nap (5)			- opera
data1						6	
dataset		element	data type	area	level	average period	show peri
SAT	T	OLR [W/m <sup>2</sup> ]  Vector SD Derivative: longitude latitude	HIST -	ASIA - Lat: -10 - 85 Ave Lon: 30 - 190 Ave	1000hPa ▼ 1000hPa ▼	MONTHLY - Ave time filter	RANGE + 2014 + 07 2014 + 07
analysis method :	-Analys	is_method-					
Graphic Option Colorizing : COLOR ·		Show Contour Labels Show Color Bar		Color Table : Blue -	Red ╺ bhic : North po	■ No Scale Labels	de

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(mage Format : png 👻	interval : 20	min : -110	ma×: 110	🗖 Reverse the Axes	
Font : default 👻	Set Vector size : [	[inch] value	e : skip : 1	Flip the X-axis Flip the Y-axis	picture size %

6. Select "average period" "MONTHLY".

- There are two styles for range selection in this option as shown below. As for this option, detailed explanation will be shown later.
- i. To select a consecutive period:

ANNUAL, MONTHLY, DAILY and PENTAD DAY

ii. To select a specific period to be repeated each year: Year average, Year average day and Year average pentad day

Standard operation



#### 2D map (6)

datal dataset	element						
dataset	element	-					
		data type	area	level	averag	e period	show perio
SST	Temperature (SST) [C.Deg.] 🔹	HIST 💌	ALL	1000hPa 🔽 1000hPa	MONTHLY	*	
	Vector  SD		Lat: -90 - 90 Ave Lon: 0 - 360 Ave		Ave 🗌 time filter 🗌		2 RANGE YEARS 2 INDEX
	Derivative: longitude 🗌 latitude 🗌			l ()	show perio	od M	
analysis method · Analysis m	ethod-				RANGE	·	
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Submit Clear SliceTool H	lelp Sample Logout	۸ <i>۳ "</i> D۸			07 08 09		

- 8. Select the year and month "2014 07", for both upper and lower boxes. Available options are:
  - RANGE : Setting the beginning and end point of the target period.
  - YEARS : Setting individual years.
  - INDEX : Setting a SST index border to pick up years. (e.g. NINO.3)

#### Standard operation

#### 2D map (7)

datal							
dataset	element	data type	area		level	average period	show period
SST -	Temperature (SST) [C.Deg.]	HIST -	ALL -		1000hPa ▼ 1000hPa ▼	MONTHLY	■ RANGE ▼ 2014 ▼ 07
,	Vector		Lon: 0 - 360	Ave		time filter	2014 - 07
!	Derivative: longitude 🔲 latitude 🔲						
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180

160E

105 40E

60E

80E

100E

120E

180 200 220 240 260 280 300

140E



### Working for multiple data

- Use the "DATA1\_DATA2" option to overlay two kinds of items on one map at the same time.
  - Contours are overlaid on a shaded map.
- Use the "SUBTRACT" option to map the difference of two data.
  - This function is used to show time variation or the difference between two levels.
- Use the "COMPOSITE" option to create a composite map based on a set condition.
  - This function is used to pick out the character of the focused event.



- "ADD", "MULTIPLY" and "DIVIDE" functions are used to do simple calculation for two items of data.
- For example, precipitation ratio can be mapped by CLIMAT data and "DIVIDE" function.
  - By "DIVIDE" function, the value of data1 divided by data2 are mapped.





#### Advanced operations

- Many types of charts can be created by the basic.
- You can create not only simple 2D maps, but also various types of maps, graphs and diagrams as follows.
  - Line graph
    - Time, vertical, longitude and latitude profile.
  - Cross section diagram
    - Time-spatial, height-longitude and height-latitude diagram.

Advanced operations



#### Line graph

- Time series graph is used to understand time development simply.
- Vertical, latitude and longitude profile is used to understand spatial structure simply.







#### Time series graph

- Annual, monthly, pentad day or daily time series
  - Set the area as 1D variable, and select a consecutive style option (listed as "ALL CAPS") in "average period".
  - You can see the time development of the element.
- Inter-annual time series
  - Set the area as 1D variable by checking "Ave" boxes, and select a repeated style option (listed as "year average xxx") in "average period".
  - You can see the annual trend and compare the focused year with the other years.



Daily time series The positive anomaly has continued except for April and there are short cycle variations.

Daily time series of 500hPa height normalized anomaly averaged over the area (25N - 35N, 120E - 130E) from July to September in 2014.



Inter-annual time series 2014 is almost normal.

averaged and converted

to 1D value by "Ave".

Inter-annual time series of 500hPa height normalized anomaly averaged over the area (25N-35N, 120E - 139E) in August from 1990 to 2014.



Lat/longitude is

#### Advanced operations Vertical and lat/longitude profile

- Vertical profile
  - Set the area as 1D variable, and select bottom and top level.
    - Using "Logarithmic Coordinates" option is recommended.
  - You can see vertical structure of the focused event.
- Latitude profile and longitude profile
  - Check either longitude's "Ave" box or latitude's "Ave" box and select a specific level.
  - You can see the meridional or zonal structure of the element.



Vertical profile The positive anomaly is dominated at the middle and upper troposhere.

Height normalized anomaly averaged over the area (25N-35N, 120E-130E) in August 2014.

"Logarithmic Coordinates" option is recommended.



Lat/longitude profile The high pressure is mainly predominant around 30N.

500hPa height normalized anomaly in August 2014. (Upper) Latitude profile averaged from 120E to 130E (Lower) Longitude profile averaged from 25N to 35N.



#### Data download

- Users can download the data used to create a map.
- A plain text file and GrADS format files (control file and data file) are available.



dset work/5474474999e0e\_z37\_0.grd title undef 9.999e+20 xdef 129 linear 30 1.25 vdef 77 linear -10 1.25 zdef 1 linear 500 1 tdef 1 linear 00Z01JUL2014 1mo vars 1 z37 1 99 γ (Geopotential Height) [gpm] endvars Default file number is: 1 X is varying Lon = 30 to 190 X = 1 to 129 Y is varying Lat = -10 to 85 Y = 1 to 77 Z is fixed Lev = 500 Z = 1 = 00Z01JUL2014 T = 1 T is fixed Time E is fixed Ens = 1 E = 1 ni = 129 nj = 77 nk = 1 nt = 1 5882.167969 5881.230469 5880.917969 5879.667969 5879.355469 5878.417969 5880.292969 5880.292969 5879.355469 5878.417969 5878.417969 5876.855469 5879.355469 5878.730469 5877.792969 5877.792969 5876.855469 5876.230469 5877.792969 5877.167969 5876.855469 5876.855469 5875.917969 5875.292969 5876.855469 5876.230469 5876.230469 5875.917969 5875.292969 5874.667969 230469 5875,917969 5875,917969 5875,292969 5875,292969 5874 The plain text data are shown. In addition to the data, map information such as area and elements are written following

GrADS control file format.

A zip format compression file is downloaded. A GrADS fomat data file and a control file are included in the zip file.

(GrADS official website; <u>http://grads.iges.org/grads/head.html</u>) (GrADS tutorial on TCC; <u>http://ds.data.jma.go.jp/tcc/tcc/products/model/tips/tutorial.html</u>)



# [Tips] Average period (1)

- There are two styles for range selection in "average period".
- < Consecutive style (listed as "ALL CAPS") >
  - Use this style to select a consecutive period:
     ANNUAL, MONTHLY, DAILY and PENTAD DAY



- < Repeated style (listed as "Year average xxx") >
  - Use this style to select a specific period to be **repeated** each year:
    - Year average, Year average day and Year average pentad day





average period

Mean Period-

Mean Period-

Blue framed DJFs (3DJFs) are selected.

Set **target years**. Enter start and end point of your range.

Set **target period**. The period input here is always averaged for each year.



# [Tips] Average period (2)

- For example, the repeated style must be used to create a map focusing a specific season of multiple years.
  - Additionally, take care not to confuse the relation between the target years and target period.

