

Ex.1

How to use the guidance tool (Producing Guidance and Verification)

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Schedule of exercise

| | |
|-------------------|---|
| 17 Nov. (Tue.) | <ul style="list-style-type: none">● Exercise of the one-month forecast1. Creation of the guidance using common data2. Creation of the guidance using individual data |
| 18 Nov. (Wed.) | <ul style="list-style-type: none">3. Interpretation of the other product (forecast map, check up of the prediction skill etc.)4. Building one-month forecast5. Making presentation file |
| 19 Nov. (Thu.) AM | 5. Making presentation file (cont.) |
| PM | ● Presentation (15min. × 15 persons) |
| 20 Nov. (Fri) AM | |

Setting an example of creation of the guidance (common data)

- Initial time of the model: 4 Nov 2015 (Wed.)
- Forecast target period: 7 Nov to 4 Dec (4 weeks mean)
- Forecast point: Tokyo/JAPAN (35.7N, 139.8E)

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)

Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

1. Check the initial date and target period
2. Production of guidance and verification

(1) Get past observation data

(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

•Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

Workflow of the guidance tool

1. (Preparation)

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Obtaining solution of probabilistic forecast by the guidance

1. Past observation data

- Element: Mean temperature and precipitation (daily)
 - Create the files separately between temperature and precipitation
- File format: **CSV**
- Period: Every day from 1 January 1981 to 31 January 2011
- Describe some information on observation point in the beginning five lines
- Embedded undefined value in case of missing data

The next slide illustrates the example

Example of the observation data file

| | A | B | C | D |
|-------|-----------------------|---|----|-------|
| 1 | #station=TOKYO/JAPAN | | | |
| 2 | #undef=-9999 | | | |
| 3 | #elname=precipitation | | | |
| 4 | #lon=140.0 | | | |
| 5 | #lat=35.0 | | | |
| 6 | 1981 | 1 | 1 | 0 |
| 7 | 1981 | 1 | 2 | 2 |
| 8 | 1981 | 1 | 3 | 0 |
| 9 | 1981 | 1 | 4 | 0 |
| 10 | 1981 | 1 | 5 | 0 |
| 11 | 1981 | 1 | 6 | 0 |
| 10986 | 2011 | 1 | 24 | 3.5 |
| 10987 | 2011 | 1 | 25 | 0 |
| 10988 | 2011 | 1 | 26 | 0 |
| 10989 | 2011 | 1 | 27 | 0 |
| 10990 | 2011 | 1 | 28 | -9999 |
| 10991 | 2011 | 1 | 29 | -9999 |
| 10992 | 2011 | 1 | 30 | 0 |
| 10993 | 2011 | 1 | 31 | 0 |
| 10994 | | | | |

- Line -1: #station={station name}
 -2: #undef={undefined value}
 -3: #elname={temperature or precipitation}
 -4: #lon={longitude of the observation point}
 -5: #lat={latitude of the observation point}

1 January 1981 to 31 January 2011

After line-6: observation data
 {Year}, {Month}, {Day}, {Observational value}

Embedded undefined value in case of missing data

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)


Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

- 
1. Check the initial date and target period

2. Production of guidance and verification

(1) Get past observation data



(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

•Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

Difference of initial date between hindcast and real-time forecast

Note:

The initial time and the forecast target period are different between verification of guidance by hindcast and real-time forecast, because operation procedures of NWP model are different between real-time and hindcast.

| | Hindcast | Real-time forecast |
|--------------|---|--------------------|
| Initial date | 10th, 20th and the end of month (10 Jan, 20 Jan, 31 Jan, 10 Feb, ..., 31 Dec) | Every Wednesday |

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)

Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

1. Check the initial date and target period
2. Production of guidance and verification



(1) Get past observation data



(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

- Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

Input data for the guidance

| | | | |
|---------------|--------------|-------|---------------------|
| | Hindcast | -4day | Real-time forecast |
| Initial time | 31 Oct | | 4 Nov 2015 |
| Target period | 3 to 30 Nov. | | 7 Nov to 4 Dec 2015 |

Input of the guidance

● to create the guidance (3 to 30 Nov (1981-2010))

- Past observation
- Model forecast (hindcast)

Regression calculations using the data during hindcast period

● For real-time forecast (for 7 Nov to 4 Dec)

- Model forecast (real-time forecast)

Input of the guidance for real-time forecast

Calculations of near-normal range for the real-time forecast

Input field of the guidance tool

Worksheet "Calc_guidance"

◆ (1a, 1b) Past observation

- Hindcast period (1a)
- 1b; Real-time forecast period (1b)

◆ (2a, 2b) Hindcast (Model)

◆ (3) Real-time forecast (Model)

| | A | B | D | E | G | H | I | J | F |
|----|---|---------------------------|----------------------|------|-------------------------------|-------------------|-------------|---|---------|
| 1 | | Observation (Temperature) | | | | Forecast of model | | | Foreca |
| 2 | | Set blank for missing | | | | Predictor 1 | Predictor 2 | | (guidar |
| 3 | | Year | Period ; Hindcast | Rank | Period ; Realtime forecast | | | | X |
| 4 | | 1981 | | #N/A | | | | | |
| 5 | | 1982 | | #N/A | | | | | |
| 6 | | 1983 | | #N/A | | | | | |
| 7 | | 1984 | observation | | | Model | | | |
| 8 | | 1985 | | | | | | | |
| 9 | | 1986 | | | | | | | |
| 10 | | 1987 | | #N/A | | | | | |
| 11 | | 1988 | | #N/A | | | | | |
| 12 | | 1989 | 1a | | 1b | 2a | 2b | | |
| 13 | | 1990 | | #N/A | | | | | |
| 14 | | 1991 | | #N/A | | | | | |
| 15 | | 1992 | | #N/A | | | | | |
| 16 | | 1993 | | #N/A | | | | | |
| 17 | | 1994 | | #N/A | | | | | |
| 18 | | 1995 | | #N/A | | | | | |
| 19 | | 1996 | | #N/A | | | | | |
| 20 | | 1997 | | #N/A | | | | | |
| 21 | | 1998 | | #N/A | | | | | |
| 22 | | 1999 | | #N/A | | | | | |
| 23 | | 2000 | | #N/A | | | | | |
| 24 | | 2001 | | #N/A | | | | | |
| 25 | | 2002 | | #N/A | | | | | |
| 26 | | 2003 | | #N/A | | | | | |
| 27 | | 2004 | | #N/A | | | | | |
| 28 | | 2005 | | #N/A | | | | | |
| 29 | | 2006 | | #N/A | | | | | |
| 30 | | 2007 | | #N/A | | | | | |
| 31 | | 2008 | | #N/A | | | | | |
| 32 | | 2009 | | #N/A | | | | | |
| 33 | | 2010 | | #N/A | | | | | |
| 34 | | | | | | | | | |
| 35 | | This year | | | | | 3 | | |

2.2 Input past observation data (1) Get past observation data (1 of 6)

iTacs

1

Analysis Dataset

Forecast Dataset

1. Choose “**Analysis Dataset**” tab (default tab)
2. Choose “**USER_INPUT**” within **Dataset for Data1**
3. Choose “**UPLOAD_TXT**” within **Element for Data1**
4. **Upload** the past observation file created by users
5. Click “Upload” button

Analysis Dataset

Select parameters

Graphic Opt

Data1

2

USER_INPUT

3

UPLOAD_TXT

4a

参照...

5

Upload

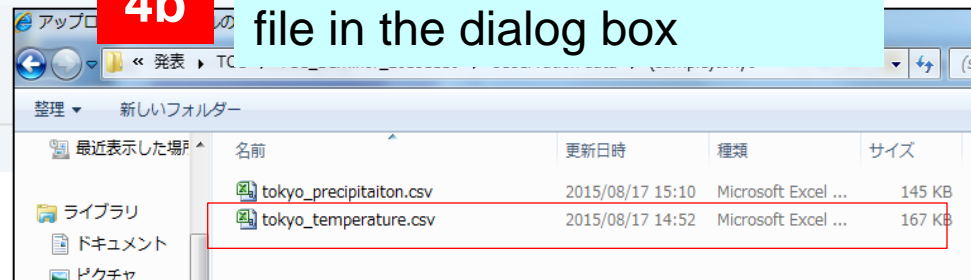
Upload and save as

Vector SD
Derivative: lon lat

Analysis method: -Analysis method-

4b

Choose the past observation file in the dialog box



2.2 Input past observation data

(1) Get past observation data (2 of 6)

Data1

The screenshot shows the 'Data1' configuration page in the iTacs system. The 'Dataset' is 'USER_INPUT' and the 'Element' is 'lastused'. The 'Input txt' field contains station information for TOKYO/JAPAN and a list of dates from 1981. The 'Time unit' is 'DAILY' and the 'Year-to-year' checkbox is checked. The target period is set to 1981-2010, with start and end dates of 11/3 and 11/30.

6 Check "Year-to-year"

7 Set period (hindcast or real-time forecast)

- Click to check the box "Year-to-year" within Time unit
- Set target period for hindcast
 Year: 1981 to 2010
 Date; target period for {hindcast and real-time forecast}

| | Hindcast | Real-time forecast |
|---------------|--------------|---------------------|
| Initial time | 31 Oct | 4 Nov 2015 |
| Target period | 3 to 30 Nov. | 7 Nov to 4 Dec 2015 |

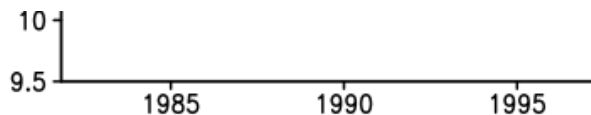
8. Click "Analysis Data Submit"

8 Analysis Data Submit

2.2 Input past observation data

(1) Get past observation data (3 of 6)

iTacs



Download text zip file

9

Download data (ctl file and 4byte data)

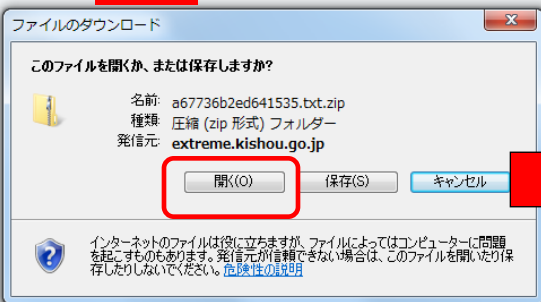
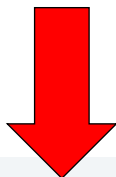
(After "Analysis Data Submit", time sequence graph is displayed.)

9. Click "Download text zip file" below the graph

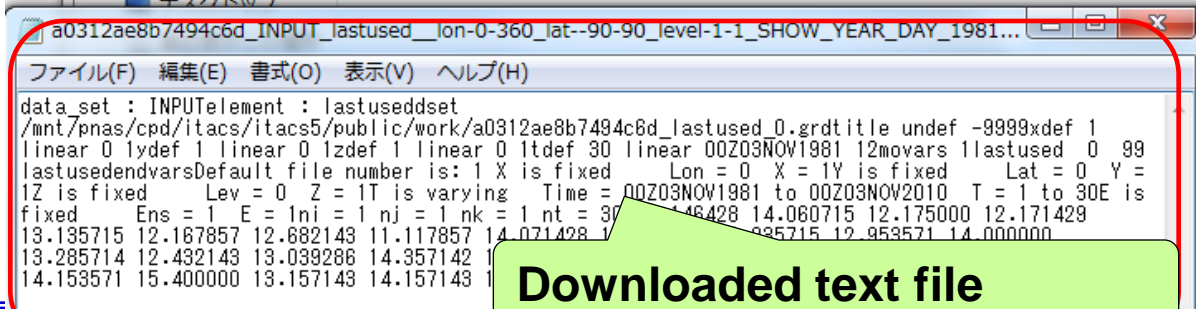
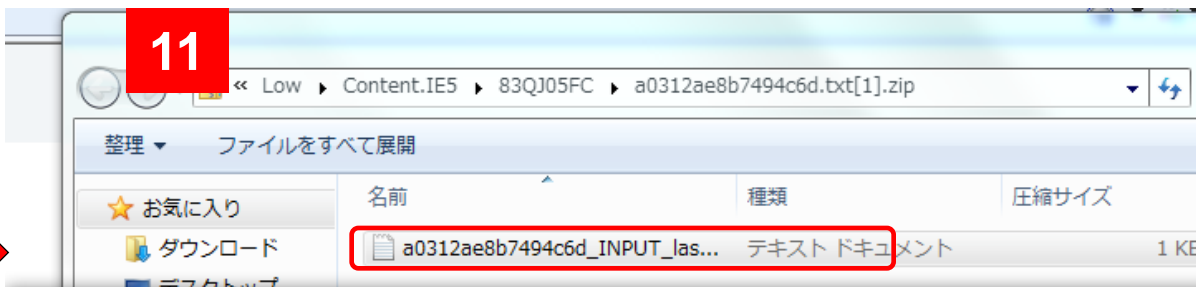
10. Download the text file

11. Open the downloaded text file

10



11



Downloaded text file

2.2 Input past observation data

(1) Get past observation data (4 of 6)

Downloaded text file

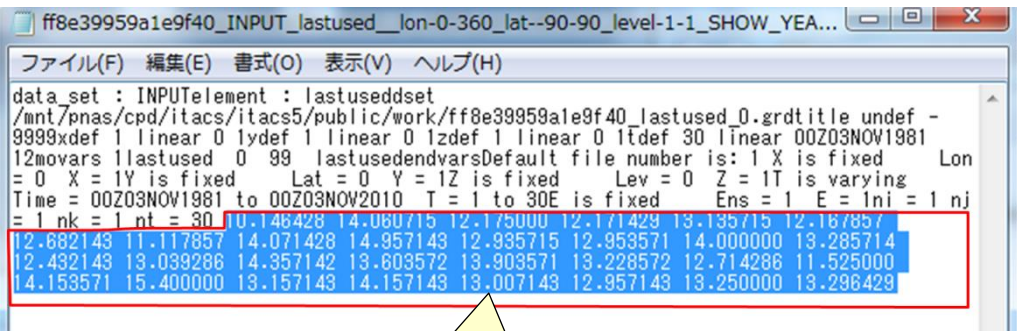
```
ff8e39959a1e9f40_INPUT_lastused__lon-0-360_lat--90-90_level-1-1_SHOW_YEA...
ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)
data_set : INPUTelement : lastuseddset
/mnt/pnas/cpd/itacs/itacs5/public/work/ff8e39959a1e9f40_lastused_0.grdtitle undef -
9999xdef 1 linear 0 1ydef 1 linear 0 1zdef 1 linear 0 1tdef 30 linear 00Z03NOV1981
12movars 1lastused 0 99 lastusedendvarsDefault file number is: 1 X is fixed Lon
= 0 X = 1Y is fixed Lat = 0 Y = 1Z is fixed Lev = 0 Z = 1T is varying
Time = 00Z03NOV1981 to 00Z03NOV2010 T = 1 to 30E is fixed Ens = 1 E = 1ni = 1 nj
= 1 nk = 1 nt = 30
10.148428 14.060715 12.175000 12.171428 13.135715 12.167857
12.682143 11.117857 14.071428 14.957143 12.935715 12.953571 14.000000 13.285714
12.432143 13.039286 14.357142 13.603572 13.903571 13.228572 12.714286 11.525000
14.153571 15.400000 14.571428 14.157143 13.007143 12.957143 13.250000 13.296429
```

Time sequence data is described after "nt = **".

2.2 Input past observation data

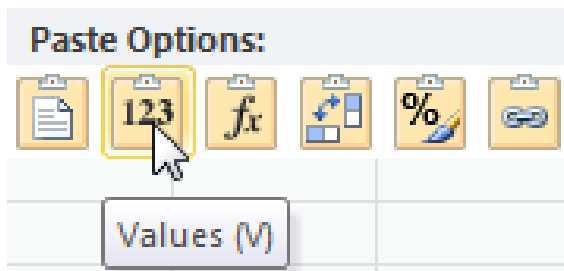
(1) Get past observation data (5 of 6)

Worksheet "Calc_guidance"



12. Copy and paste with the paste values option to the Excel file

| 12 | | Observation (Temperature) | | Forecast of model | |
|------|---------------------|---------------------------|------------------------------|-------------------------|--|
| | | Set blank for missing | | Predictor 1 Predictor 2 | |
| Year | Period; Hindcast | Rank | Period; Realtime forecast | | |
| 1981 | 10.146428 | 30 | | | |
| 1982 | 14.060715 | 7 | | | |
| 1983 | 12.175000 | 25 | | | |
| 1984 | 12.171429 | 26 | | | |
| 1985 | 13.135715 | 16 | | | |
| 1986 | 12.167857 | 27 | | | |
| 1987 | 12.682143 | 23 | | | |
| 1988 | 11.117857 | 29 | | | |
| 1989 | 14.071428 | 6 | | | |
| 1990 | 14.957143 | 2 | | | |
| 1991 | 12.935715 | 21 | | | |
| 1992 | 12.953571 | 20 | | | |
| 1993 | 13.285714 | 14 | | | |
| 1994 | 13.285714 | 12 | | | |
| 1995 | 12.432143 | 24 | | | |
| 1996 | 13.039286 | 17 | | | |
| 1997 | 14.357142 | 3 | | | |
| 1998 | 13.603572 | 10 | | | |
| 1999 | 13.903571 | 9 | | | |
| 2000 | 13.228572 | 14 | | | |
| 2001 | 12.714286 | 22 | | | |
| 2002 | 11.525000 | 28 | | | |
| 2003 | 14.153571 | 5 | | | |
| 2004 | 15.400000 | 1 | | | |
| 2005 | 13.157143 | 15 | | | |
| 2006 | 14.157143 | 4 | | | |
| 2007 | 13.007143 | 18 | | | |
| 2008 | 12.957143 | 19 | | | |
| 2009 | 13.250000 | 13 | | | |
| 2010 | 13.296429 | 11 | | | |



(Tips) For smoothly copy and paste

- The copied string sometimes include a blank line at the beginning.
- Thereupon, once copy the string to the tab "Memopad" and **re-paste** to the input field on the tab "Calc_guidance"

```

a0312ae8b7494c6d_INPUT_lastused_lon-0-360_lat--90-90_level-1-1_SHOW_YEAR_DAY_1981...
ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)
data set : INPUTelement : lastuseddset
/mnt/pnas/cpd/itacs/itacs5/public/work/a0312ae8b7494c6d_lastused_0.grdtitle undef -9999xdef 1
linear 0 lydef 1 linear 0 lzdef 1 linear 0 ltdef 30 linear 00Z03NOV1981 12movars 1lastused 0 99
lastusedndvarsDefault file number is: 1 X is fixed Lon = 0 X = 1Y is fixed Lat = 0 Y =
1Z is fixed Lev = 0 Z = 1T is varying Time = 00Z03NOV1981 to 00Z03NOV2010 T = 1 to 30F is
fixed Fns = 1 F = 1ni = 1 nk = 1 nt = 30 10.146428 14.060715 12.175000 12.171429
13.135715 12.167857 12.682143 11.117857 14.071428 14.957143 12.935715 12.953571 14.000000
13.285714 12.432143 13.039286 14.357142 13.603572 13.903571 13.228572 12.714286 11.525000
14.153571 15.400000 13.157143 14.157143 13.007143 12.957143 13.250000 13.296429
    
```

1) Once paste to the tab "Memopad"

| Year | Period, Hindcast | Rank | Period, Realtime forecast |
|------|------------------|------|---------------------------|
| 1981 | 10.14643 | 30 | |
| 1982 | 14.06072 | 7 | |
| 1983 | 12.175 | 25 | |
| 1984 | 12.17143 | 26 | |
| 1985 | 13.13572 | 16 | |
| 1986 | 12.16786 | 27 | |
| 1987 | 12.68214 | 23 | |
| 1988 | 11.11786 | 29 | |
| 1989 | 14.07143 | 6 | |
| 1990 | 14.95714 | 2 | |
| 1991 | 12.93572 | 21 | |
| 1992 | 12.95357 | 20 | |
| 1993 | 14 | 8 | |
| 1994 | 13.28571 | 12 | |
| 1995 | 12.43214 | 24 | |
| 1996 | 13.03929 | 17 | |
| 1997 | 14.35714 | 3 | |
| 1998 | 13.60357 | 10 | |
| 1999 | 13.90357 | 9 | |
| 2000 | 13.22857 | 14 | |
| 2001 | 13.22857 | 22 | |
| 2002 | 12.71429 | 28 | |
| 2003 | 11.525 | 5 | |
| 2004 | 14.15357 | 1 | |
| 2005 | 15.4 | 15 | |
| 2006 | 13.15714 | 4 | |
| 2007 | 14.15714 | 18 | |
| 2008 | 13.00714 | 19 | |
| 2009 | 12.95714 | 13 | |
| 2010 | 13.25 | 11 | |

2) Re-paste to the input field on the tab "Calc_guidance"

| Year | Period, Hindcast | Rank | Period, Realtime forecast |
|------|------------------|------|---------------------------|
| 1981 | 10.14643 | 30 | |
| 1982 | 14.06072 | 7 | |
| 1983 | 12.175 | 25 | |
| 1984 | 12.17143 | 26 | |
| 1985 | 13.13572 | 16 | |
| 1986 | 12.16786 | 27 | |
| 1987 | 12.68214 | 23 | |
| 1988 | 11.11786 | 29 | |
| 1989 | 14.07143 | 6 | |
| 1990 | 14.95714 | 2 | |
| 1991 | 12.93572 | 21 | |
| 1992 | 12.95357 | 20 | |
| 1993 | 14 | 8 | |
| 1994 | 13.28571 | 12 | |
| 1995 | 12.43214 | 24 | |
| 1996 | 13.03929 | 17 | |
| 1997 | 14.35714 | 3 | |
| 1998 | 13.60357 | 10 | |
| 1999 | 13.90357 | 9 | |
| 2000 | 13.22857 | 14 | |
| 2001 | 13.22857 | 22 | |
| 2002 | 12.71429 | 28 | |
| 2003 | 11.525 | 5 | |
| 2004 | 14.15357 | 1 | |
| 2005 | 15.4 | 15 | |
| 2006 | 13.15714 | 4 | |
| 2007 | 14.15714 | 18 | |
| 2008 | 13.00714 | 19 | |
| 2009 | 12.95714 | 13 | |
| 2010 | 13.25 | 11 | |

Tab "Memopad"

(Note) In case of continuous missing data in the past observation file

- If observation data for **whole target period** is **missing for certain year**, it is impossible to aggregate on iTacs.
- If so, target year (i.e. “Showing period”) should be set with the exception of missing-data year.

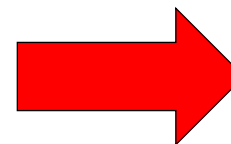
◆ In this exercise, long-term missing data
Cambodia data; 1981 to 1984
Singapore data; Jan to Jun 1981

(Example)

- ✓ Including missing data during 1981 to 1984;
 - Aggregate 1985 to 2010

Due to missing data during 1981 to 1984, iTacs does not support aggregation of data.

The screenshot shows the iTacs interface with the 'Showing period' set to 'RANGE' from 1981 to 2010. A red box highlights the year range. Below the interface, a message box displays an error: 'Error Occured. Detail is as followed, ITACS ERROR:<Itacs::Analysis::effective_mean> there is no valid data'.



The screenshot shows the iTacs interface with the 'Showing period' set to 'RANGE' from 1985 to 2010. A red box highlights the year range, indicating the correction from the previous state.

(Note) In case of continuous missing data in the past observation file

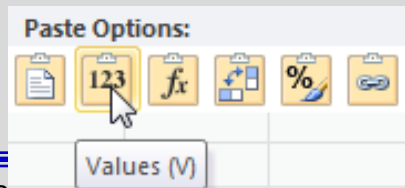
```

f03955f3286dd2f1_INPUT_lastused__lon-0-360_lat--90-90_level-1-1_SHOW_YEAR_DAY_19851...
ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)
data_set : INPUTelement : lastuseddset
/mnt/pnas/cpd/itacs/itacs5/public/work/f03955f3286dd2f1_lastused_0.grdtitle undef -9999xdef 1
linear 0 lydef 1 linear 0 lzdef 1 linear 0 ltdef 26 linear 00Z03NOV1985 12movars 1lastused 0 99
lastusedendvarsDefault file number is: 1 X is fixed Lon = 0 X = 1Y is fixed Lat = 0 Y =
1Z is fixed Lev = 0 Z = 1T is varying Time = 00Z03NOV1985 to 00Z03NOV2010 T = 1 to 26F is
fixed Fns = 1 F = 1ni = 1 nk = 1 nt = 26 27.155357 27.723215 27.751785 25.564465
26.396429 26.325001 26.262501 25.783928 26.546429 27.548571 26.035715 28.312500 27.792856
27.146429 26.975000 26.914286 25.421429 27.535715 27.857143 27.914286 26.250000 28.810715
26.378571 27.178572 28.049999 27.703571
    
```

Time sequence data from 1985 to 2010

Set blank field for missing period (1981 to 1984)

Copy and paste (with value option)



| Year | Period; Hindcast | Rank | Period; Realtime forecast |
|------|------------------|------|---------------------------|
| 1981 | | #N/A | |
| 1982 | | #N/A | |
| 1983 | | #N/A | |
| 1984 | | #N/A | |
| 1985 | 27.155357 | 14 | |
| 1986 | 27.723215 | 9 | |
| 1987 | 27.751785 | 8 | |
| 1988 | 25.564465 | 25 | |
| 1989 | 26.396429 | 19 | |
| 1990 | 26.325001 | 21 | |
| 1991 | 26.262501 | 22 | |
| 1992 | 25.783928 | 24 | |
| 1993 | 26.546429 | 18 | |
| 1994 | 27.548571 | 11 | |
| 1995 | 26.035715 | 23 | |
| 1996 | 28.3125 | 2 | |
| 1997 | 27.792856 | 7 | |
| 1998 | 27.146429 | 15 | |
| 1999 | 26.975 | 16 | |
| 2000 | 26.914286 | 17 | |
| 2001 | 25.421429 | 26 | |
| 2002 | 27.535715 | 12 | |
| 2003 | 27.857143 | 6 | |
| 2004 | 27.914286 | 5 | |
| 2005 | 28.25 | 3 | |
| 2006 | 28.810715 | 1 | |
| 2007 | 26.378571 | 20 | |
| 2008 | 27.178572 | 13 | |
| 2009 | 28.049999 | 4 | |
| 2010 | 27.703571 | 10 | |

2.2 Input past observation data

(1) Get past observation data (6 of 6)

Worksheet "Calc_guidance"

| | | |
|---------------|--------------|---------------------|
| | Hindcast | Real-time forecast |
| Initial time | 31 Oct | 4 Nov 2015 |
| Target period | 3 to 30 Nov. | 7 Nov to 4 Dec 2015 |

| Year | Period; Hindcast | Rank | Period; Realtime forecast |
|------|---------------------|------|------------------------------|
| 1981 | 10.146428 | 30 | 9.185715 |
| 1982 | 14.060715 | 7 | 13.842857 |
| 1983 | 12.175 | 25 | 11.564285 |
| 1984 | 12.171429 | 26 | 11.446428 |
| 1985 | 13.135715 | 16 | 12.482142 |
| 1986 | 12.167857 | 27 | 11.214286 |
| 1987 | 12.682143 | 23 | 11.257143 |
| 1988 | 11.117857 | 29 | 10.478572 |
| 1989 | 14.071428 | 6 | 13.435715 |
| 1990 | 14.957143 | 2 | 14.5 |
| 1991 | 12.935715 | 21 | 12.65 |
| 1992 | 12.953571 | 20 | 12.357142 |
| 1993 | 14 | 8 | 13.632143 |
| 1994 | 13.285714 | 12 | 12.978572 |
| 1995 | 12.432143 | 24 | 11.75 |
| 1996 | 13.039286 | 17 | 11.867857 |
| 1997 | 14.357142 | 3 | 13.3 |
| 1998 | 13.603572 | 10 | 12.357142 |
| 1999 | 13.903571 | 9 | 13.135715 |
| 2000 | 13.228572 | 14 | 12.242857 |
| 2001 | 12.714286 | 22 | 12.257143 |
| 2002 | 11.525 | 28 | 11.325 |
| 2003 | 14.153571 | 5 | 13.403571 |
| 2004 | 15.4 | 1 | 14.385715 |
| 2005 | 13.157143 | 15 | 12.110714 |
| 2006 | 14.157143 | 4 | 13.053572 |
| 2007 | 13.007143 | 18 | 12.264286 |
| 2008 | 12.957143 | 19 | 12.303572 |
| 2009 | 13.25 | 13 | 13.046429 |
| 2010 | 13.296429 | 11 | 13.325 |

- Similarly, get the past observation data for the real-time forecast period

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)

Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

1. Check the initial date and target period
2. Production of guidance and verification

(1) Get past observation data

(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

• Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

2.2 Input past observation data (2) Get hindcast data (1 of 5)

Analysis Dataset

Forecast Dataset **1**

1. Choose "Forecast Dataset" tab
2. Choose "1MONTH_HIND" within Dataset for Data1
3. Choose "Element" and "Level" for the predictor

Forecast Dataset

Select parameters

Graphic Options

Data1 **2**

2

3a

| Dataset | Element | Data type | Area | Level | Initial time | Time unit | Forecast time |
|-------------|--|-----------|--------------------------------------|---------|--------------|---|--------------------------|
| 1MONTH_HIND | Pressure Levels Temperature [C.Deg] | HIST | ALL Lat: -90 - 90 Lon: 0 - 360 | 1000hPa | 1231 | DAILY <input type="checkbox"/> Ave <input type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter | 1981 12 31 1981 12 31 |

Vector Spread

Analysis method: -Analysis Method-

3b

Ex. 1000hPa temp.

Major element for predictors

| | |
|---|---------------------|
| Isobatic (pressure levels) (1000,925,850,700,500,... hPa) | Surface |
| Temperature Dew-point depression (=T-Td) Wind (U or V) Geopotential height | Temperature Rain |

2.2 Input past observation data (2) Get hindcast data (2 of 5)

iTacs

4. Input the nearest grid point from the observation site **by 2.5°**, with in the cells "Lat" and "Lon"
5. Click to **check** the box "Year-to-year" within **Time unit**
6. Set target period for hindcast
7. Click "**Forecast Data Submit**"

Analysis Dataset | Forecast Dataset

Forecast Dataset

Select parameters | Graphic Options

Data1

| Dataset | Element | Data type | Area | Level | Initial time | Time unit | Forecast time |
|-------------|--|-----------|---|---------|--------------|---|-----------------------------|
| 1MONTH_HIND | Pressure Levels Temperature [C.Deg] | HIST | ALL Lat: 35 - 35 Ave Lon: 140 - 140 Ave | 1000hPa | 1031 | DAILY <input checked="" type="checkbox"/> Year-to-year | 1981 - 2010 11 3 - 11 30 |

4 In units of 2.5°

5 Check "Year-to-year"

6a **6b**

7 Forecast Data Submit

Ex.
Tokyo 35.7°N --> **35°N**
139.8°E --> **140°E**

Year: 1981 to 2010
Date; target period for hindcast

| | Hindcast | Real-time forecast |
|---------------|--------------|---------------------|
| Initial time | 31 Oct | 4 Nov 2015 |
| Target period | 3 to 30 Nov. | 7 Nov to 4 Dec 2015 |

2.2 Input past observation data (2) Get hindcast data (3 of 5)

iTacs

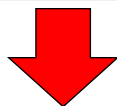
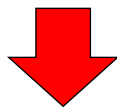
296.4
1985 1990

Download text zip file

8

Download data (ctl file and 4byte data)

8. Click “Download text zip file” below the graph
9. Download the text file
10. Open the downloaded text file



10

```
data set : 1031element : ttdef  
/mnt/pnas/cpd/itacs/itacs5/public/work/f65a8985175d484a_tt_0.grdtitle undef 9.999e+20  
xdef 1 linear 0 lydef 1 linear 0 lzdef 1 linear 1000 1tdef 30 linear 00Z02NOV1981  
12mvars ltt 1 99 Temperature [C.Deg]endvarsDefault file number is: 1 X is fixed  
Lon = 0 X = 1Y is fixed Lat = 0 Y = 1Z is fixed Lev = 1000 Z = 1T is  
varying Time = 00Z02NOV1981 to 00Z02NOV2010 T = 1 to 30F is fixed Fns = 1 E =  
1n1 = 1 n1 = 1 n1 = 1 nt = 30 11.418977 13.716712 12.673327 12.528245 12.50947  
12.370591 12.576674 11.977682 13.144664 13.908705 12.216642 13.072927 12.99577  
14.390061 12.427397 12.331535 12.891855 14.248815 13.480264 13.746979 12.91796  
12.289198 13.803856 13.837895 12.995385 13.861711 12.834921 13.185645 13.56476  
14.058388
```

2.2 Input past observation data (2) Get hindcast data (4 of 5)

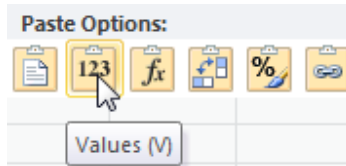
Worksheet "Calc_guidance"

```

data_set : 1031element : ttdset
/mnt/pnas/cpd/itacs/itacs5/public/work/f65a8985175d484a_tt_0.grdtitle undef 9.999e+20
xdef 1 linear 0 iydef 1 linear 0 lzdef 1 linear 1000 ltdef 30 linear 00Z02NOV1981
12movars 1tt 1 99 Temperature [C.Deg]endvarsDefault file number is: 1 X is fixed
Lon = 0 X = 1Y is fixed Lat = 0 Y = 1Z is fixed Lev = 1000 Z = 1T is
varying Time = 00Z02NOV1981 to 00Z02NOV2010 T = 1 to 30F is fixed Ens = 1 E =
lpl = 1 nl = 1 nk = 1 nt = 30 11.416977 13.716712 12.673327 12.528245 12.50947
12.370591 12.576674 11.977682 13.144664 13.908705 12.216642 13.072927 12.99577
14.390061 12.427397 12.331535 12.891855 14.248815 13.480264 13.746979 12.91798
12.289198 13.803856 13.837895 12.995385 13.861711 12.834921 13.185645 13.58476
14.058389
    
```

(Recommendation)
The element name should be memorized (ex. T1000)

Copy and paste with
paste values option



11. Copy and paste with the paste values option
to the Predictor (1 or 2) field in the Excel file

| Year | Observation (Temperature) | | Forecast of model | | Fore: (guida) |
|------|---------------------------|------|---------------------------|-------------|---------------|
| | Period; Hindcast | Rank | Period; Realtime forecast | Predictor 1 | |
| 1981 | 10.146428 | 30 | 9.195715 | T1000 | 11 |
| 1982 | 14.060715 | 7 | 13.842857 | | |
| 1983 | 12.175 | 25 | 11.564285 | | |
| 1984 | 12.171429 | 26 | 11.446428 | | |
| 1985 | 13.135715 | 16 | 10.499143 | | |
| 1986 | 13.135715 | 27 | 11.214286 | | |
| 1987 | 12.682143 | 23 | 11.257143 | | |
| 1988 | 11.117857 | 29 | 10.478572 | | |
| 1989 | 14.071428 | 6 | 13.435715 | | |
| 1990 | 14.957143 | 2 | 14.5 | | |
| 1991 | 12.935715 | 21 | 12.65 | | |
| 1992 | 12.953571 | 20 | 12.357142 | | |
| 1993 | 14 | 8 | 13.632143 | | |
| 1994 | 13.285714 | 12 | 12.978572 | | |
| 1995 | 12.432143 | 24 | 11.75 | | |
| 1996 | 13.039286 | 17 | 11.867857 | | |
| 1997 | 14.357142 | 3 | 13.3 | | |
| 1998 | 13.603572 | 10 | 12.357142 | | |
| 1999 | 13.903571 | 9 | 13.135715 | | |
| 2000 | 13.228572 | 14 | 12.242857 | | |
| 2001 | 12.714286 | 22 | 12.257143 | | |
| 2002 | 11.525 | 28 | 11.325 | | |
| 2003 | 14.153571 | 5 | 13.403571 | | |
| 2004 | 15.4 | 1 | 14.385715 | | |
| 2005 | 13.157143 | 15 | 12.110714 | | |
| 2006 | 14.157143 | 4 | 13.053572 | | |
| 2007 | 13.007143 | 18 | 12.264286 | | |
| 2008 | 12.957143 | 19 | 12.303572 | | |
| 2009 | 13.25 | 13 | 13.046429 | | |
| 2010 | 13.296429 | 11 | 13.325 | | |

2.2 Input past observation data (2) Get hindcast data (5 of 5)

- Select the **second predictors** and paste the hindcast data

Data I

| Dataset | Element | Data type | Area | Level | Initial time | Time unit | Forecast time |
|-------------|--|-----------|---|--------|--------------|--|---------------------------|
| 1MONTH_HIND | Pressure Levels Meridional wind [m/s] | HIST | ALL Lat: 35 - 35 Ave Lon: 140 - 140 Ave | 850hPa | 1031 | DAILY <input type="checkbox"/> Ave <input checked="" type="checkbox"/> Year-to-year <input type="checkbox"/> Time filter | 1981 - 2010 11 3 11 30 |

Analysis method: -Analysis Method-

| Year | Observation (Temperature) | | Forecast of model | | |
|------|---------------------------|------|-------------------------------|----------------------|---------------------|
| | Period ; Hindcast | Rank | Period ; Realtime forecast | Predictor 1 T1000 | Predictor 2 v850 |
| 1981 | 10.146428 | 30 | 9.185715 | 11.416977 | 0.13591 |
| 1982 | 14.060715 | 7 | 13.842857 | 13.716712 | -0.330044 |
| 1983 | 12.175 | 25 | 11.564285 | 12.673327 | 0.512746 |
| 1984 | 12.171429 | 26 | 11.446428 | 12.528245 | 0.384438 |
| 1985 | 13.195715 | 16 | 12.482142 | 12.509471 | 0.523422 |
| 1986 | 12.167857 | 27 | 11.214286 | 12.370591 | 0.509626 |
| 1987 | 12.682143 | 23 | 11.257143 | 12.576674 | -0.005612 |
| 1988 | 11.117857 | 29 | 10.478572 | 11.977682 | -0.879957 |
| 1989 | 14.071428 | 6 | 13.435715 | 13.144664 | 0.252846 |
| 1990 | 14.957143 | 2 | 14.5 | 13.908705 | 1.24744 |
| 1991 | 12.935715 | 21 | 12.65 | 12.216642 | 0.288555 |
| 1992 | 12.953571 | 20 | 12.357142 | 13.072927 | 0.77095 |
| 1993 | 14 | 8 | 13.632143 | 12.995776 | 0.40513 |
| 1994 | 13.285714 | 12 | 12.978572 | 14.390061 | -0.60789 |
| 1995 | 12.432143 | 24 | 11.75 | 12.427397 | -0.798494 |
| 1996 | 13.039286 | 17 | 11.867857 | 12.331535 | -0.169563 |
| 1997 | 14.357142 | 3 | 13.3 | 12.891855 | 1.17955 |
| 1998 | 13.603572 | 10 | 12.357142 | 14.248815 | 0.475606 |
| 1999 | 13.003571 | 0 | 12.195715 | 12.490264 | 0.496911 |

In this example, "Meridional wind at 850hPa" is selected as the second element.

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)

Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

1. Check the initial date and target period
2. Production of guidance and verification

(1) Get past observation data

(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

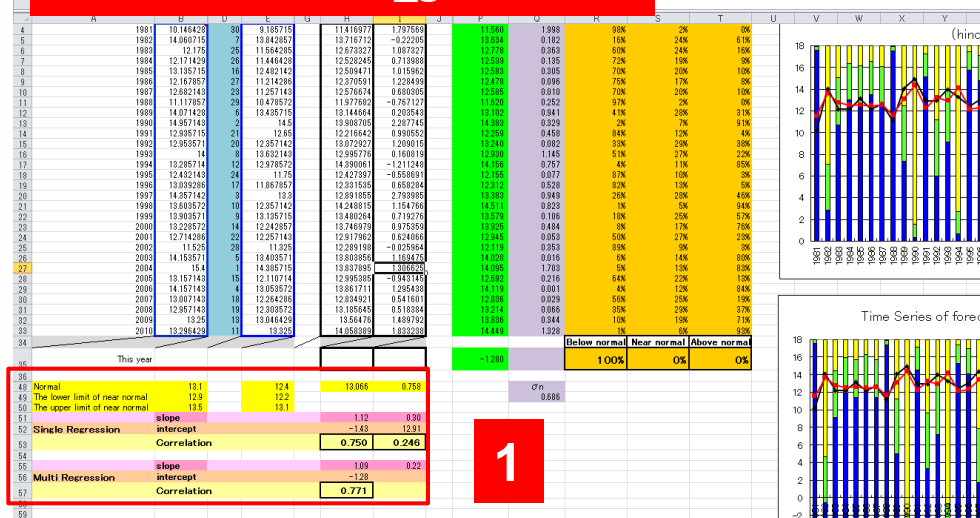
• Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

2.2 Input past observation data

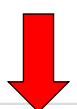
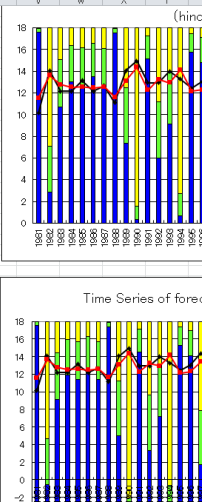
(3) Confirmation of prediction skill of guidance (1 of 3)

Worksheet "Calc_guidance"



1. Check up correlation

✓ Whether the correlation score of multi-regression better than that of single-regression?



| | | | | |
|--------------------------------|-------------|------|--------|-------|
| Normal | 13.1 | 12.4 | 13.066 | 0.176 |
| The lower limit of near normal | 12.9 | 12.2 | | |
| The upper limit of near normal | 13.5 | 13.1 | | |
| Single Regression | slope | | 1.12 | 0.66 |
| | intercept | | -1.43 | 13.02 |
| | Correlation | | 0.750 | 0.370 |
| Multi Regression | slope | | 1.04 | 0.83 |
| | intercept | | -0.54 | |
| | Correlation | | 0.771 | |

Correlation with the single-regression (predictor-1,-2, respectively)

Correlation of guidance (multi-regression)

Closer to 1 (preferably)

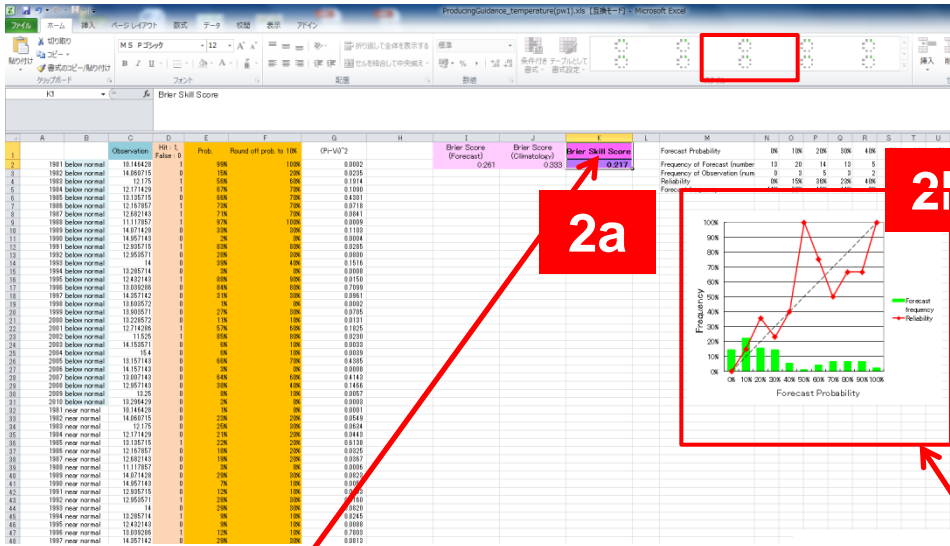
2.2 Input past observation data

(3) Confirmation of prediction skill of guidance (2 of 3)

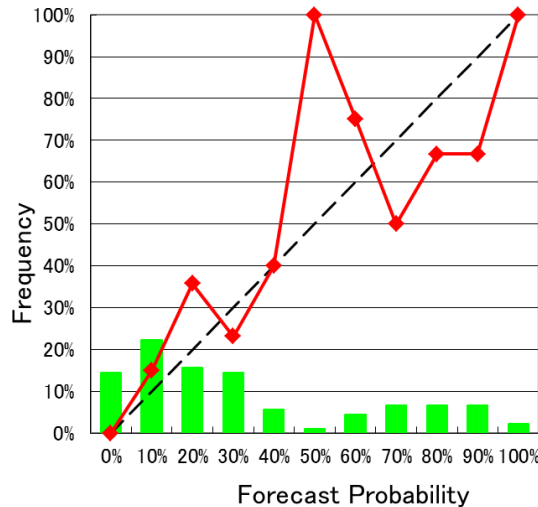
Worksheet "Verification"

2. Check up probabilistic verification

- (2a) BSS (preferable >0)
- (2b) reliability diagram
- ✓ Whether the reliability curve has a positive slope?



Brier Skill Score
0.217



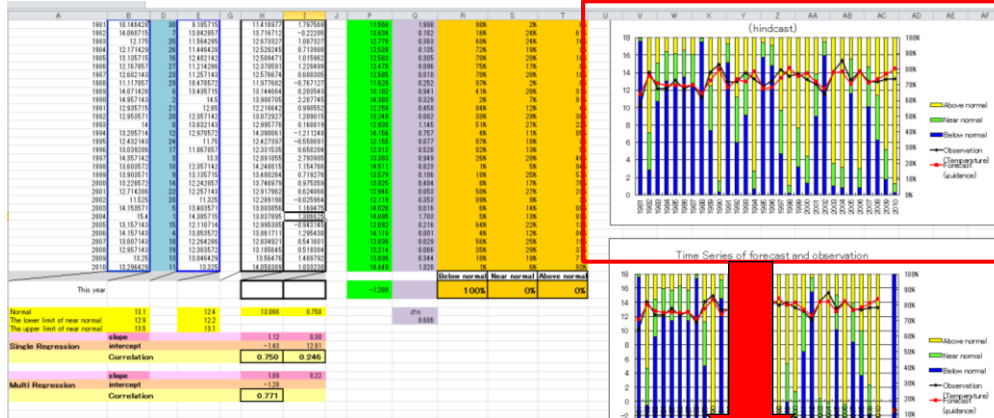
2.2 Input past observation data

(3) Confirmation of prediction skill of guidance (3 of 3)

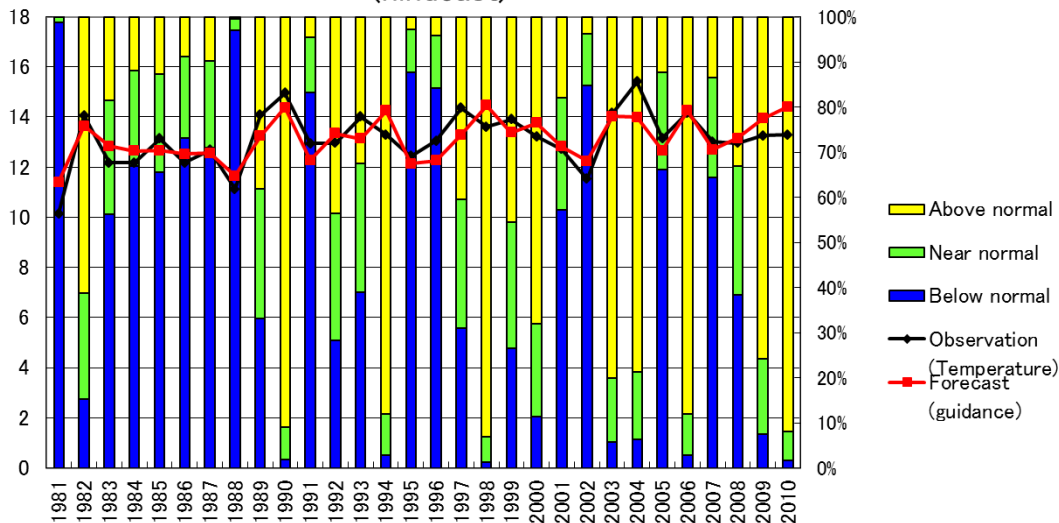
Worksheet "Calc_guidance"

3

3. Check up prediction result for the noticeable year



Time Series of forecast and observation (hindcast)



Example;
Cool year; 1988, 2002
Warm year; 1990, 2004

The above cases are well predicted.

Prediction skill of guidance

| | |
|--------------------|--|
| Objective variable | Temperature |
| Predictors | 1000 hPa temperature 850hPa meridional wind |
| Correlation | 0.771 |
| Brier Skill Score | 0.217 |

- Check up the skill of guidance selected two elements (predictors)
- Look for the more effective combination of variables

Hint; Recommended combination of predictors

◆ (Forecast of temperature)

- One predictor is selected among **temperature**
 - **Lower troposphere temperature** (1000, 925, 850 hPa) **or surface temperature**
 - As for the island point, to avoid using surface temp. might be better (i.e. using 925, 850hPa temp.).
- Another predictor is selected except for temperature, such as **wind, TTD**.
 - ✓ In statistics, if two or more predictor variables in a multiple-regression are remarkably correlated, reliability of regression analysis become poor (**multicollinearity**).

Example;

(o) T1000 and V850, (x) T1000 and Tsurface

Hint; Recommended combination of predictors

◆ (Forecast of precipitation)

- One predictor is selected **precipitation**
- Another predictor is selected depending on regionality

Example;

- **Temperature or geopotential** height in consideration of temperature-precipitation correlation
- **Lower wind (U or V)** in consideration of terrain condition

Workflow of the guidance tool

1. (Preparation)

1. Create the past observation file (csv format)

Input of the guidance tool
(We have already prepared.)

2. (using EXCEL file and iTacs)

1. Check the initial date and target period
2. Production of guidance and verification

(1) Get past observation data

(2) Get hindcast data

(3) Confirmation of prediction skill of guidance

3. Application to the real-time forecast

- Input of real-time forecast of model

Obtaining solution of probabilistic forecast by the guidance

3 Application to the real-time forecast (1 of 5)

iTacs

1

Forecast Dataset

1. Choose “Forecast Dataset” tab
2. Choose “1MONTH_ENS_MEAN” within Dataset for Data1
3. Choose “Element” and “Level” for the predictor
4. Input the nearest grid point from the observation site by 2.5°, with in the cells “Lat” and “Lon”

Forecast Dataset

Select parameters

Graphic Options

Data 1

2

Dataset
1MONTH_ENS_MEAN

3a

Element
Pressure Levels
T (Temperature) [C.D]

3b

Level
1000hPa

4

Area
ALL
Lat: 35 - 35 Ave
Lon: 140 - 140 Ave

In units of 2.5°

Ex. 1000hPa temp.

Ex.
Tokyo 35.7°N --> 35°N
139.8°E --> 140°E

3 Application to the real-time forecast (2 of 5)

iTacs

5. Click to **check** the box “**Ave**” within **Time unit**
6. Set target period for forecast
7. Click “**Forecast Data Submit**”

The screenshot shows the iTacs configuration interface. The 'Time unit' section has the 'Ave' checkbox checked. The 'Initial time' is set to 20151104. The 'Forecast time' is set from 2015-11-7 to 2015-12-4. The 'Forecast Data Submit' button is highlighted with a red box and the number 7.

Check “Ave”

| | Hindcast | Real-time forecast |
|---------------|--------------|---------------------|
| Initial time | 31 Oct | 4 Nov 2015 |
| Target period | 3 to 30 Nov. | 7 Nov to 4 Dec 2015 |

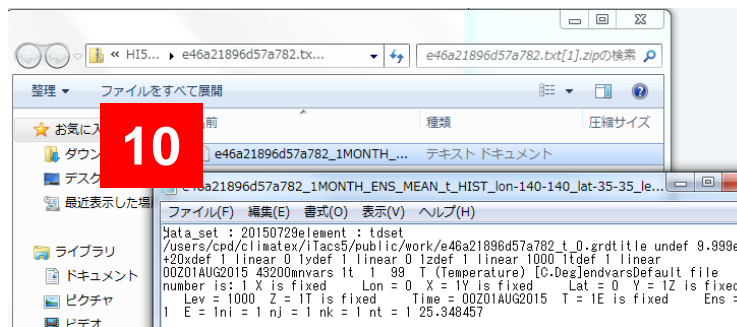
3 Application to the real-time forecast (3 of 5)

iTacs

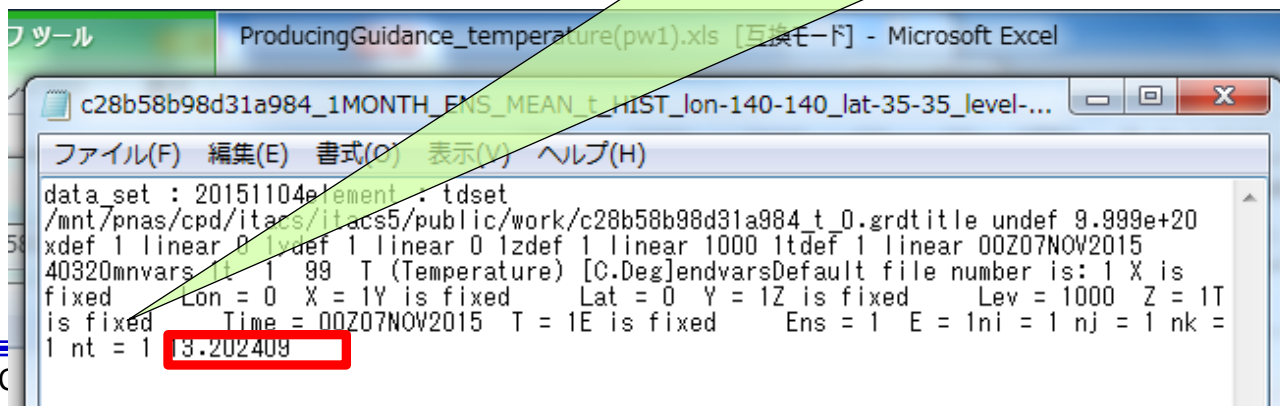
Download text zip file

Download data (ctl file and 4byte data)

8. Click "Download text zip file"
9. Download the text file
10. Open the downloaded text file



Forecast value is described after "nt = 1".



3 Application to the real-time forecast (4 of 5)

Worksheet "Calc_guidance"

Predictor 1 (T1000)

Predictor 2 (V850)

```

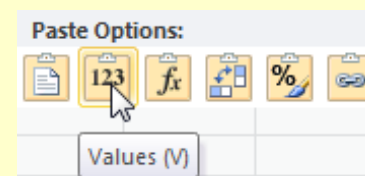
ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)
data_set : 20151104element : tdset
/mnt/pnas/cpd/itacs/itacs5/public/work/c28b58b98d31a984_t.D.grdtitle undef 9.999e+20
xdef 1 linear 0 lydef 1 linear 0 lzdef 1 linear 1000 ltxdef 1 linear 00Z07NOV2015
40320mnnvars 1t 1 99 T (Temperature) [C.Deg]endvarsDefault file number is: 1 X is
fixed Lon = 0 X = 1Y is fixed Lat = 0 Y = 1Z is fixed Lev = 1000 Z = 1T
is fixed Time = 00Z07NOV2015 T = 1E is fixed Ens = 1 E = 1ni = 1 nj = 1 nk =
1 nt = 1
    
```

```

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)
data_set : 20151104element : vdset
/mnt/pnas/cpd/itacs/itacs5/public/work/c8179c75078c9699_v.D.grdtitle undef 9.999e+20
xdef 1 linear 0 lydef 1 linear 0 lzdef 1 linear 850 ltxdef 1 linear 00Z07NOV2015
40320mnnvars 1v 1 99 V (Meridional Wind) [m/s]endvarsDefault file number is: 1 X is
fixed Lon = 0 X = 1Y is fixed Lat = 0 Y = 1Z is fixed Lev = 850 Z = 1T
is fixed Time = 00Z07NOV2015 T = 1E is fixed Ens = 1 E = 1ni = 1 nj = 1 nk =
1 nt = 1
    
```

| | | | | | |
|------|-----------|----|-----------|-----------|-----------|
| 2001 | 12.714286 | 22 | 12.257143 | 12.917962 | 0.624066 |
| 2002 | 11.525 | 28 | 11.325 | 12.289198 | -0.025964 |
| 2003 | 14.153571 | 5 | 13.403571 | 13.803856 | 1.169475 |
| 2004 | 15.4 | 1 | 14.385715 | 13.837895 | 1.306625 |
| 2005 | 13.157143 | 15 | 12.110714 | 12.995385 | -0.943145 |
| 2006 | 14.157143 | 4 | 13.053572 | 13.861711 | 1.295438 |
| 2007 | 13.007143 | 18 | 12.264286 | 12.834921 | 0.541601 |
| 2008 | 12.957143 | 19 | 12.303572 | 13.185645 | 0.518384 |
| 2009 | 13.25 | 13 | 13.046429 | 13.56476 | 1.489792 |
| 2010 | 13.296429 | 11 | 13.325 | 14.058389 | 1.833288 |

11. Copy and paste with the paste values option to the Predictor (1 or 2) field in the Excel file



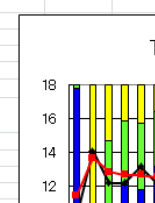
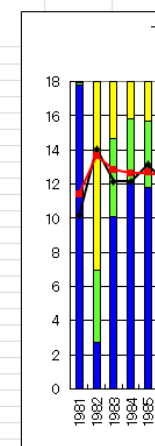
13.202409 0.780037

11a **11b**

3 Application to the real-time forecast (5 of 5)

Worksheet "Calc_guidance"

| Observation (Temperature) | | | Forecast of model | | Forecast (guidance) | square error | Probabilistic Forecast | | | |
|--------------------------------|----------------------|------|-------------------------------|-------------|---------------------|----------------|-----------------------------|------------------------|------------------------|--------------|
| Set blank for missing | | | Predictor 1 | Predictor 2 | | | NO(x, σ _n) | NO(x, σ _n) | NO(x, σ _n) | |
| Year | Period ; Hindcast | Rank | Period ; Realtime forecast | T1000 | v850 | χ _s | σ _n ² | Below normal | Near normal | Above normal |
| 1981 | 10.146428 | 30 | 9.185715 | 11.416977 | 0.135911 | 11.403 | 1.578 | 99% | 1% | 0% |
| 1982 | 14.060715 | 7 | 13.842857 | 13.716712 | -0.330044 | 13.646 | 0.172 | 15% | 23% | 61% |
| 1983 | 12.175 | 25 | 11.564285 | 12.673327 | 0.512746 | 12.837 | 0.438 | 56% | 25% | 19% |
| 1984 | 12.171429 | 26 | 11.446428 | 12.528245 | 0.384438 | 12.643 | 0.223 | 67% | 21% | 12% |
| 1985 | 13.135715 | 16 | 12.482142 | 12.509471 | 0.523422 | 12.670 | 0.217 | 66% | 22% | 13% |
| 1986 | 12.167857 | 27 | 11.214286 | 12.370591 | 0.509626 | 12.520 | 0.124 | 73% | 18% | 9% |
| 1987 | 12.682143 | 23 | 11.257143 | 12.576674 | -0.005612 | 12.565 | 0.014 | 71% | 19% | 10% |
| 1988 | 11.117857 | 29 | 10.478572 | 11.977682 | -0.879957 | 11.652 | 0.285 | 97% | 3% | 0% |
| 1989 | 14.071428 | 6 | 13.435715 | 13.144664 | 0.252846 | 13.242 | 0.687 | 33% | 29% | 38% |
| 1990 | 14.957143 | 2 | 14.5 | 13.908705 | 1.24744 | 14.367 | 0.348 | 2% | 7% | 91% |
| 1991 | 12.935715 | 21 | 12.65 | 12.216642 | 0.288555 | 12.287 | 0.421 | 83% | 12% | 4% |
| 1992 | 12.953571 | 20 | 12.357142 | 13.072927 | 0.770951 | 13.339 | 0.148 | 28% | 28% | 44% |
| 1993 | 14 | 8 | 13.632143 | 12.995776 | 0.40513 | 13.137 | 0.744 | 39% | 29% | 32% |
| 1994 | 13.285714 | 12 | 12.978572 | 14.390061 | -0.60789 | 14.256 | 0.942 | 3% | 9% | 88% |
| 1995 | 12.432143 | 24 | 11.75 | 12.427397 | -0.798494 | 12.147 | 0.081 | 88% | 9% | 3% |
| 1996 | 13.039286 | 17 | 11.867857 | 12.331535 | -0.169563 | 12.255 | 0.615 | 84% | 12% | 4% |
| 1997 | 14.357142 | 3 | 13.3 | 12.891855 | 1.179551 | 13.285 | 1.150 | 31% | 29% | 40% |
| 1998 | 13.603572 | 10 | 12.357142 | 14.248815 | 0.475606 | 14.467 | 0.745 | 1% | 6% | 93% |
| 1999 | 13.903571 | 9 | 13.135715 | 13.480264 | -0.406816 | 13.374 | 0.280 | 27% | 28% | 46% |
| 2000 | 13.228572 | 14 | 12.242857 | 13.746979 | -0.048611 | 13.771 | 0.294 | 11% | 21% | 68% |
| 2001 | 12.714286 | 22 | 12.257143 | 12.917962 | -0.31432 | 12.819 | 0.011 | 57% | 25% | 18% |
| 2002 | 11.525 | 28 | 11.325 | 12.289198 | -0.086853 | 12.238 | 0.509 | 85% | 11% | 4% |
| 2003 | 14.153571 | 5 | 13.403571 | 13.803856 | 0.548405 | 14.027 | 0.016 | 6% | 14% | 80% |
| 2004 | 15.4 | 1 | 14.385715 | 13.837895 | 0.350808 | 13.997 | 1.968 | 6% | 15% | 79% |
| 2005 | 13.157143 | 15 | 12.110714 | 12.995385 | -1.046594 | 12.658 | 0.250 | 66% | 21% | 12% |
| 2006 | 14.157143 | 4 | 13.053572 | 13.861711 | 1.061383 | 14.257 | 0.010 | 3% | 9% | 88% |
| 2007 | 13.007143 | 18 | 12.264286 | 12.834921 | -0.435827 | 12.692 | 0.099 | 64% | 22% | 13% |
| 2008 | 12.957143 | 19 | 12.303572 | 13.185645 | -0.159032 | 13.149 | 0.037 | 38% | 29% | 33% |
| 2009 | 13.25 | 13 | 13.046429 | 13.56476 | 1.010597 | 13.930 | 0.463 | 8% | 17% | 76% |
| 2010 | 13.296429 | 11 | 13.325 | 14.058389 | 0.913254 | 14.413 | 1.2 | 12% | 12% | 76% |
| This year | | | | 13.202409 | 0.780037 | 13.477 | | 3% | 24% | 73% |
| Normal | 13.1 | | 12.4 | 13.066 | 0.178 | | σ _n | | | |
| The lower limit of near normal | 12.9 | | 12.2 | | | | 0.686 | | | |
| The upper limit of near normal | 13.5 | | 13.1 | | | | | | | |



| | | |
|--------------|-------------|--------------|
| Below normal | Near normal | Above normal |
| 3% | 24% | 73% |

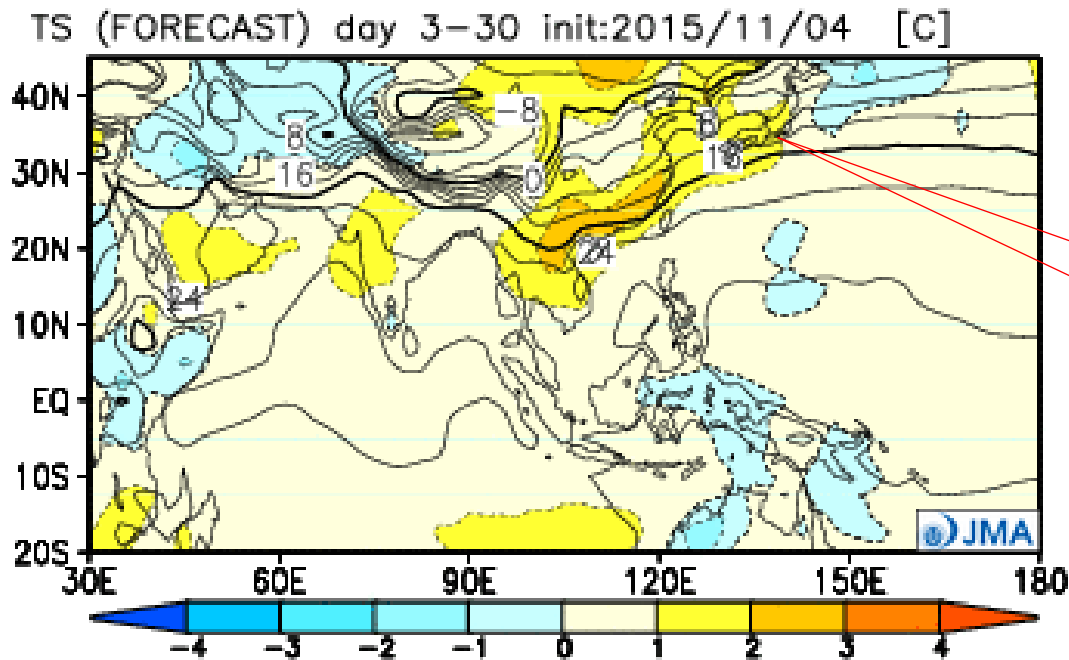
(Output)
Probabilities by guidance for real-time forecast

Confirmation of the output guidance

- ✓ In order to validate the output of guidance, it is recommended that the output of the guidance is compared with forecast of model.

◆ Forecast map

➤ <http://ds.data.jma.go.jp/gmd/tcc/tcc/products/model/index.html>



Positive anomalies are predicted around Tokyo

TS (FORECAST) day 3-30 init:2015/11/11 [C]

