

# GDP Creation of Meisei's Gpssonde

- Session 4, 12 June 2017 -

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# *Outline*

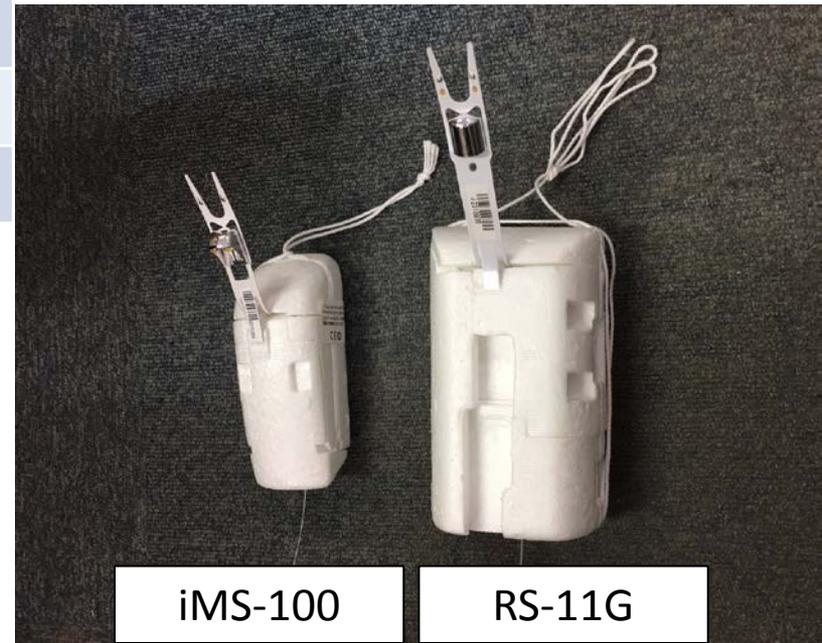
1. Introduction
2. GDP Creation for RS-11G / iMS-100
3. Progress and future plan

# Introduction

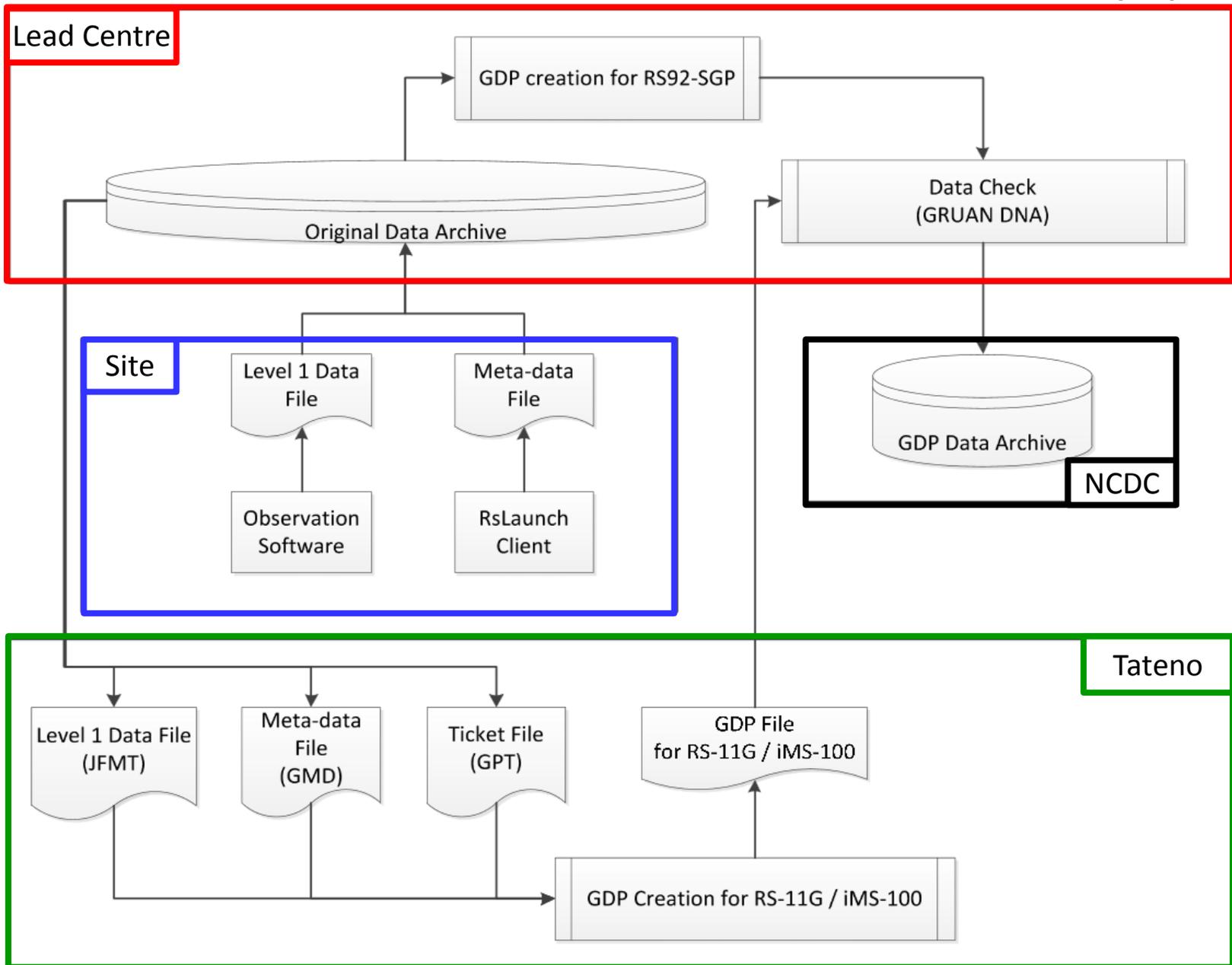
Meisei's gpssonde:

Type	Station	Term
RS-11G	Tateno	2013~2017
	Tateno (ozonesondes)	2013~
iMS-100	Tateno	2017~

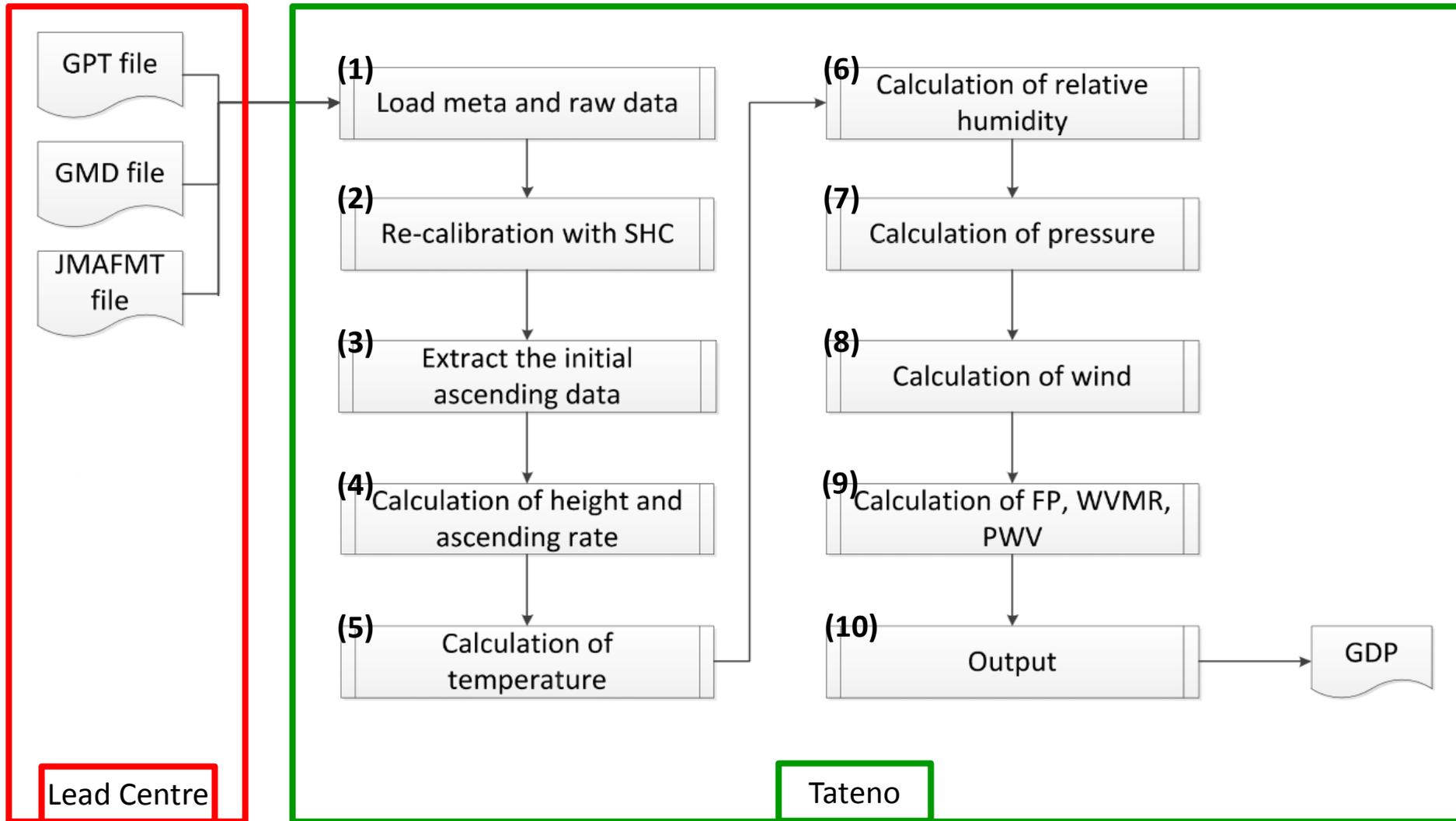
Type	Station (candidate)	Term
RS-11G	Syowa	2017~
	Syowa (ozonesondes)	2017~
iMS-100	Minamitorishima	2017~



# GDP Creation for RS-11G / iMS-100 (1)



# GDP Creation for RS-11G / iMS-100 (2)



# GDP Creation for RS-11G / iMS-100 (3)

## (1) Load meta and raw data

- Load raw files

Load GPT file, GMD file and JFMT file.

- Calculate raw temperature

Convert frequency into temperature.

- Calculate raw relative humidity

Convert frequency into relative humidity.

- Calculate raw temperature of humidity sensor (iMS-100 only)

Convert frequency into temperature of relative humidity.

Raw data of observed frequency are saved

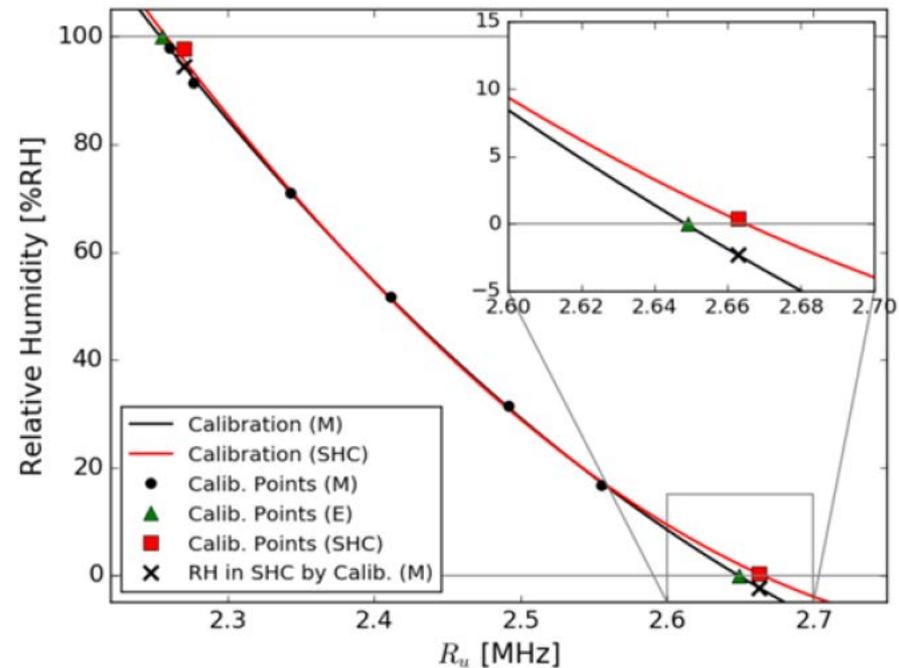
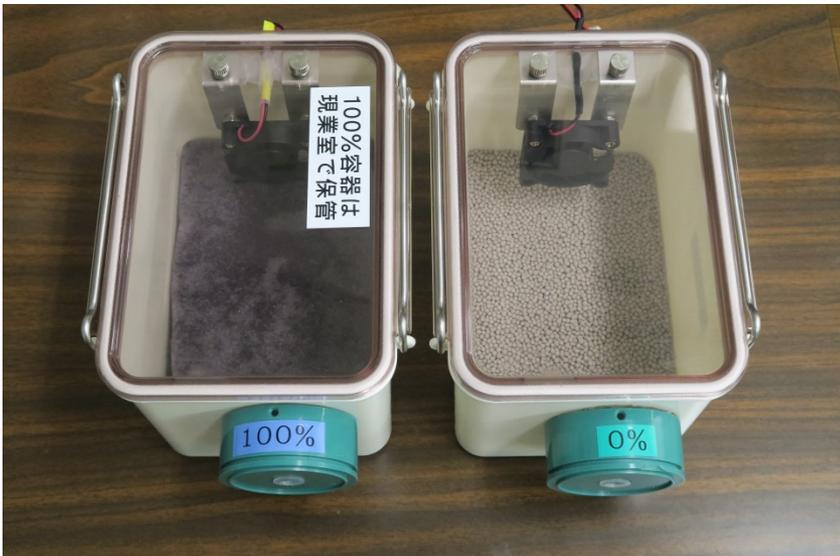
# GDP Creation for RS-11G / iMS-100 (4)

## (2) Re-calibration with SHC

- Re-calibrate humidity proofreading curve by use of SHC

### Humidity proofread point:

At the time of gpssonde production : 15, 30, 50, 70, 90, 95 (%RH)  
SHC before observation : 0, 100 (%RH)



# GDP Creation for RS-11G / iMS-100 (5)

## (3) Extract the initial ascending data

- Consider the first data of JFMT file as initial ascending data
- Consider the highest raw gps altitude data of JFMT file as final ascending data

# GDP Creation for RS-11G / iMS-100 (6)

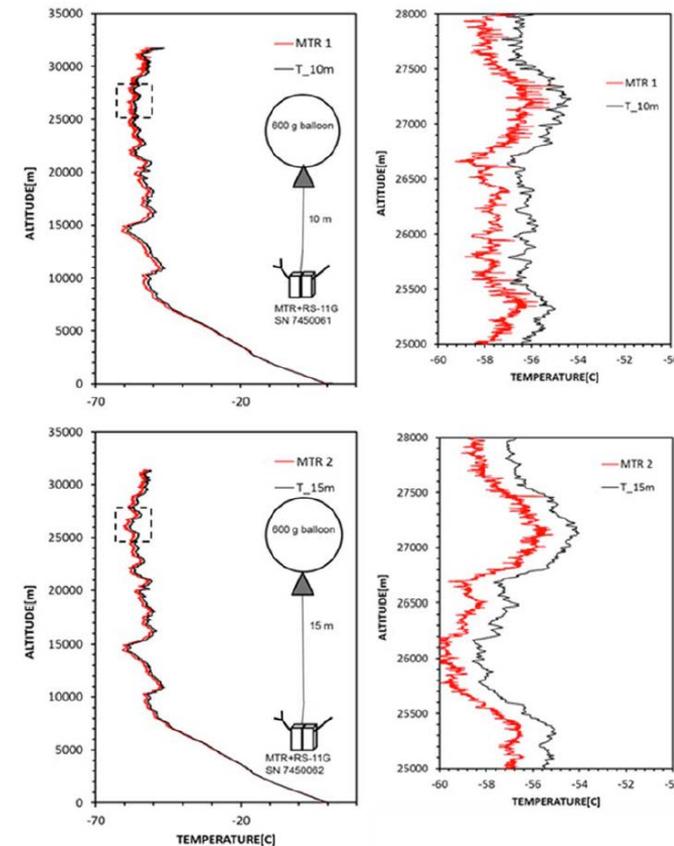
## (4) Calculation of height and ascending rate

- Calculate differences between first GPS altitude and real altitude as  $alt_{offset}$
- Reduce  $alt_{offset}$  from each altitude
- Calculate definitive GPS altitude by using the moving average with a 61 point
- Calculate geopotential height from GPS altitude
- Calculate ascending rate from geopotential height

# GDP Creation for RS-11G / iMS-100 (7)

## (5) Calculation of temperature

- Calculate a provisional value of the atmospheric pressure
- Heat spike filtering
- Smoothing by moving average
- Calculate radiation correction.



# GDP Creation for RS-11G / iMS-100 (8)

## (6) Calculation of relative humidity

- Calculate of temperature of humidity sensor
  - iMS-100 : Use temperature of humidity sensor
  - RS-11G : Estimate it from definitive temperature
- Time lag correction
  - Divide ingredient into a low frequency and a high frequency
  - The cut-off frequency is 4 times of the pendulum
- Contamination removal filter
  - Apply a minimum filter to a high frequency ingredient
  - Apply a smoothing filter to a high frequency ingredient
  - Apply the moving average of 90 seconds to a high frequency ingredient.
  - Compose a low frequency ingredient and a high frequency component
- Temperature-humidity dependence correction
- Sensor versus air temperature correction

# GDP Creation for RS-11G / iMS-100 (9)

## (7) Calculation of pressure

- Calculate atmospheric pressure temperature by use of humidity, geopotential height and ground atmospheric pressure

# GDP Creation for RS-11G / iMS-100 (10)

## (8) Calculation of wind

- Convert the wind velocity and the wind direction into East-West ingredients and North-South ingredients of the wind
- Apply a pendulum motion removal filter to each ingredient of the wind
- Compose each ingredient of the wind
- Calculate the wind velocity and the wind direction.

# GDP Creation for RS-11G / iMS-100 (11)

## (9) Calculation of FP, WVMR, PWV

- Calculate the following Values
  - Dew point
  - Mixing rate of water vapor
  - Precipitable water vapor
  - Tropopause
  - End point of the observation

# GDP Creation for RS-11G / iMS-100 (12)

## (10) Output

- Output GDP as NetCDF file

### **NetCDF File:**

Each definitive value

Each uncertainty

Meta data about observation and GDP

# Progress and future plan

## (1) Progress

- GDP creation : Done
- Technical document : just before an exhibition

For more information on GDP, including such as uncertainty, please look at the technical document.

## (2) Future plan

- Reexamination of the radiation correction