Updates and future plans from Tateno

- Session 7, 27 April 2016 -

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Outline

(Introduction)

1. Time-series variation of 600 g Balloon burst height in Tateno

(Activity)

2. Temperature comparison with RS-11G and RS92-SGP carried out in this year

(Future plans)

3. New sounding system of JMA
Time-series variation (monthly mean) of Balloon burst height

Observation Height using 600 g balloon (Monthly mean)

- Meisei RS2-91
- Vaisala RS92
- Meisei RS-11G

TATENO (00Z)
- Sonde: RS2-91 (Body: 270 g / NozzleLift: 1900 g)
- Sonde: RS92-SGP (Body: 275 g / NozzleLift: 1900 g)
- Sonde: RS-11G (Body: 85g / NozzleLift: 1700 g)
Temperature comparison with RS-11G and RS92-SGP (1)

Parachute

Unwinder

30 m ~ 35 m

>1m

Configurations for consolidated launch
**Four features**

- **1** RS-11G temperature is 0.2 K lower than RS92 on the whole at the **nighttime** observation.
- **2** RS-11G temperature is 0.4 K lower than RS92 at 7 hPa at the **nighttime** observation.
- **3** RS-11G temperature is 0.7 K lower than RS92 at 7 hPa at the **daytime** observation.
- **4** RS-11G temperature is 0.2 – 0.4 K lower than RS92 on the whole at the **daytime** observation.
1. RS-11G temperature is 0.2K lower than RS92 on the whole at the nighttime observation

- Issue of offset for GC25 reference thermometer -

Operators can’t change the offset of this GC25 reference thermometer
Detailed observation (e.g. RS92 GDP) will be necessary to include this temperature offset.
Average of 10 sounding at the daytime
(Corrected 0.16 K of GC25 offset)

Average of 15 soundings at the nighttime
(Corrected 0.16 K of GC25 offset)
2. RS-11G temperature is 0.4K lower than RS92 at 7 hPa at the nighttime observation

- Issue of the negative heat spike correction by Balloon’s slipstream at the nighttime observation -

Air masses cooled by the adiabatic expansion of the balloon gives the cold noise to the thermo-sensor. It may be necessary to consider the negative heat filter for the Balloon's slipstream in the night time.
3. RS-11G temperature is 0.5K (corrected GC25 offset) lower than RS92 at 7 hPa at the daytime

4. RS-11G temperature is 0 – 0.25 K (corrected GC25 offset) lower than RS92 on the whole at the daytime

- Issue of the ventilation used in a RS-11G solar radiation correction.

- The ventilation which used in the RS-11G radiation correction, is only used ascent rate (Fig. 2a).
- But in 30 km or higher, the pendulum speed is 3 m/s or more, and synthetic wind (pendulum speed plus ascent rate) is 9 m/s or 10 m/s (Fig. 2a).
- This means that the RS-11G radiation correction increase the 0.2 K at the 10 hPa level, and it is necessary to also use a pendulum speed (Fig. 2b).

Fig. 2a Received wind speed on the temperature sensor.

Fig. 2b Relationship of the radiation correction and ventilation for RS-11G
Summary

- Understanding for the RS92 and RS-11G temperature comparison -

- Consider the offset of GC25 reference temperature for detailed observation

- Consider the negative heat spike filter at 10 hPa or higher observation

- Consider the pendulum effect on solar radiation effect

- Confirm the radiation correction using a MTR with a solar radiation meter

(RS92 observation)

- Consider the offset of GC25 reference temperature for detailed observation

(RS-11G observation at the nighttime)

- Consider the negative heat spike filter at 10 hPa or higher observation

(RS-11G observation at the daytime)

- Consider the pendulum effect on solar radiation effect

(RS-11G and RS92 observation at the daytime)

- Confirm the radiation correction using a MTR with a solar radiation meter
New sounding system of JMA planning in 2018

(System update)
1. Sounding system which will install in early 2018.
2. New sounding system will be able to monitoring the all sounding sites data in JMA.
3. The TEMP and BUFR reports will be sent from New sounding system.

(Radiosonde update)
4. All Auto launch sites will be improved for using the RS41 or iMS-100 radiosonde (3 sites are RS-41, 5 sites are iMS-100).
5. All Manual launch sites will use the RS41 or iMS-100. (by competitive bidding)
6. Tateno newly use the RS41 at this time. And RS-11G and iMS-100 will continue to use.
New sounding system of JMA (Currently system)

8 Auto launch site
- Loading the radiosonde and balloon
- Auto launch
- Auto TEMP creation and Sending
- Use the RS92 (3 sites) and RS-11G (5 sites)

Command protocol for the data correction

Observation Data for monitoring (incl. correction, smoothing)
(e.g. Vaisala: 2s EDT, Meisei: 1s HRD)

8 Manual launch Site
- Own site observation
- Own site data correction
- Own site TEMP report
- Use the RS-11G

Integrated control System
- All auto launch sites monitoring
- Observation and scheduling for Auto launch sites

Protocol Switching System
- TEMP BUFR creation from A/N TEMP Message
- TEMP, TEMP BUFR, and Full BUFR reports

A/N TEMP message

JMA HQ

GTS Network

TATENO
Use the RS92 and RS-11G

Metadata RAW DATA
(e.g. DC3DB,JMAFMT) GDP(RS-11G)

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Reporting

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New sounding system of JMA (New system)

**8 Auto launch site**
- Loading the radiosonde and balloon
- Auto launch
- Auto TEMP creation and Sending
- Use the RS41 (3 sites) and iMS-100 (5 sites)

**8 Manual launch Site**
- All sites monitoring
- Own site observation
- Own site data correction
- Own site TEMP report
- Use the iMS-100

**Integrated Sounding processing system (Tentative)**
For all sites
- Data collection
- Data storage
- TEMP, TEMP BUFR, and Full BUFR creation

**Integrated control System**
- All sites monitoring
- Observation and scheduling for Auto launch sites

**Protocol Switching System**
- TEMP BUFR creation from A/N TEMP Message
- TEMP, TEMP BUFR, and Full BUFR reports

**WEB operation**
- Observation and scheduling for Auto launch sites

**Landing sites**
- 8 Auto launch site
- 8 Manual launch Site

**Metadata**
- 1-sec observation Data (e.g. EDT data)

**WEB operation**
- For all sites
- Data collection
- Data storage
- TEMP, TEMP BUFR, and Full BUFR creation

**GTS Network**

**TATENO**
Use the RS41 and RS-11G/iMS-100

**Metadata RAW DATA**
(e.g. DC3DB, JMAFMT) GDP(RS-11G)

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**Metadata**
- RAW DATA (e.g. DC3DB, JMAFMT)
- GDP(RS-11G)
Thank you!
additional Information
“OMAKE” in Japanese
Abstract

JMA has started using domestic high resolution radiosonde data (WMO FM-92) every 3 hour for the assimilation in its mesoscale numerical weather prediction (NWP) system (horizontal resolution: 5km) since 24 March 2016. Some pre-operational experiments show improvement of performance of the system, having accurate rainfall estimation on heavy rain events.

Verification

Equitable Threat Score (ETS) & Bias Score (BI)

The Equitable Threat Scores (ETSS) indicate that the quantitative precipitation forecasts of the Test run was better than those of the Control run for almost all precipitation thresholds in summer.

Rainfall Prediction

2015/08/25
Heavy rainfall event at Kinki Region

Distribution and Intensity of heavy rainfall by test run (high-reso) are more accurate to analysis.
Time-series variation (day) of Balloon burst height

Height of 00 UTC observation using 600g balloon

Period: 1 April 2015 - 31 March 2016

- Highest height: 5.6 hPa
- 25th percentile: 7.4 hPa
- Median height: 8.4 hPa
- 75th percentile: 10.3 hPa
- Lowest height: 72 hPa

(30km)
Outlines at Tateno activities in 2015-2016

(For data comparison)

-MTR (with RS-11G)
  Purpose: Study for the Balloon’s slipstream
  Launch date: 06 UTC on 28 October 2015  Obs. Height: 34385 m (6.3hPa)
  Plans in this year: 2 times launch
    (For the verification of RS-11G solar radiation correction)

-CFH: (with RS-11G)
  Purpose: Comparison with the RS-11G humidity
  Launch date: 06 UTC on 17 November 2015  Obs. Height: 4049 m (623.6hPa)
  Launch date: 06 UTC on 18 April 2016  Obs. Height: 23.0 km (34.1hPa)
  Plans in this year: 2 – 8 times launch (confirmation of RS-11G in various situations)

-RS92 and RS-11G Consolidated launch
  Purpose: Confirming a performance of both radiosonde observations
  Launch date: 00UTC, 12UTC observations on Monday
    (25 observations were carried out from April 2015 to February 2016)
  Plans in this year: Continuation (change to every Friday launch from this April)
New sounding system of JMA (JMA planning)

Integrated Sounding processing system (Tentative)

**Advantage**
(For data quality)
- Possible to data comparison of each site in real time

(For data management)
- Possible to concentrative data quality management

(For system management)
- Possible to early improvement to the system setting
  (e.g. screen settings, output format change, etc.)
+ because this system does not depend on the radiosonde manufacturer

**Disadvantage**
- ?