

Site report : Tateno (Japan)

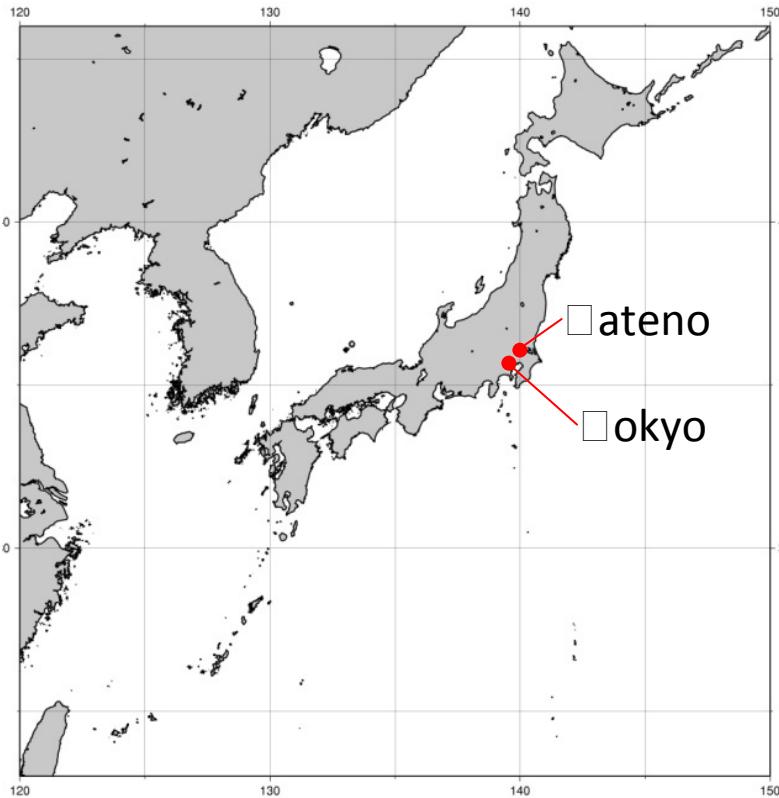
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Japan Meteorological Agency (JMA)

(GRUAN ICM-5, February 2013)



Tateno site

Observations with operational basis are performed



Recent activity of Tateno/JMA for GRUAN

Dec. 2009 □ Oct. 2010 : Inter-comparison between RS2-91 and RS92-SGP
with double launching carried out 120 times

Mar. 2011 : The results were reported at ICM-3

Jun 2011 : Provide the inter- comparison data to GRUANs Lead Centre

Jun 2011 : Begin quasi-real-time report of routine upper-air observation data and radiosonde launch metadata to GRUAN Lead Center by using the RsLaunchClient

Jan. 2012 : Tateno's RsLaunchClient application was upgraded to Ver. 0.4

Mar.2012 : 4th GRUAN Implementation-Coordination Meeting (ICM-4)
was held at Tokyo/JAPAN

Now GRUAN Task Team Member form JMA

Task Team: Radiosondes Nobuhiko Kizu

Task Team: GNSS-PW Yoshinori Shoji

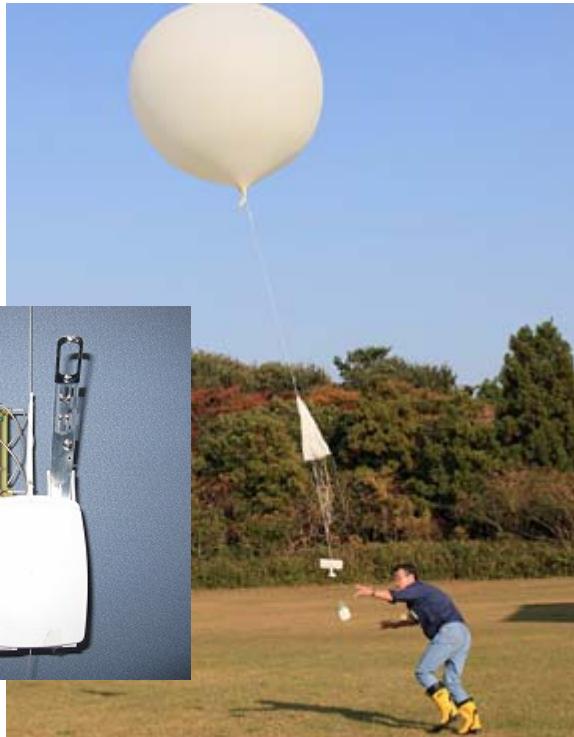
Task Team: Site Representation Toru Ueda □changed from Yokota at April 2012)



Observation related GRUAN at Tateno

1. Upper-air Observation

- ✓ Using Vaisala RS92-SGPJ-type GPS radiosondes since Dec.2009.
- ✓ Twice a day (00,12UTC)



- ✓ ECC-type ozonesonde since Dec.2009
- ✓ Every Wednesday



GRUAN



Observation related GRUAN at Tateno

2. GPS Precipitable Water Vapor (GPS-PWV) Observation

- ✓ Reciver:Trimble NetR8 GNSS reference type
- ✓ Antenna : TRM559800.00 type.



3. Ozone Observation

- ✓ using a Dobson ozone spectrophotometer.



Dobson ozone spectrophotometer

These Ozone data including ozonesonde data are sent to WOUDC(The World Ozone and Ultraviolet Radiation Data Centre)

Observation related GRUAN at Tateno

4. Radiation Observation (BSRN station)

Global solar radiation, direct solar radiation, diffuse solar radiation, reflected solar radiation, downward long-wave radiation and upward long-wave radiation are observed.

Radiometry Observation



Broadband UV Radiometer



Pyranometer



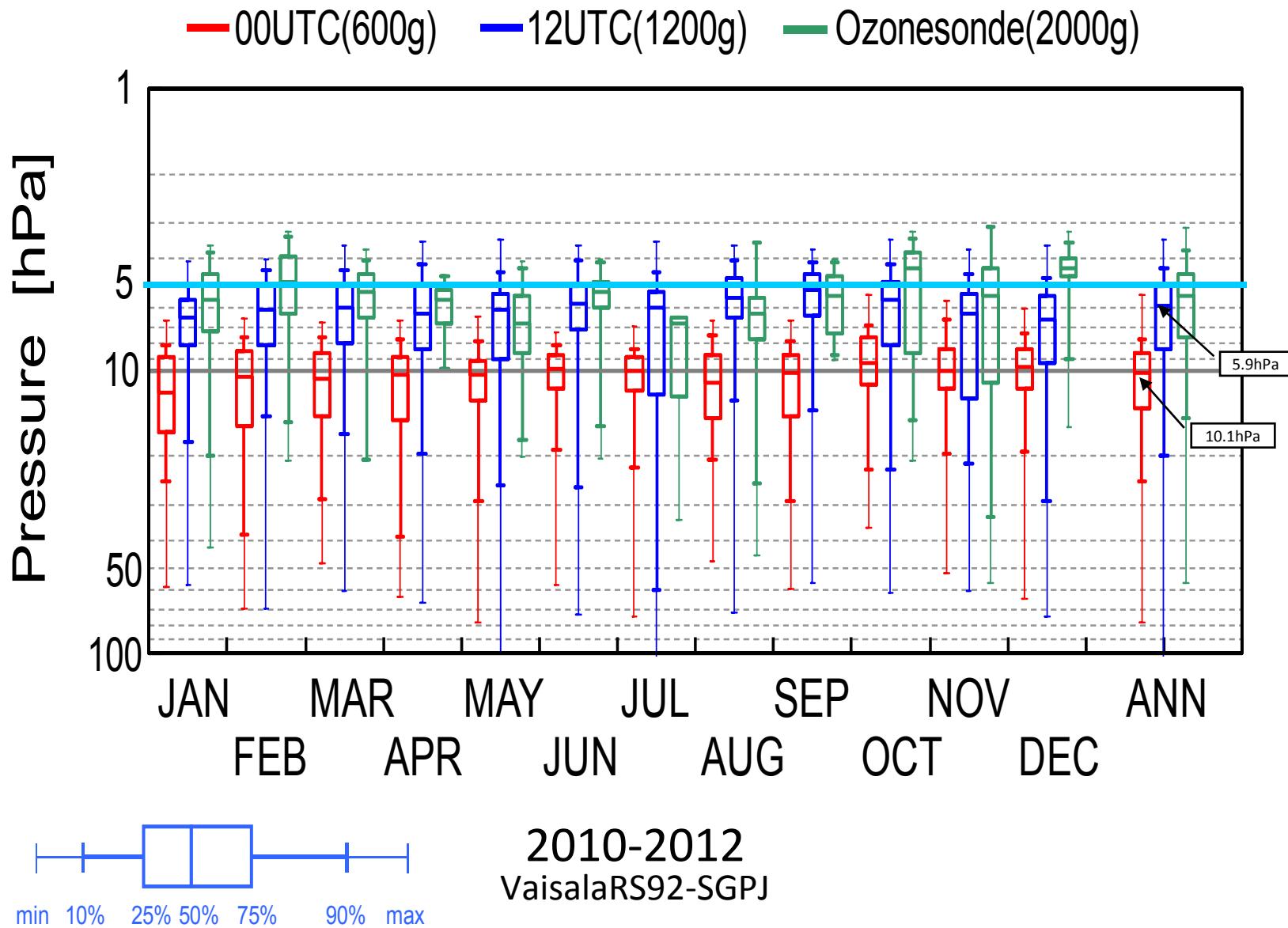
Pyrgeometer



Pyrheliometer



Sunphotometer



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Comparison of Meisei RS2-91 Rawinsondes and Vaisala RS92-SGP Radiosondes at Tateno for the Data Continuity for Climatic Data Analysis

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Sensitivity analysis for the number of dual soundings

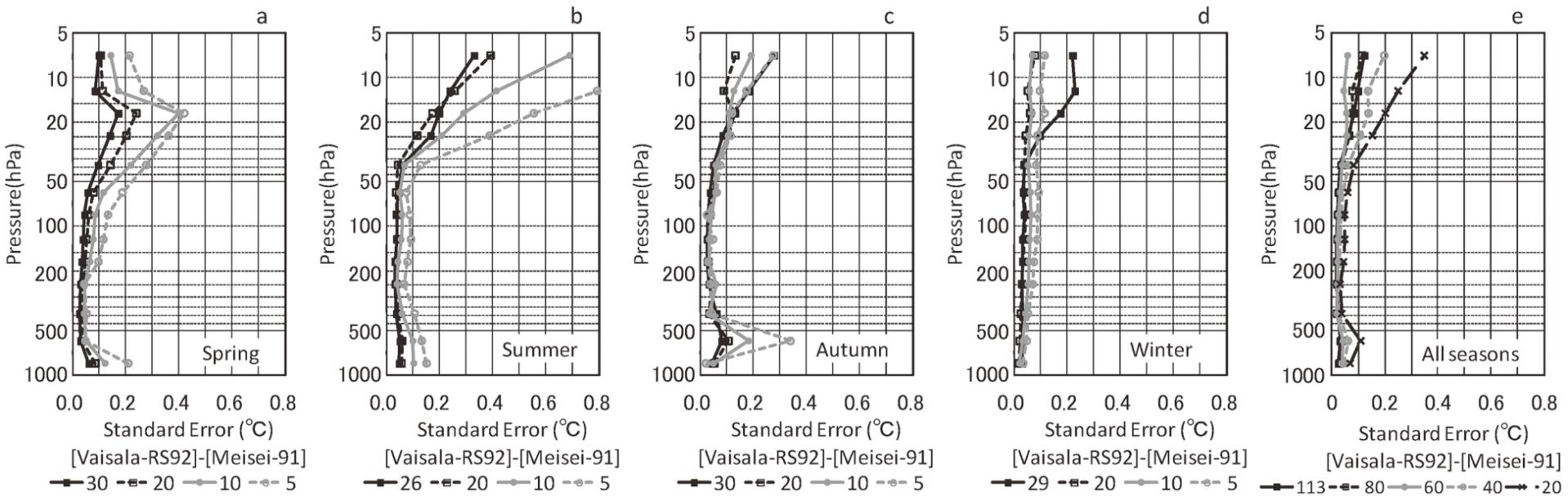


Fig1. Standard errors of the mean differences (Vaisala-RS92 minus Meisei-91) in temperature as a function of pressure for each season (a-d) and for all seasons (e). Each line shows the case of 30,20,10 and 5 sounding samples for each season and 113,80,60,40 and 20 sounding samples for all seasons.

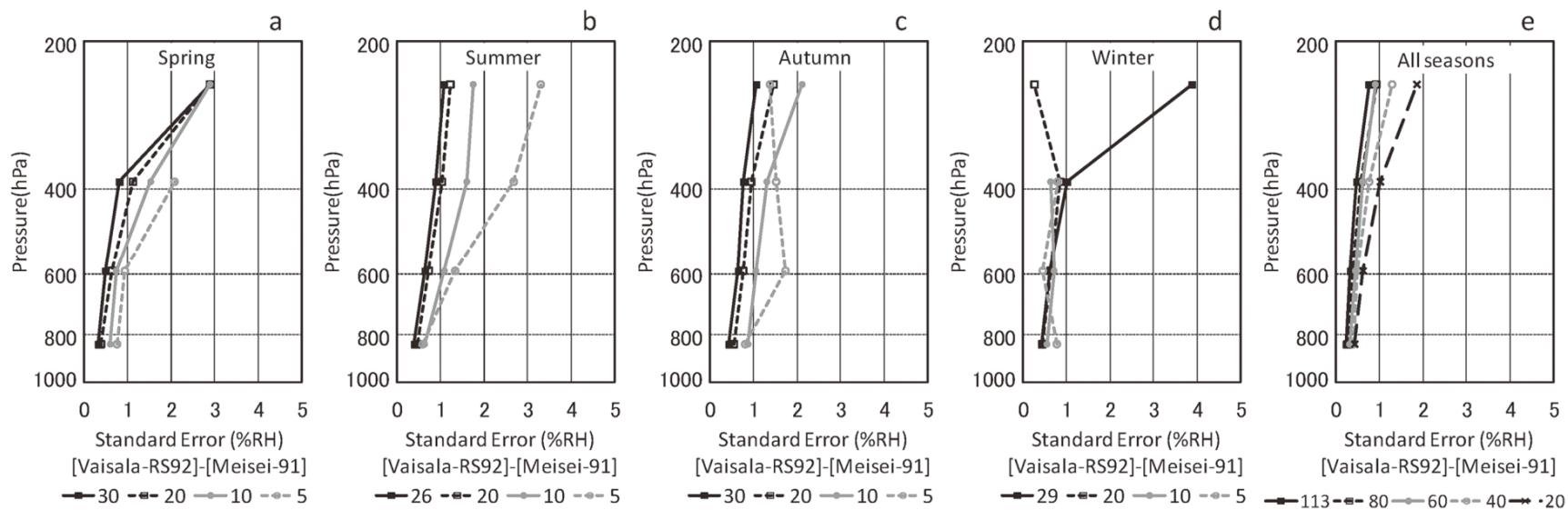


Fig2. As for Figure 1 but for relative humidity.

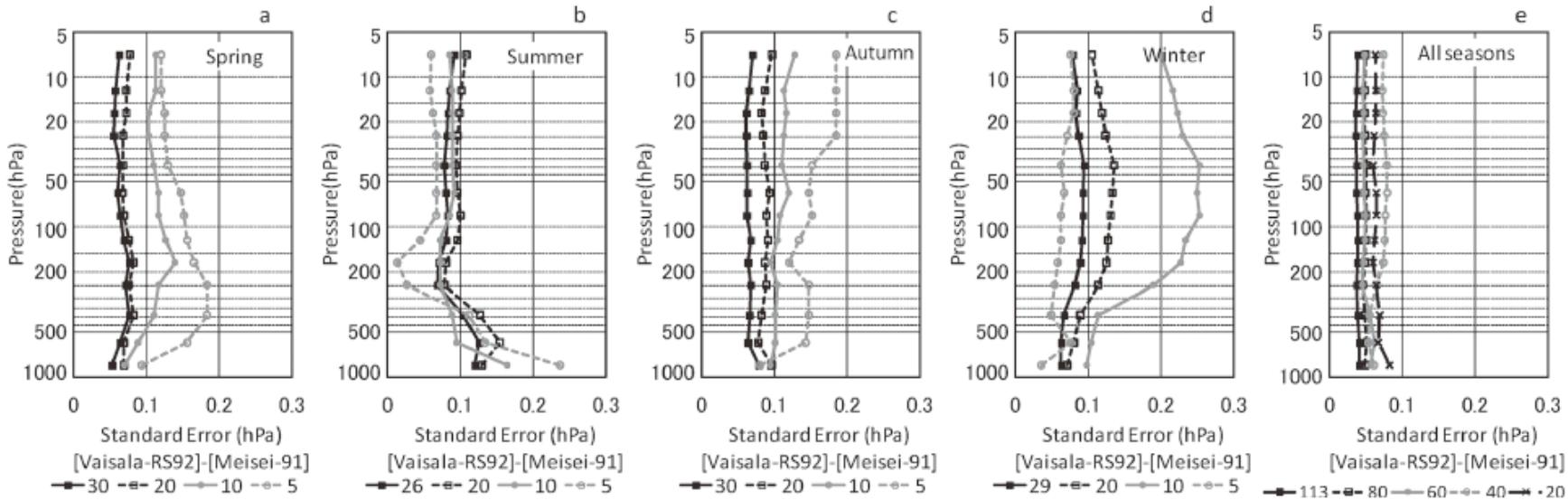


Fig3. As for Figure 1 but for pressure.

Thank you



Appendix D: The method of simultaneous sensor comparison

We defined T_i^V and T_i^M as measurement values from the Vaisala-RS92 and Meisei-91, respectively, at the 4 seconds time step i . These data were sorted into 13 pressure layers based on the pressure data P_i^M from the Meisei-91, that is, 1000–700, 700–500, 500–300, 300–200, 200–150, 150–100, 100–70, 70–50, 50–30, 30–20, 20–15, 15–10 and 10–5 hPa.

The mean of each element (\bar{T}^V , \bar{T}^M) and the mean of the difference ($\bar{\Delta T}$) were calculated by the following equations for each pressure layer. The difference is defined as Vaisala-RS92 data minus Meisei-91 data, or $\Delta T_i = T_i^V - T_i^M$.

The mean for each pressure layer is

$$\bar{T}^V = \frac{\sum_{i=i_s}^{i_e} T_i^V}{i_e - i_s + 1}, \quad \bar{T}^M = \frac{\sum_{i=i_s}^{i_e} T_i^M}{i_e - i_s + 1} \quad (D1)$$

and the mean difference for each pressure layer is

$$\bar{\Delta T} = \frac{\sum_{i=i_s}^{i_e} \Delta T_i}{i_e - i_s + 1} \quad (D2)$$

where i_s and i_e are the observation counts of the first and last data points, respectively, when P_i^M is in that pressure layer.

Statistics for each pressure layer were calculated for every observation time and season, being based on the N soundings made in the order $K = 1, 2, \dots, N$.

The ensemble mean for each pressure layer is

$$\bar{T}^V = \frac{\sum_{K=1}^N \bar{T}_K^V}{N}, \quad \bar{T}^M = \frac{\sum_{K=1}^N \bar{T}_K^M}{N} \quad (D3)$$

The ensemble mean difference for each pressure layer is

$$\bar{\Delta T} = \frac{\sum_{K=1}^N \bar{\Delta T}_K}{N} \quad (D4)$$

The standard deviation of ensemble mean difference for each pressure layer is

$$\sigma(\bar{\Delta T}) = \sqrt{\frac{\sum_{K=1}^N (\bar{\Delta T}_K - \bar{\Delta T})^2}{N}} \quad (D5)$$