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Working together for clean air

Meteorological Measurements To Meet Air Quality Program Needs

MTP 5-HE Vertical Temperature Measurements

MTP 5-HE
Harsh, Extended range

- Height range up to 1,000 m
- Height resolution varies from 50 m to 120 m
- Frequency 56.7 GHz, 3º view, narrower bandwidth, Single Side-Band (SSB)
- Improved specification of radiometer to maintain signal to noise performance
- Mist, cloud and heavy rain slightly degrades accuracy of temperature measurement

It's a Different World

- **Filters, Filters, Filters**
  - **Air Quality <u>Past</u>**
- **Ozone and AQI**
  - **Timely reporting to the Public**
  - **Action calls**
- **PM 2.5 changed air program needs**
  - **Forecasts**
  - **Curtailment calls**
  - **Momentum is building**

Meteorological Measurements

- **Largely ignored by the air quality community**
- **Cost issues**
- **Old paradigms**
  - **Climatology for modeling**

- **Future networks must change!**
  - **Lower NAAQS**
  - **Higher enforcement expectation**
  - **NAAQS determinations and strategy development**

NWAIRQUEST- Role

- **Develop technical recommendations to Air Directors**
- **Develop budget requests to address the shortfalls**
- **Provided leadership via NACAA & WESTAR to influence EPA**
  - **NCORE sites**
  - **PAMS Funds**
  - **PM2.5**

PSCAA RASS and RWP system

- **Installed in 1994**
- **Several upgrades and repairs**
- **Recently completed major upgrade and grooming**
  - **$130K**
  - **Extends life ~ 5-8 years**
- **Need new technology to meet future needs.**

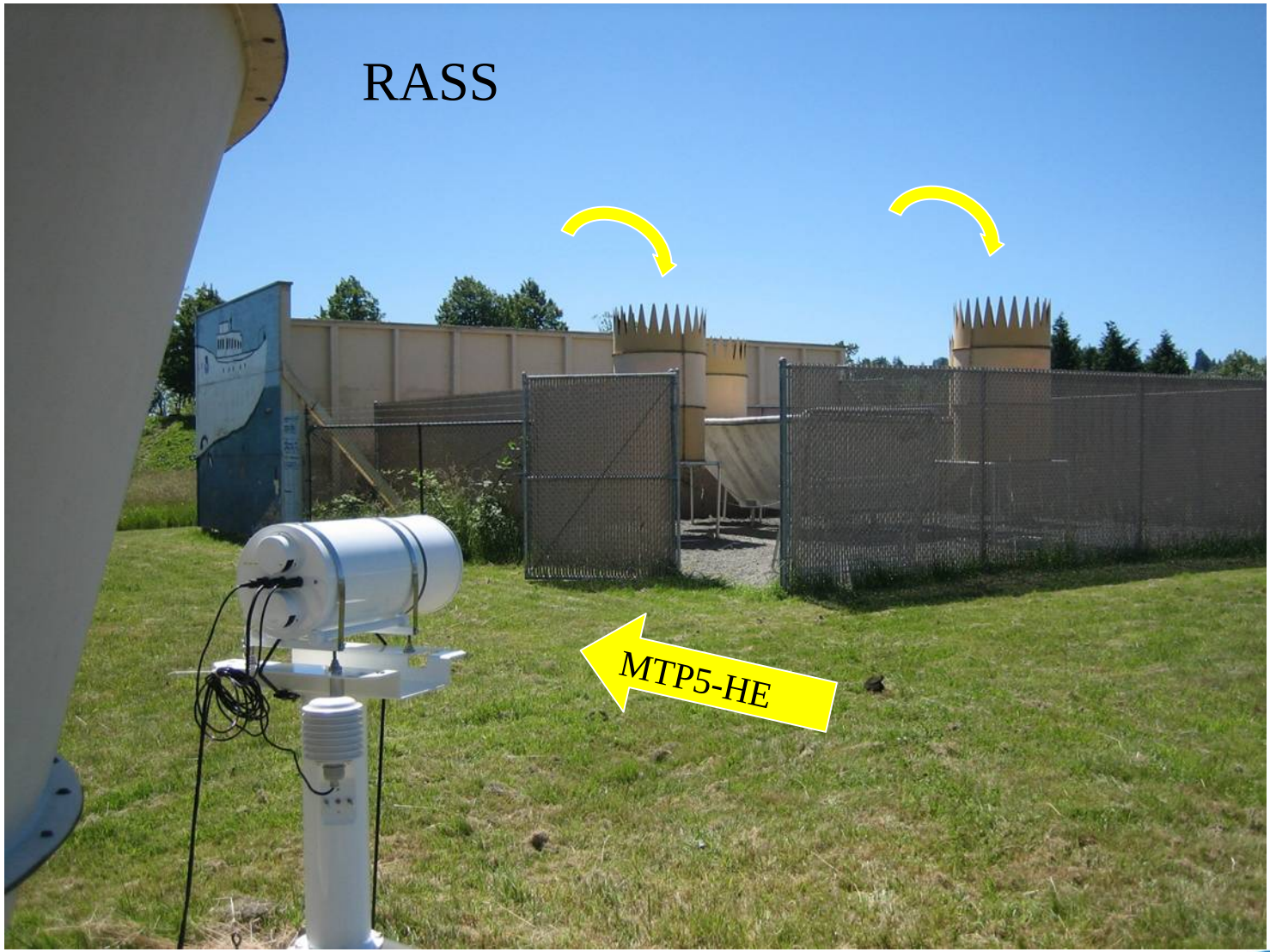
New Tools

- **Demonstration tests MTP5HE**
  - **Compared to Vaisala Profiler**
  - **Hanford Met Tower**
- **Result were favorable**
- **Procured two systems**
  - **~$130 each**

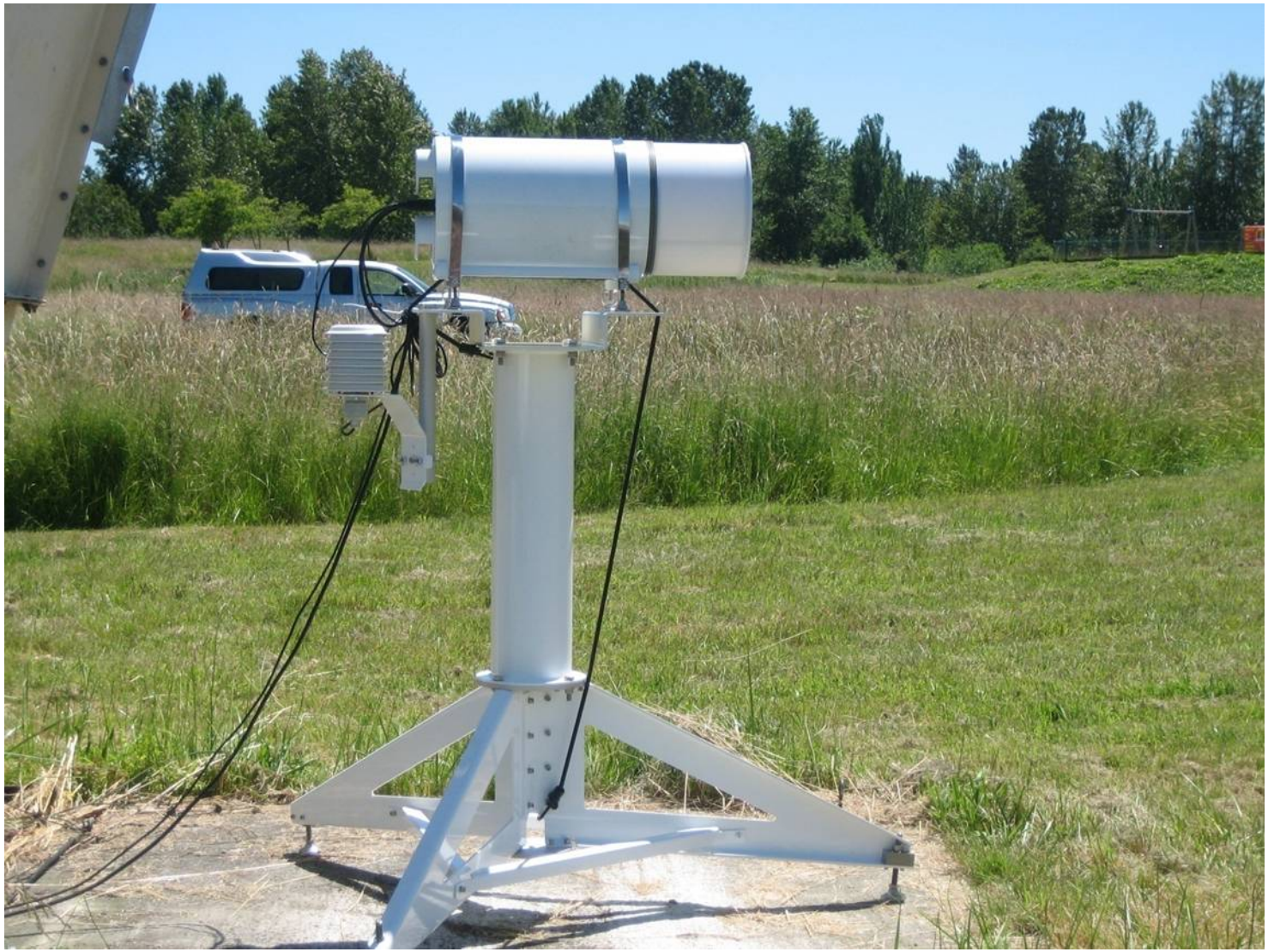
Acceptance Test

- **Received MTP5-HE's –June 08**
- **Performed inventory and shop tests**
- **Installed devices at NOAA Campus collocated with Vaisala LAP XM-3000**

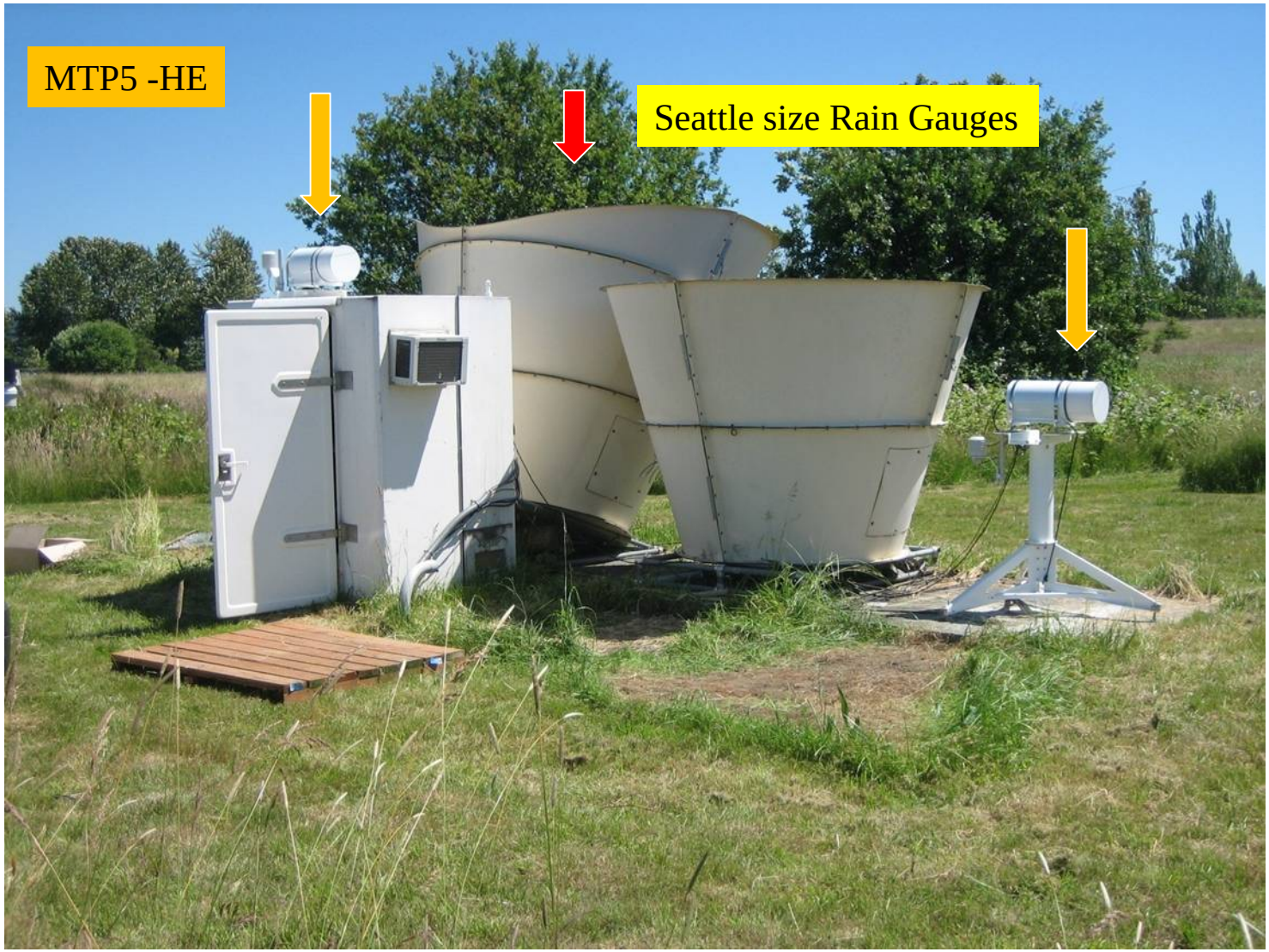
Technology Comparison



MTP5-HE on Pedestal



Site Installation

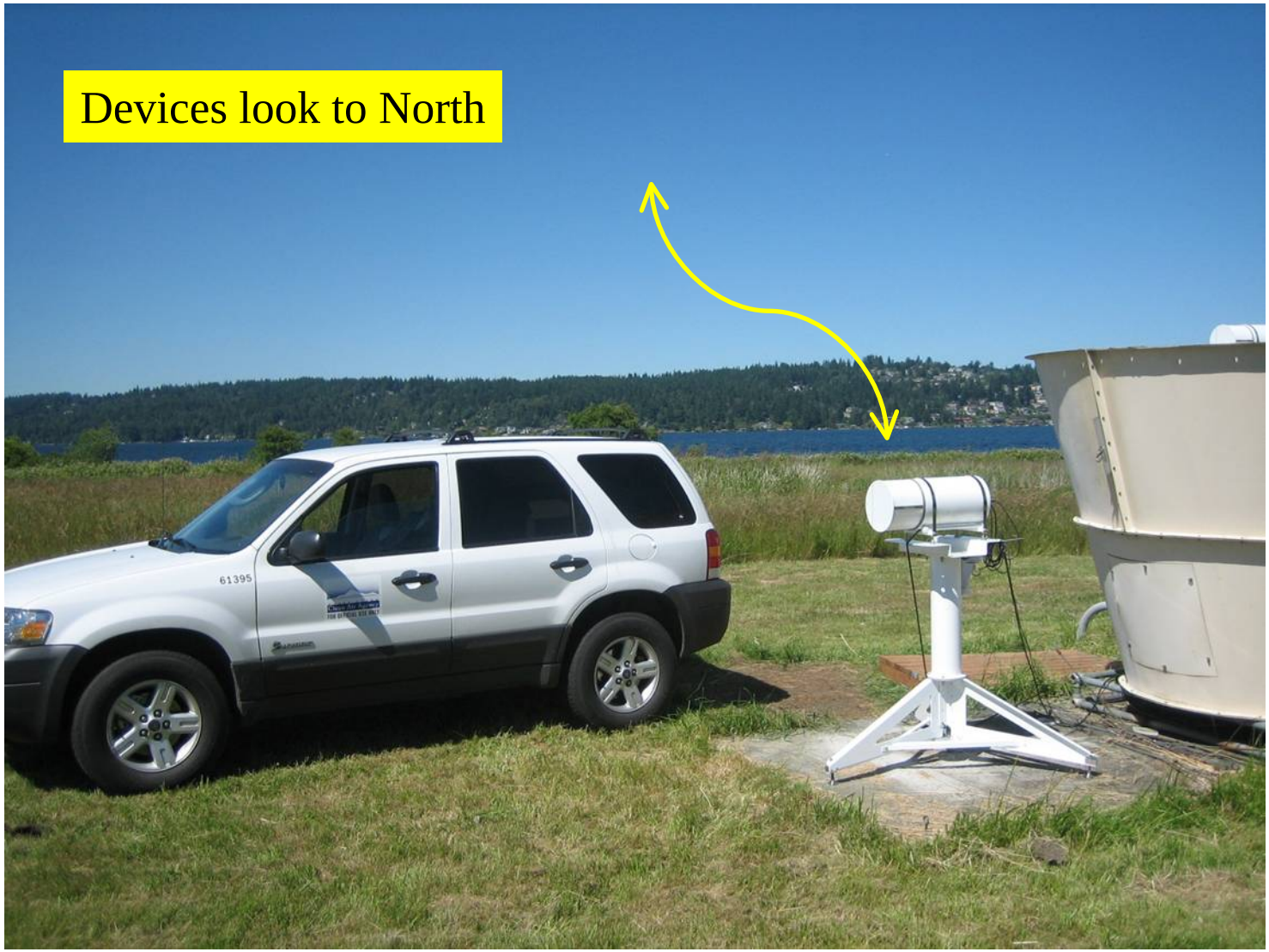


MTP5-HE

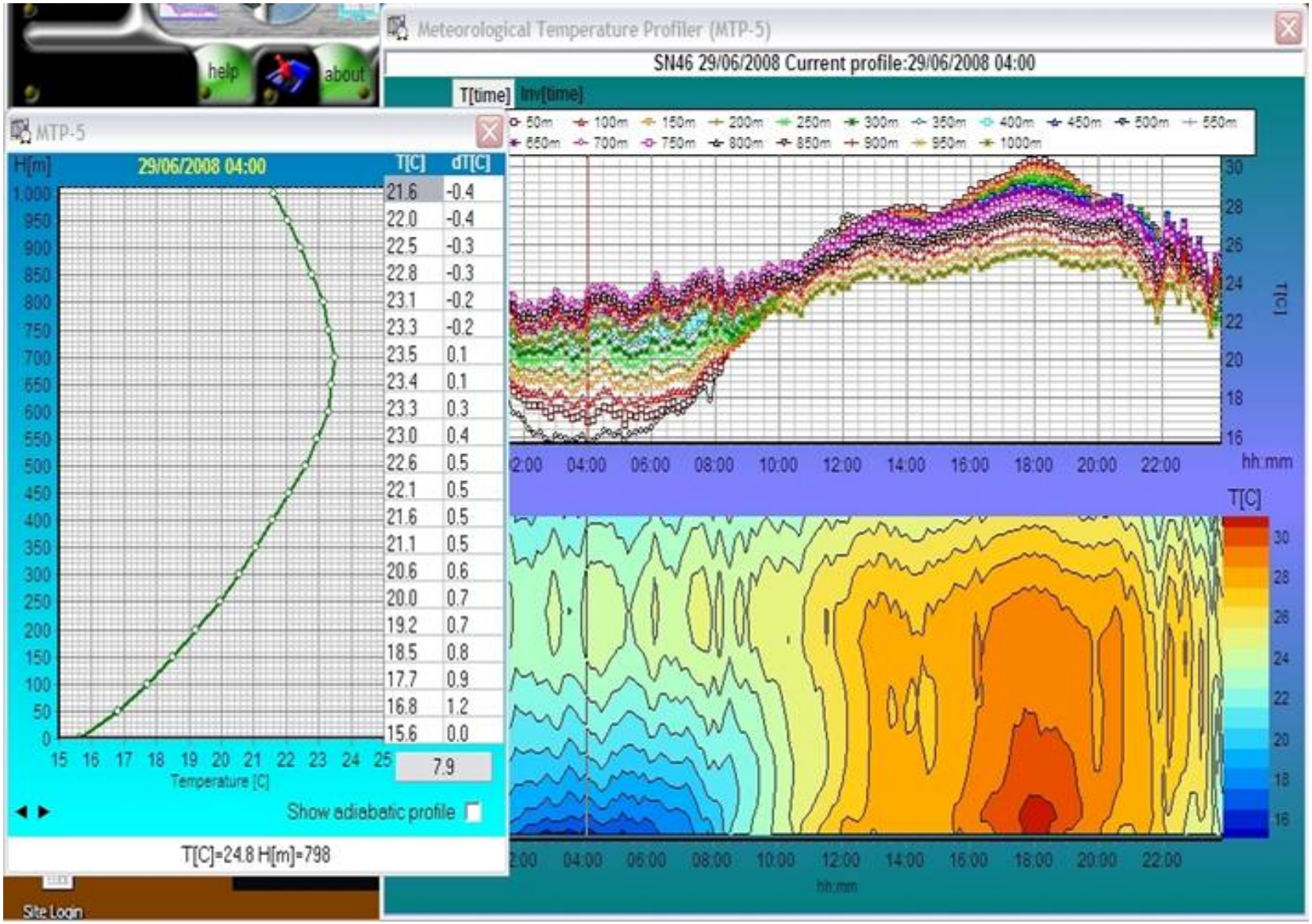
Roof Mount

Thermistor

Site view

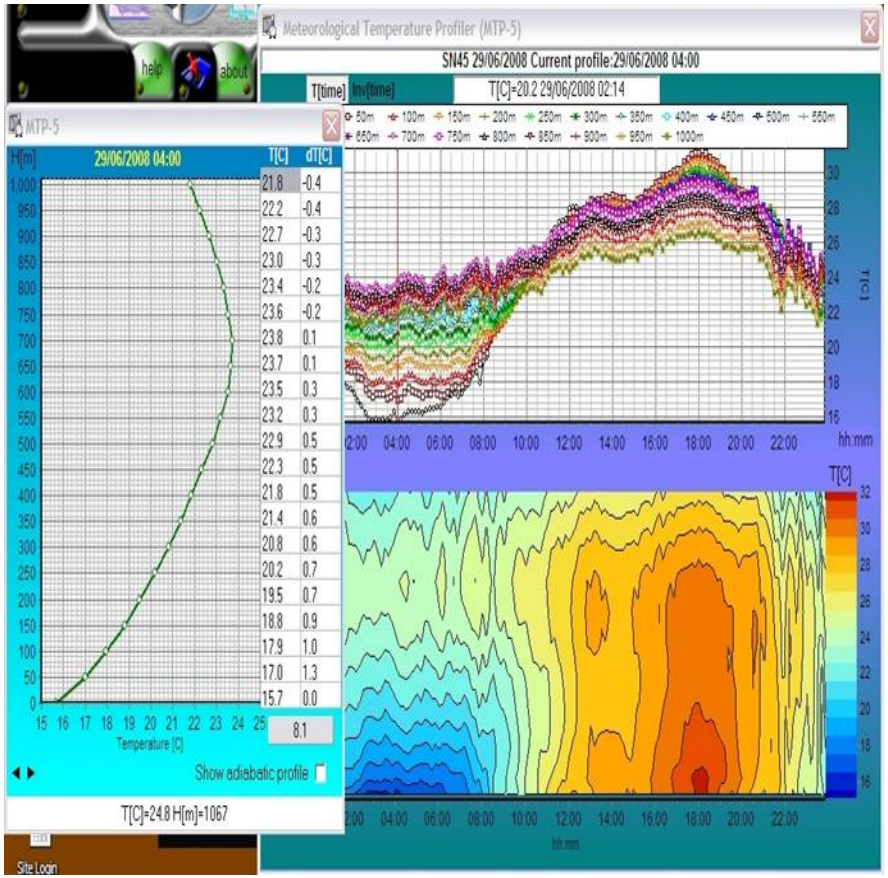


MTPNEWS.exe Display



MTP5-HE Collocation-29June 2008

SN# 0045 @ 0400/12UTC



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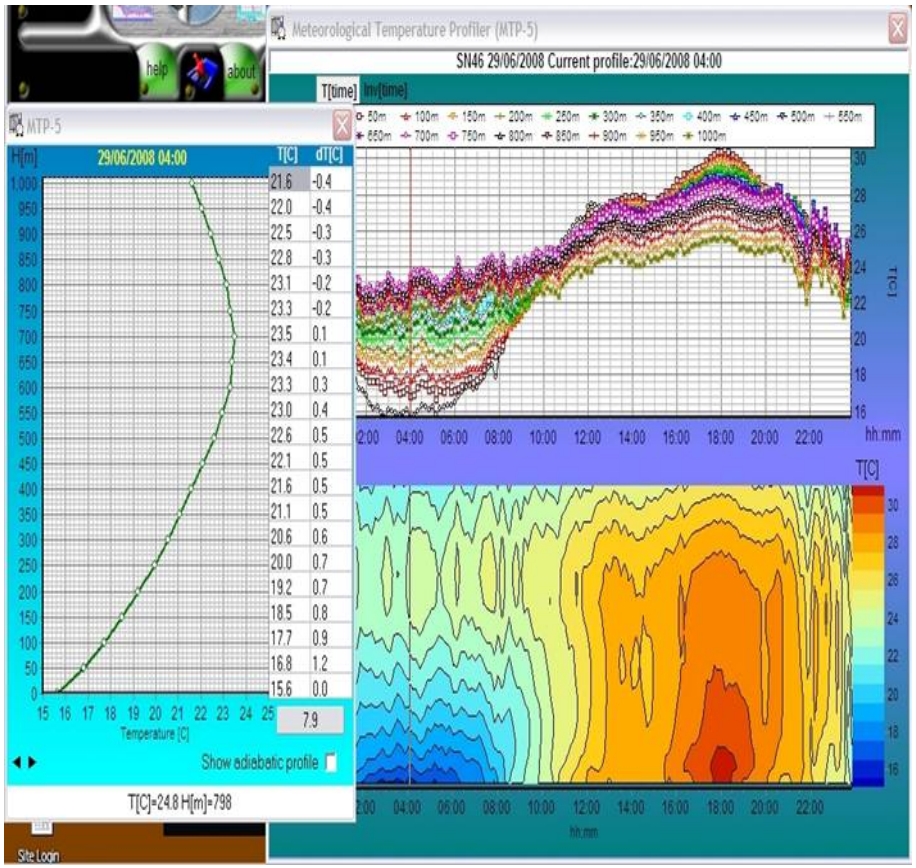
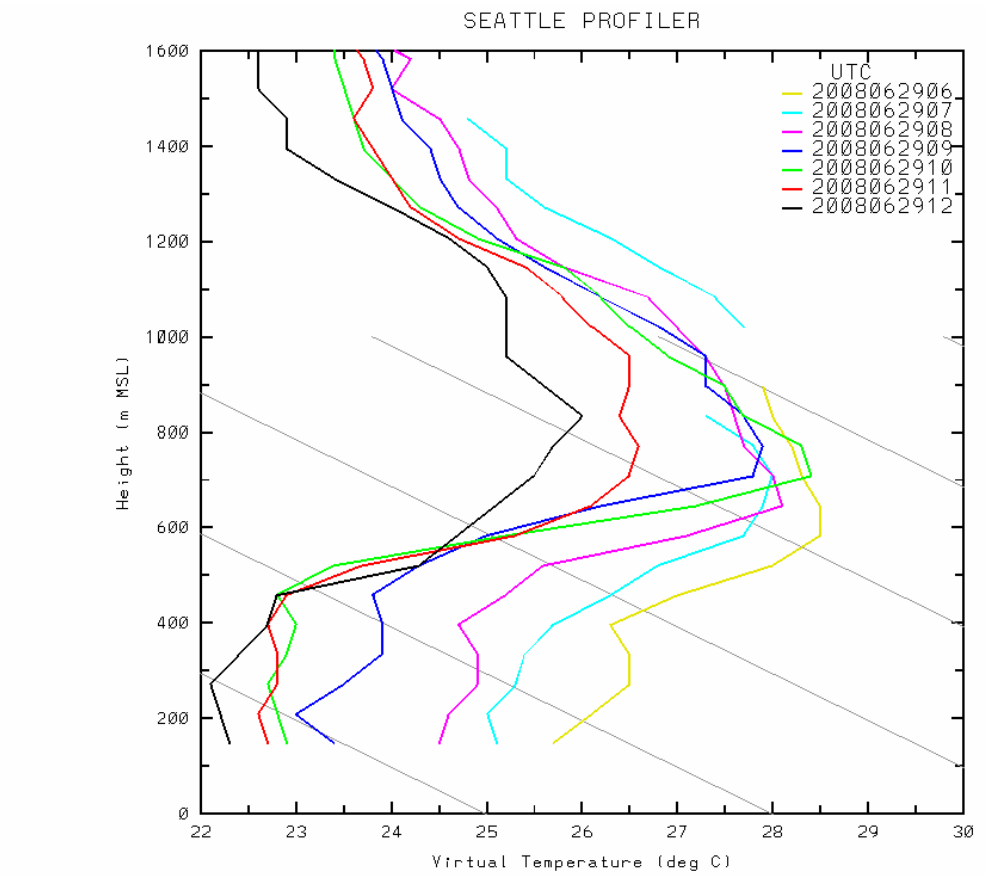


Vaisala Lap
XM-3000
29 June 2008



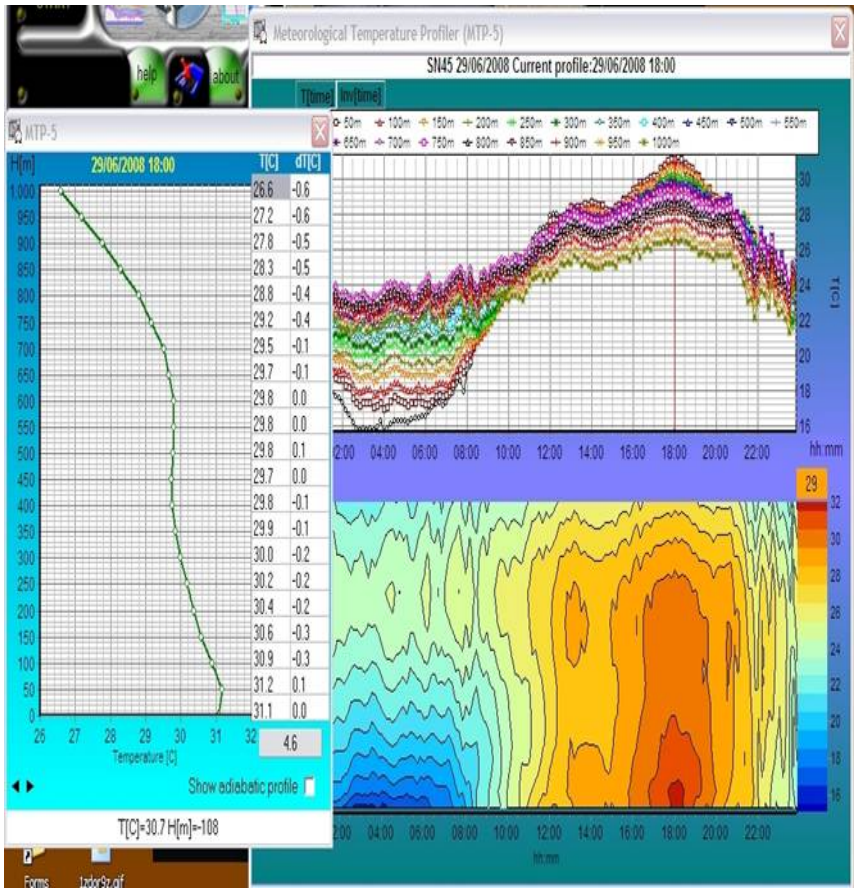
Collocated RASS Data

- **Virtual Temp**
  - **~1.5-2 deg C Warmer**

- **Coarse resolution**
- **Lower 150 m missing**
- **Vertical structure appears correct**

MTP5-HE Collocation-29June 2008

SN # 0045 @ 1800/02UTC



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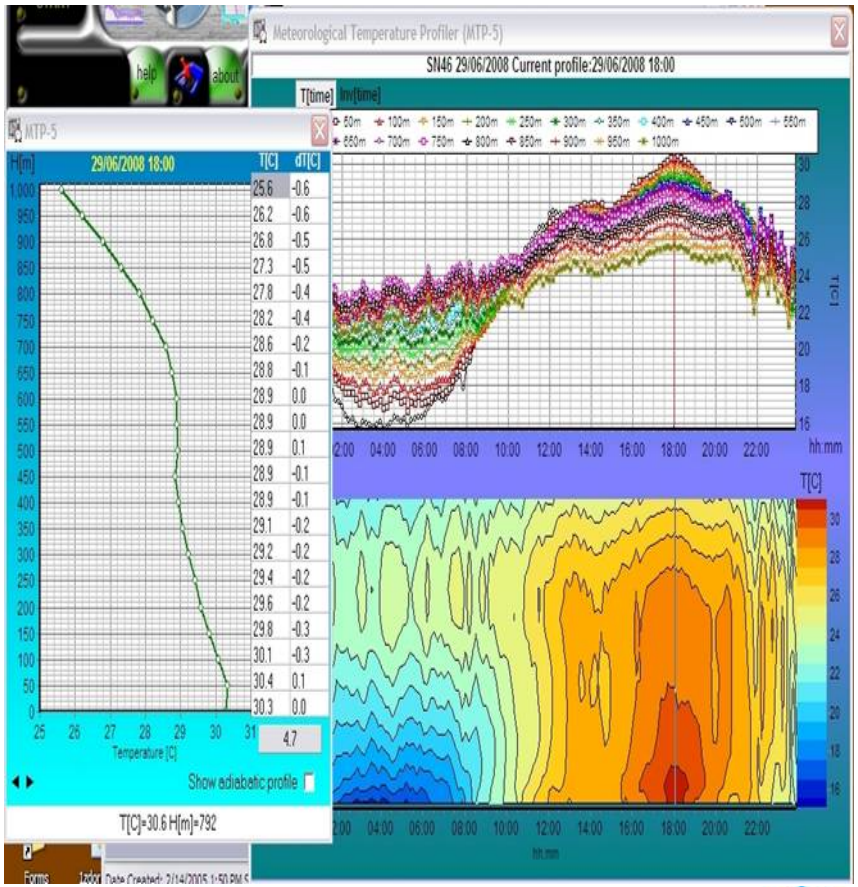
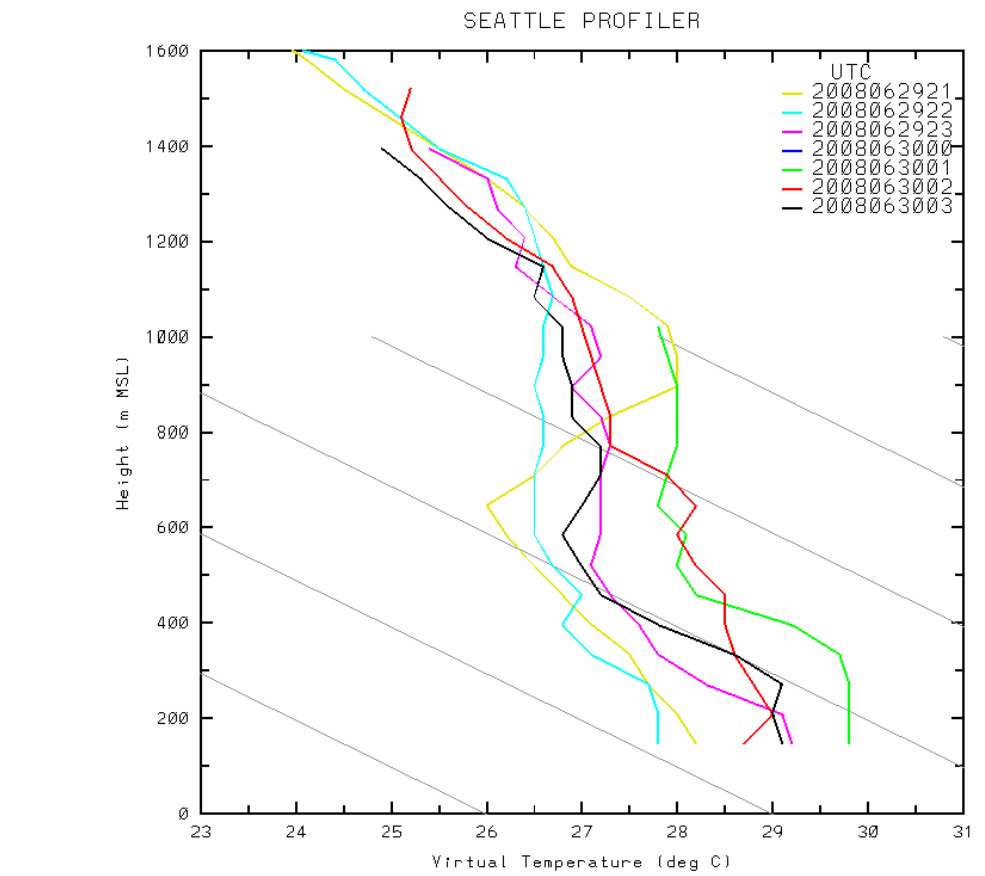


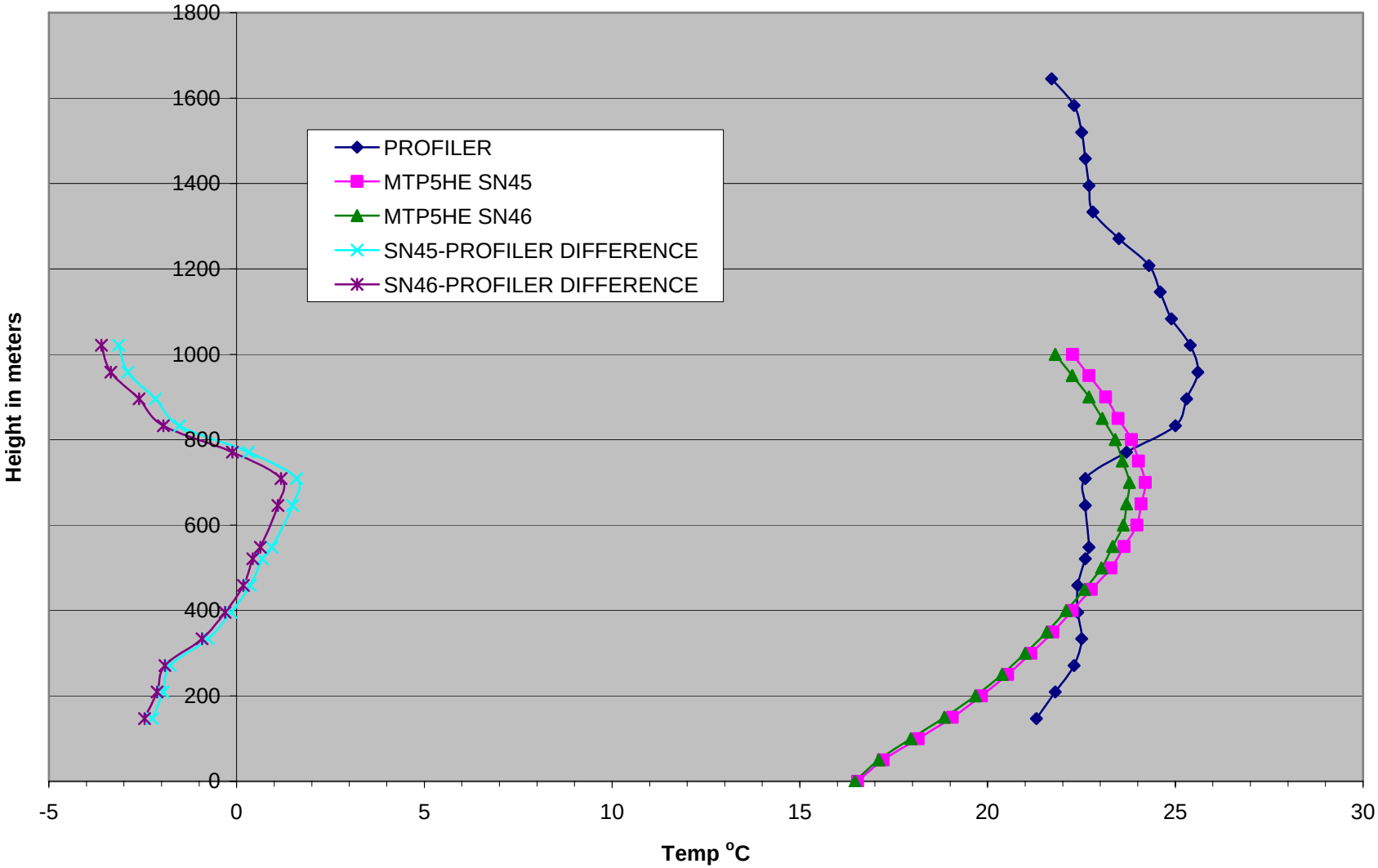
Vaisala Lap
XM-3000
30 June 2008



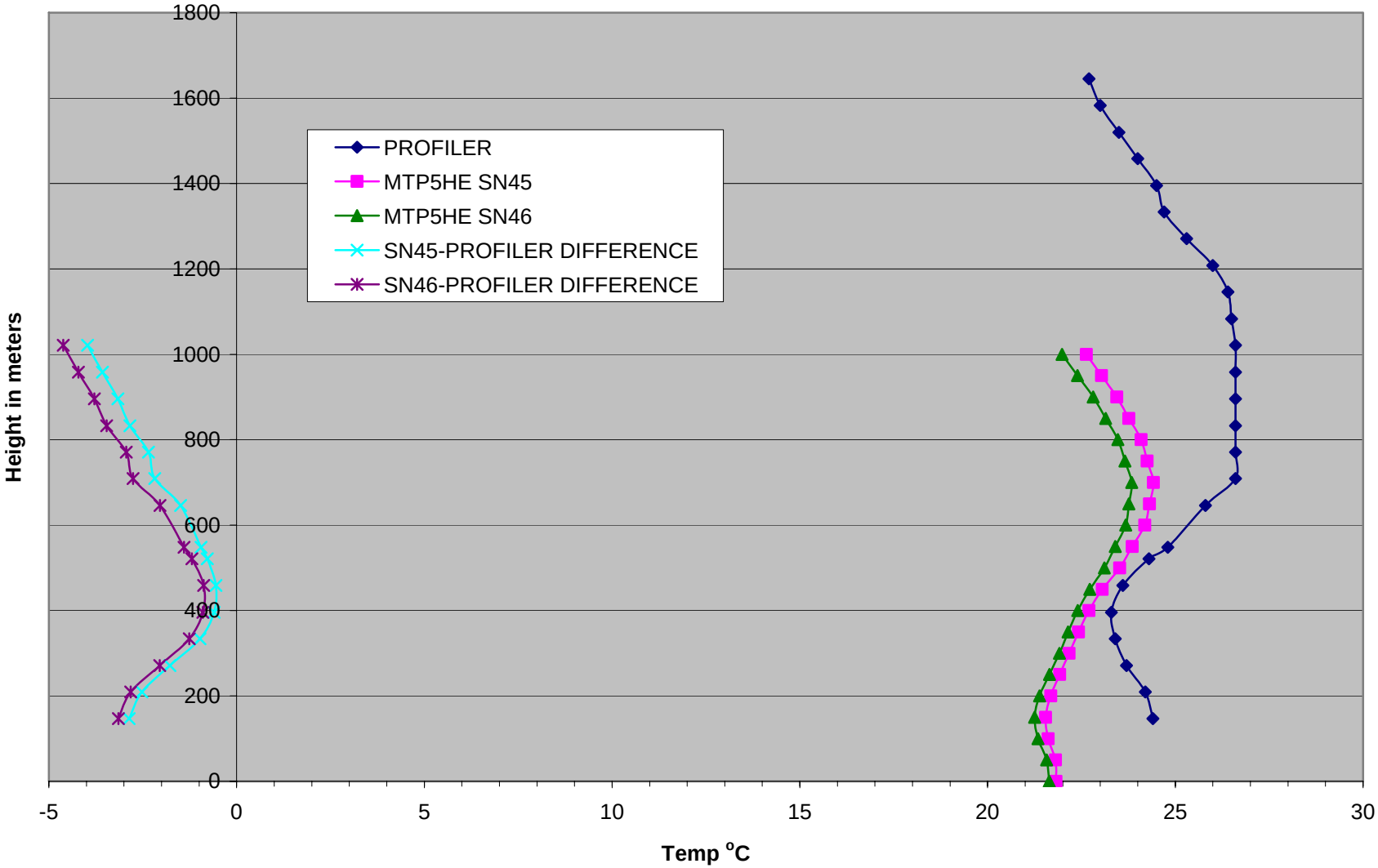
Collocated RASS Data

- Coarse resolution
- Lower 150 m missing
- Vertical structure appears correct

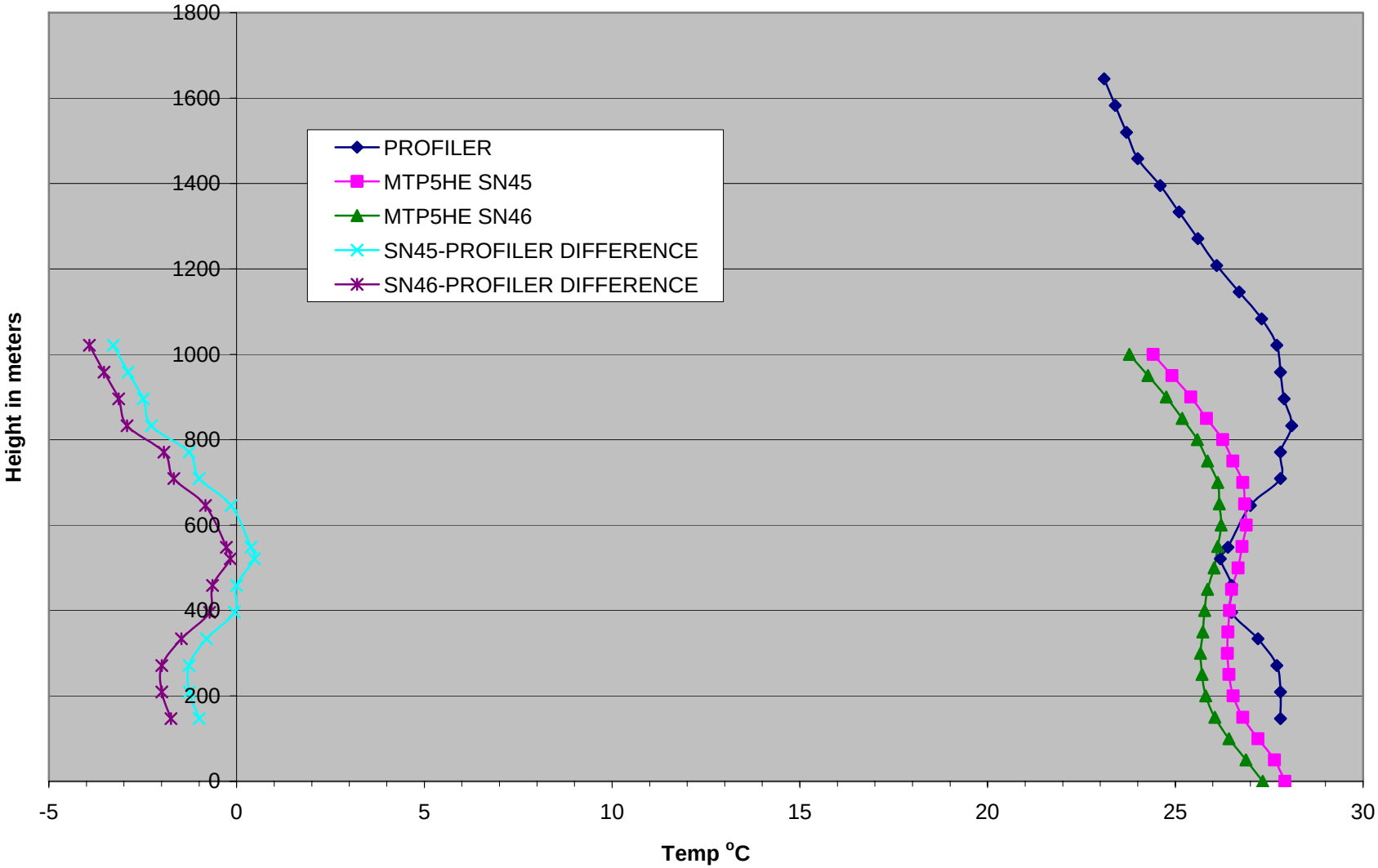
Temperature Profile on June 29, 2008 at 0600PST



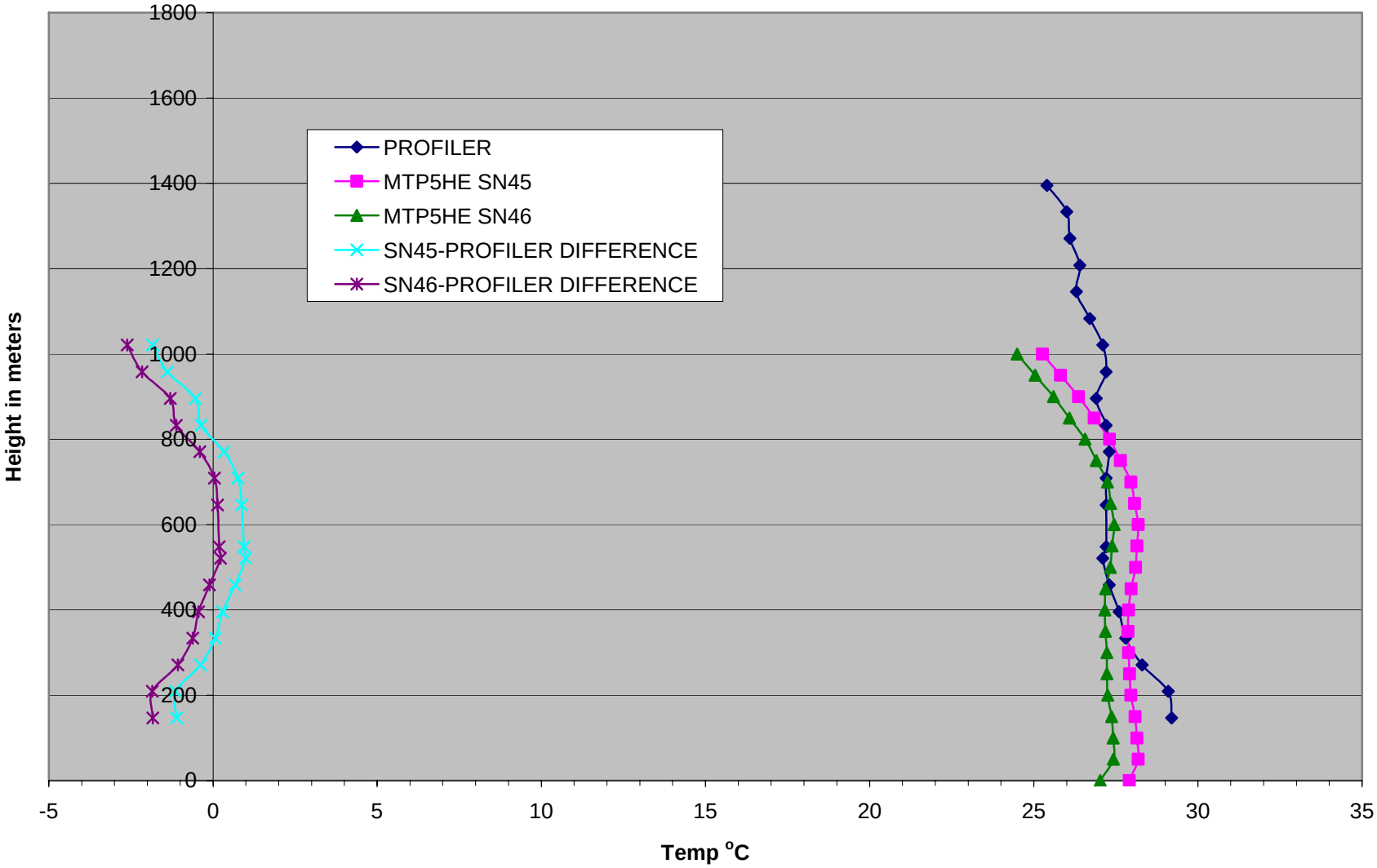
Temperature Profile on June 29, 2008 at 0900PST



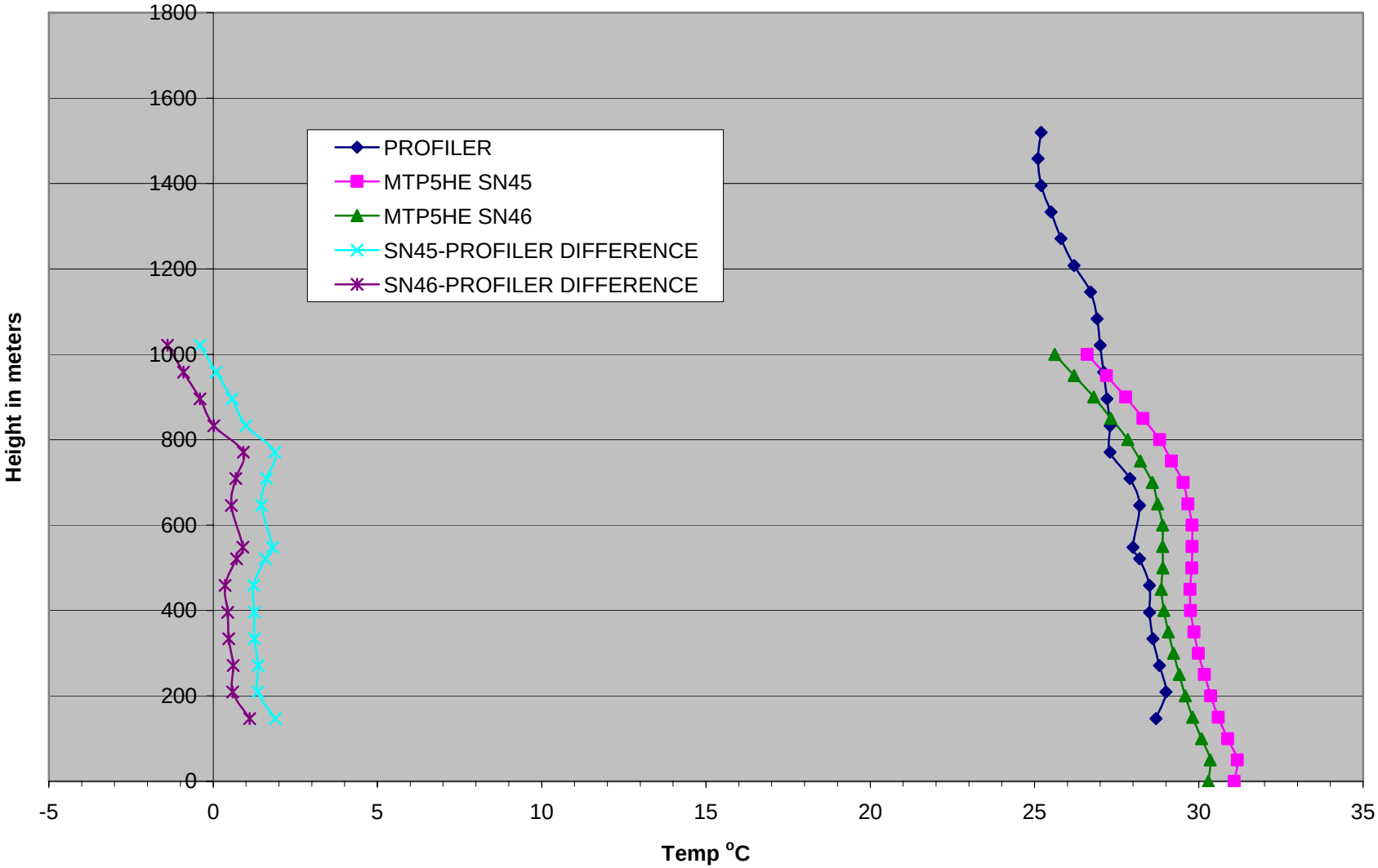
Temperature Profile on June 29, 2008 at 1200PST



Temperature Profile on June 29, 2008 at 1500PST



Temperature Profile on June 29, 2008 at 1800PST



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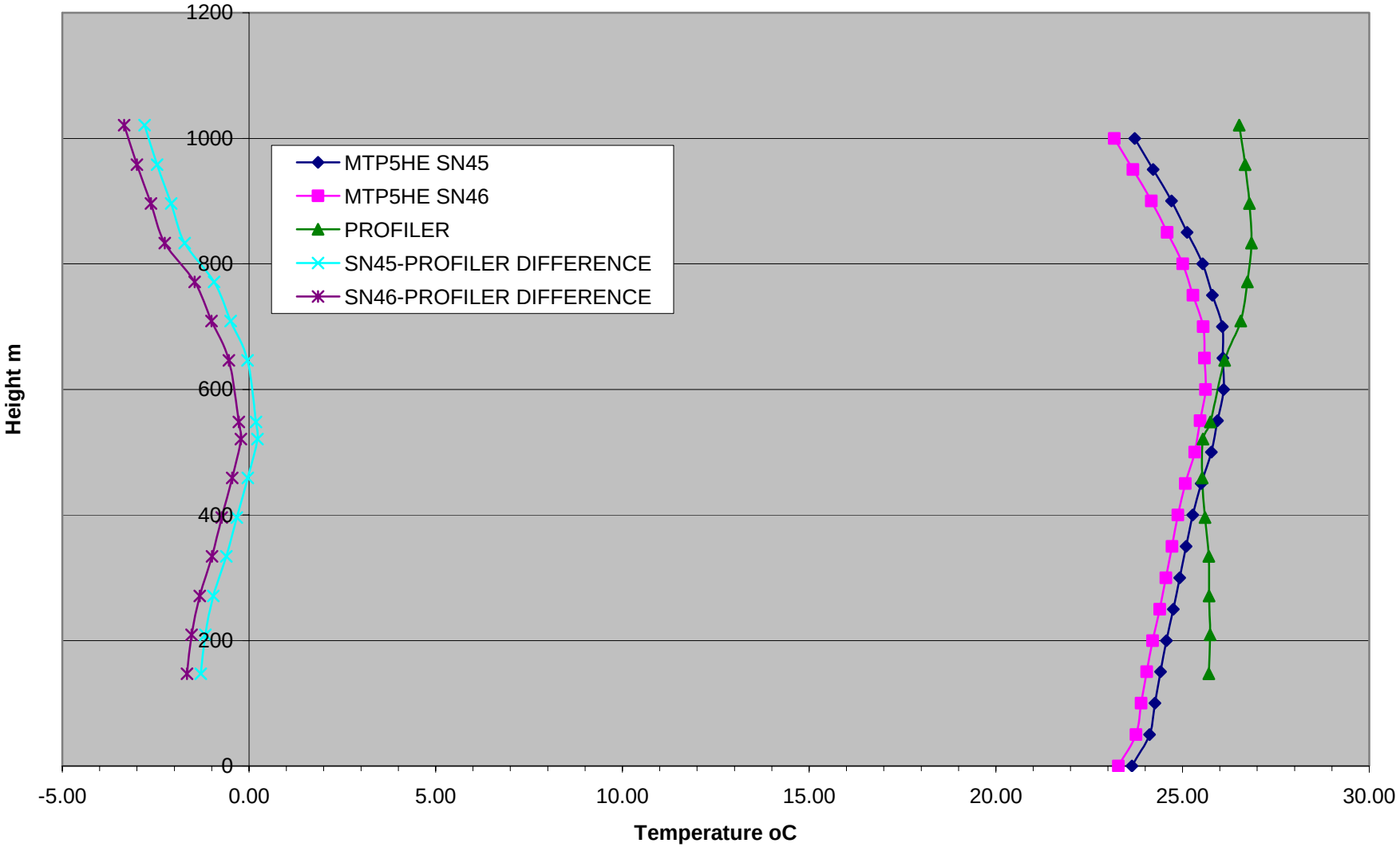
Temperature Profile Averaged for A Day on June 29, 2008



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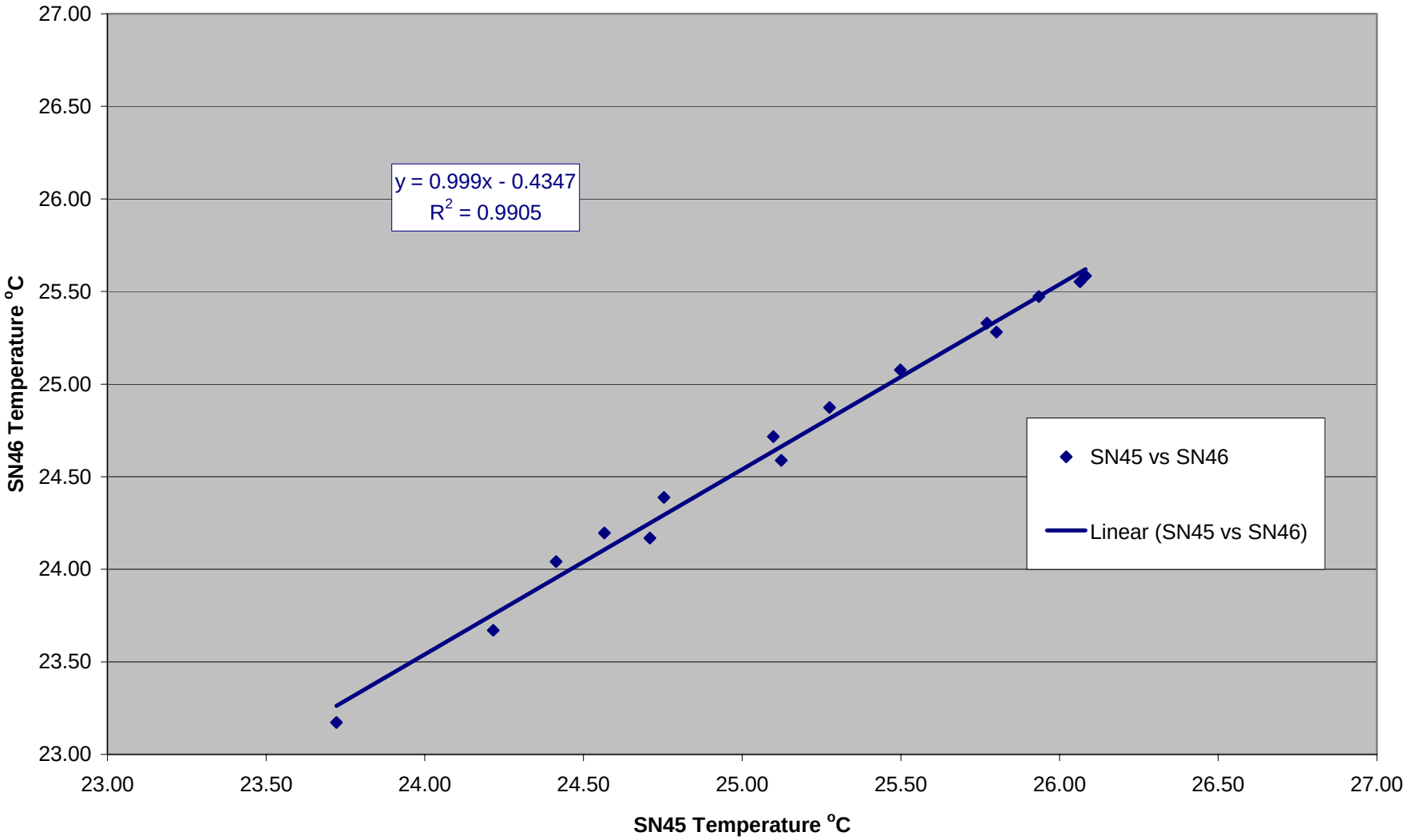
SN45 vs SN46 Averaged on 06/29/08



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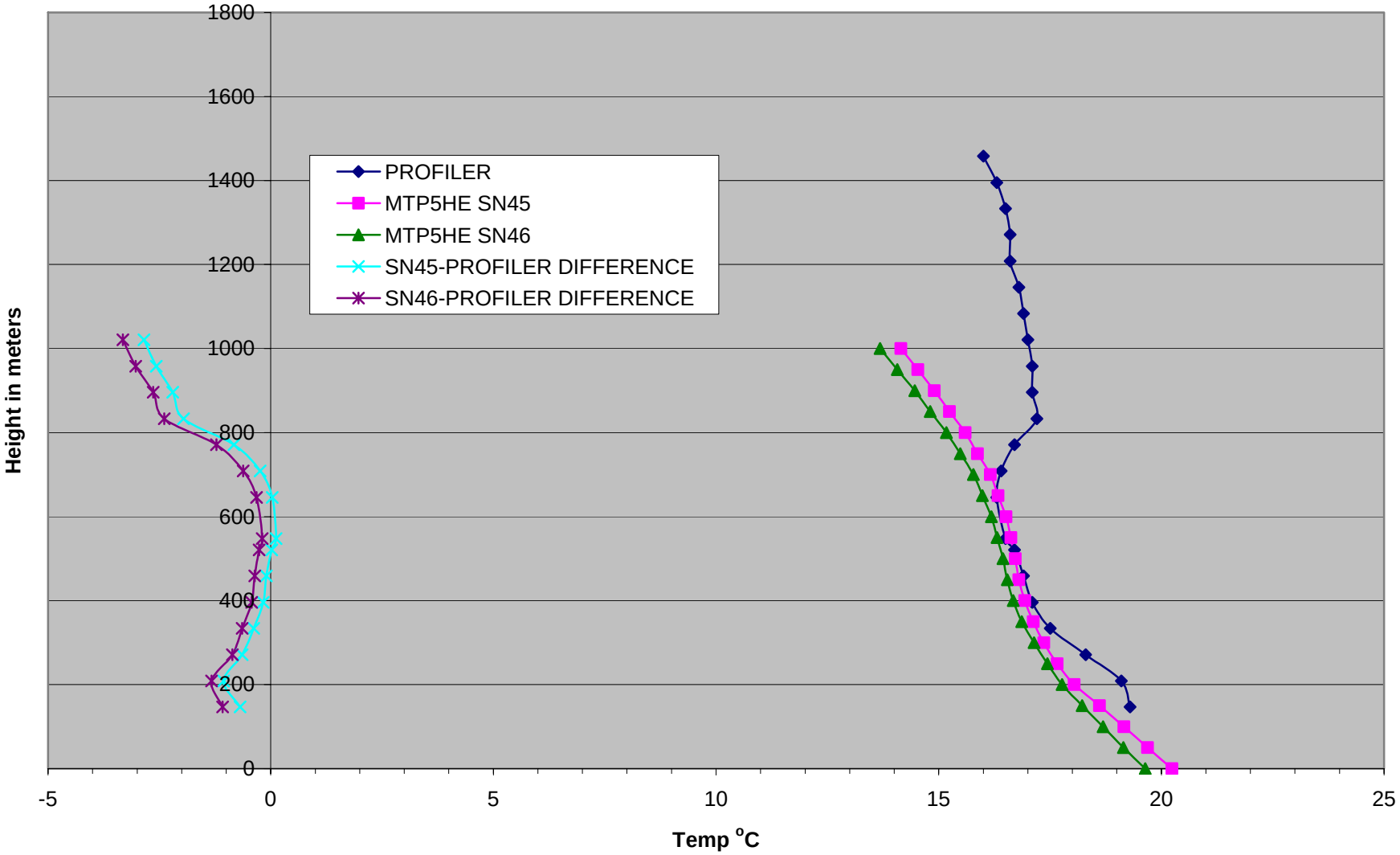
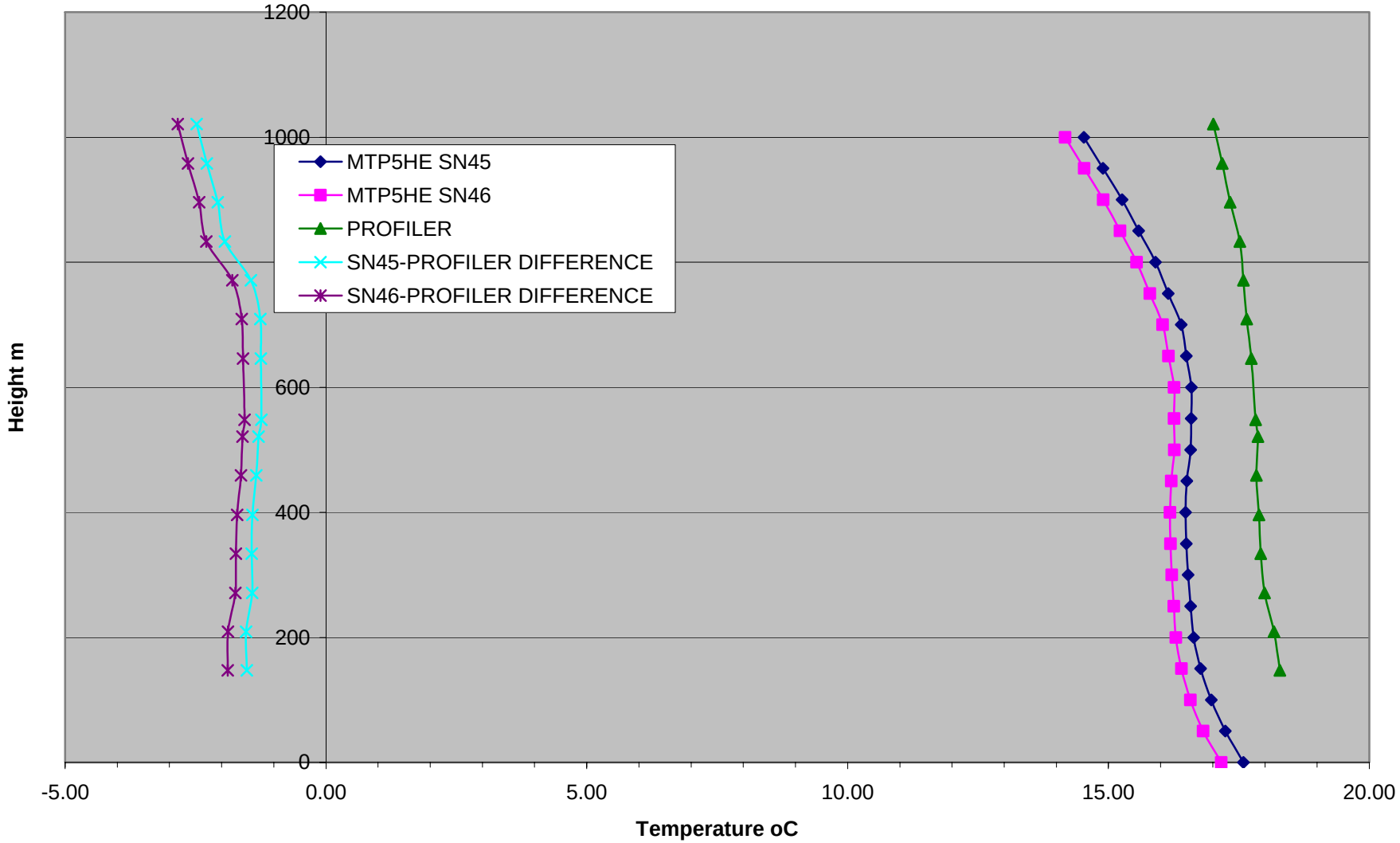
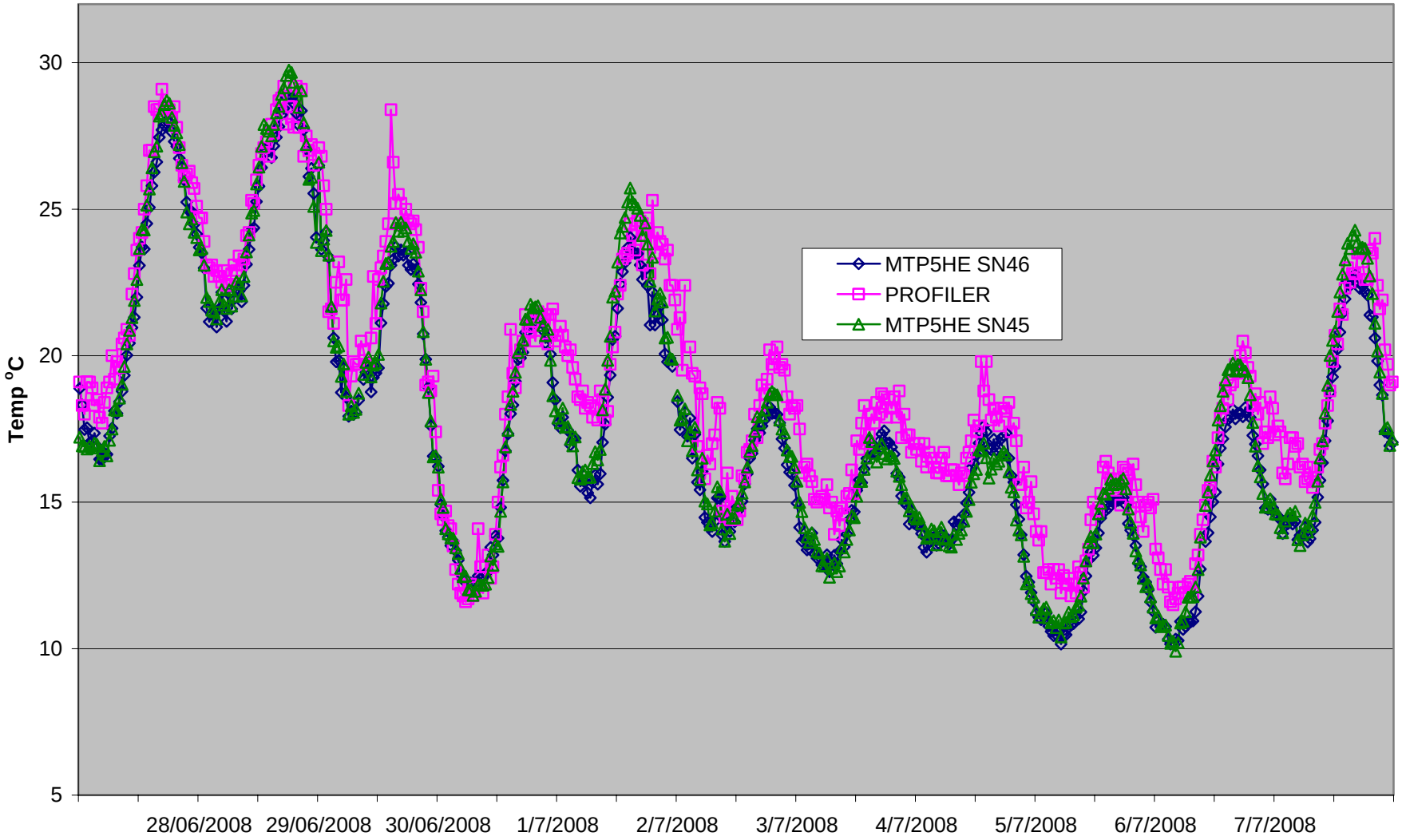
Temperature Profile on July 3, 2008 at 1500PST



Temperature Profile Averaged for A Day on July 3, 2008



Temperature at 400m



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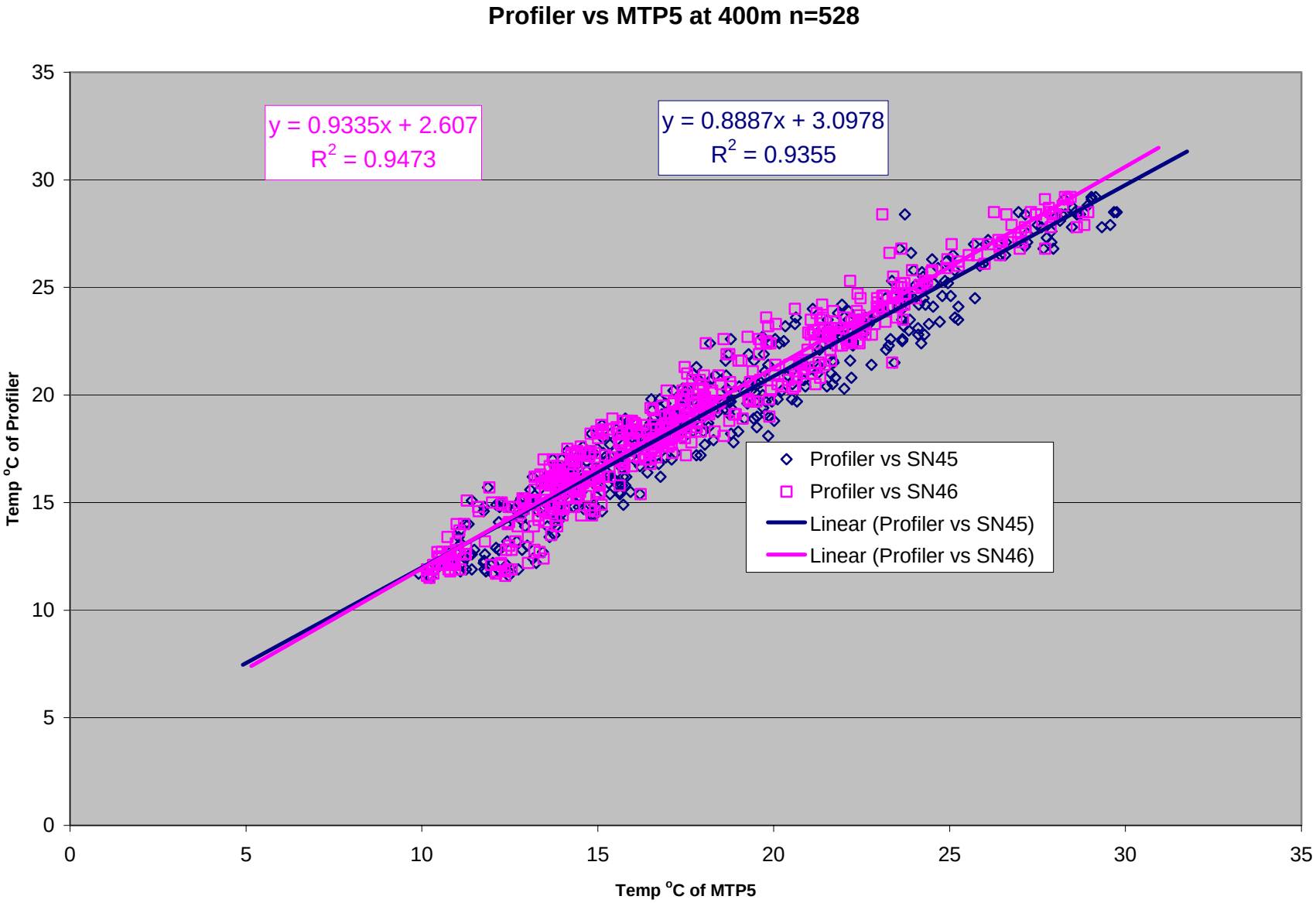

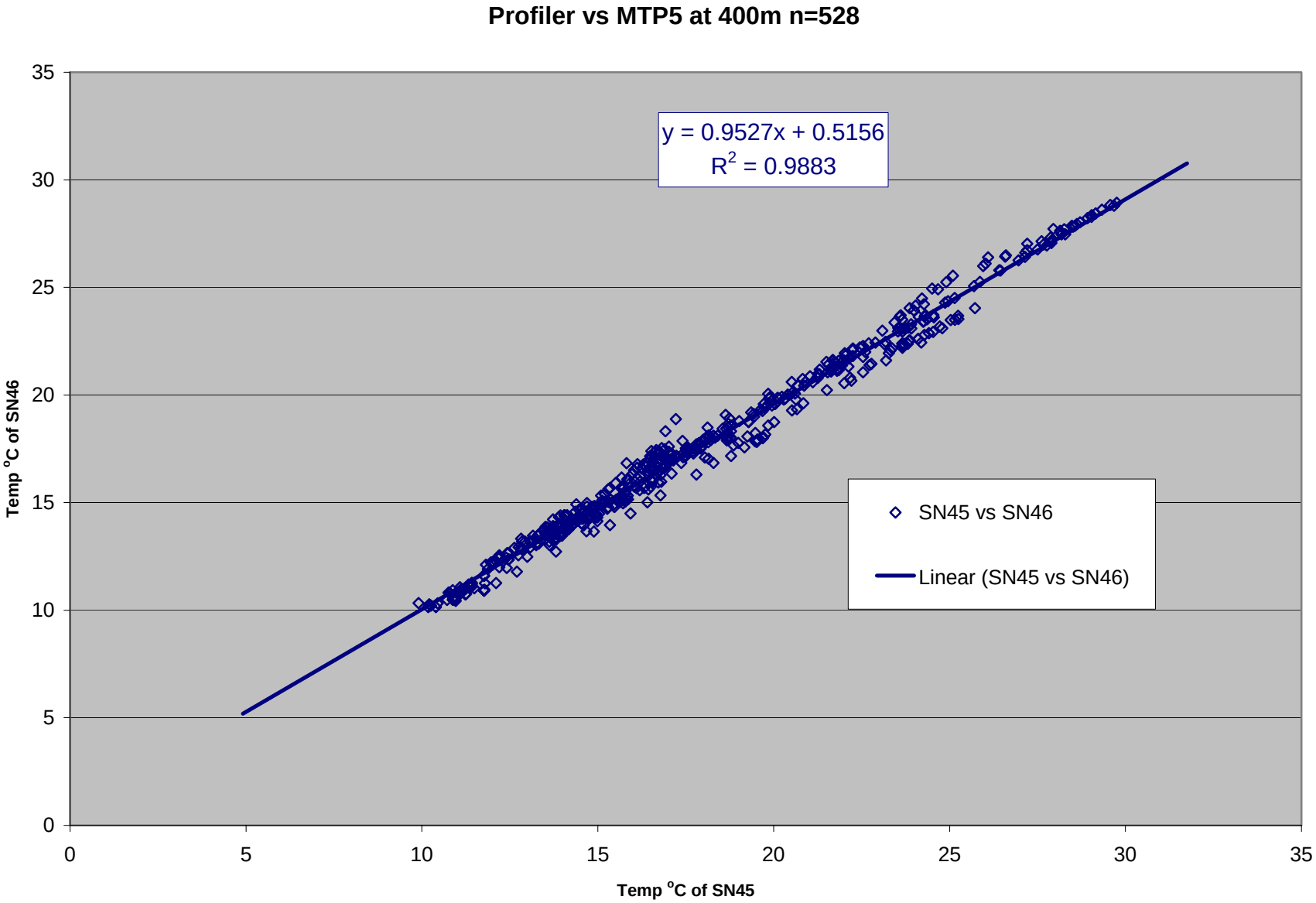

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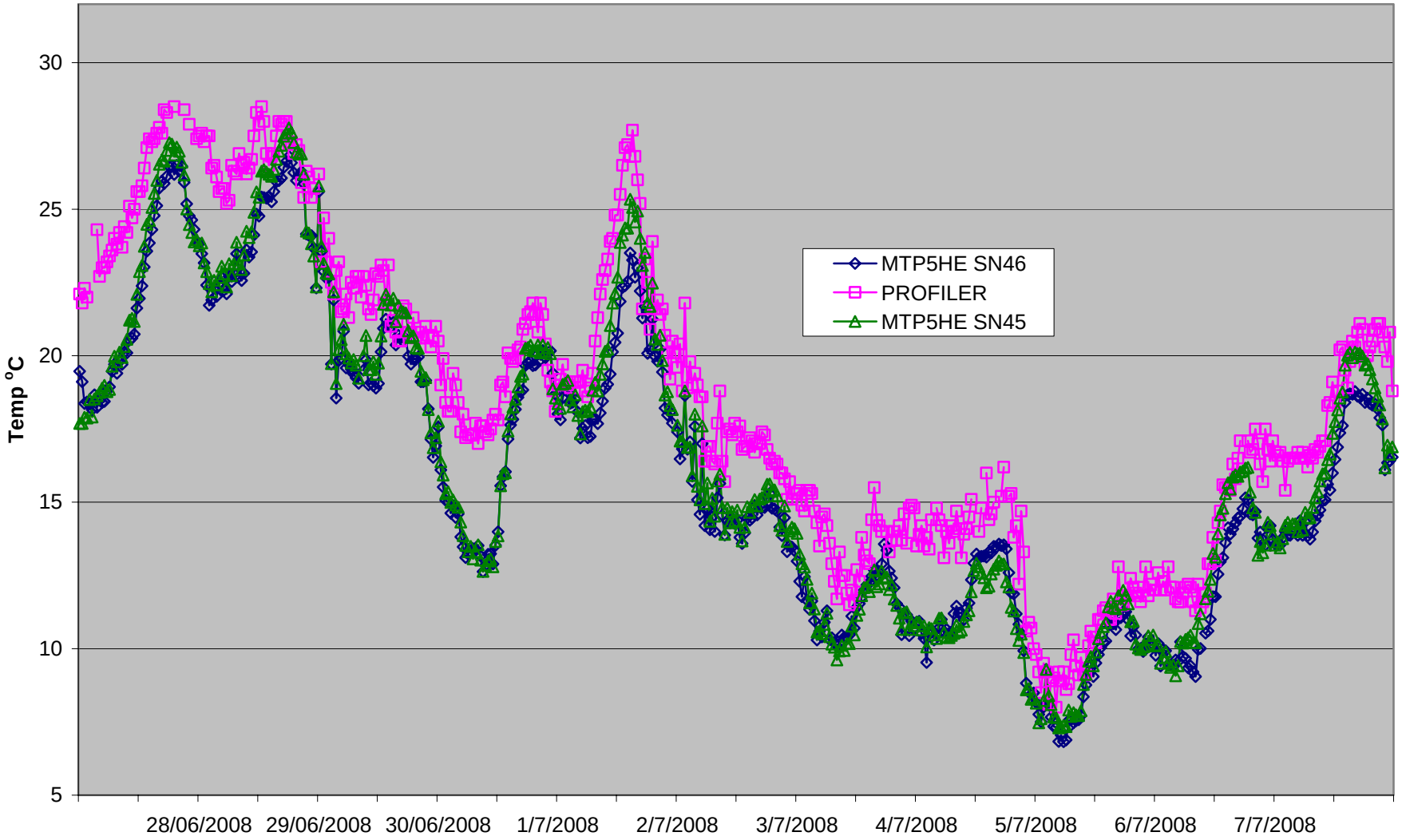
Temperature at 900m



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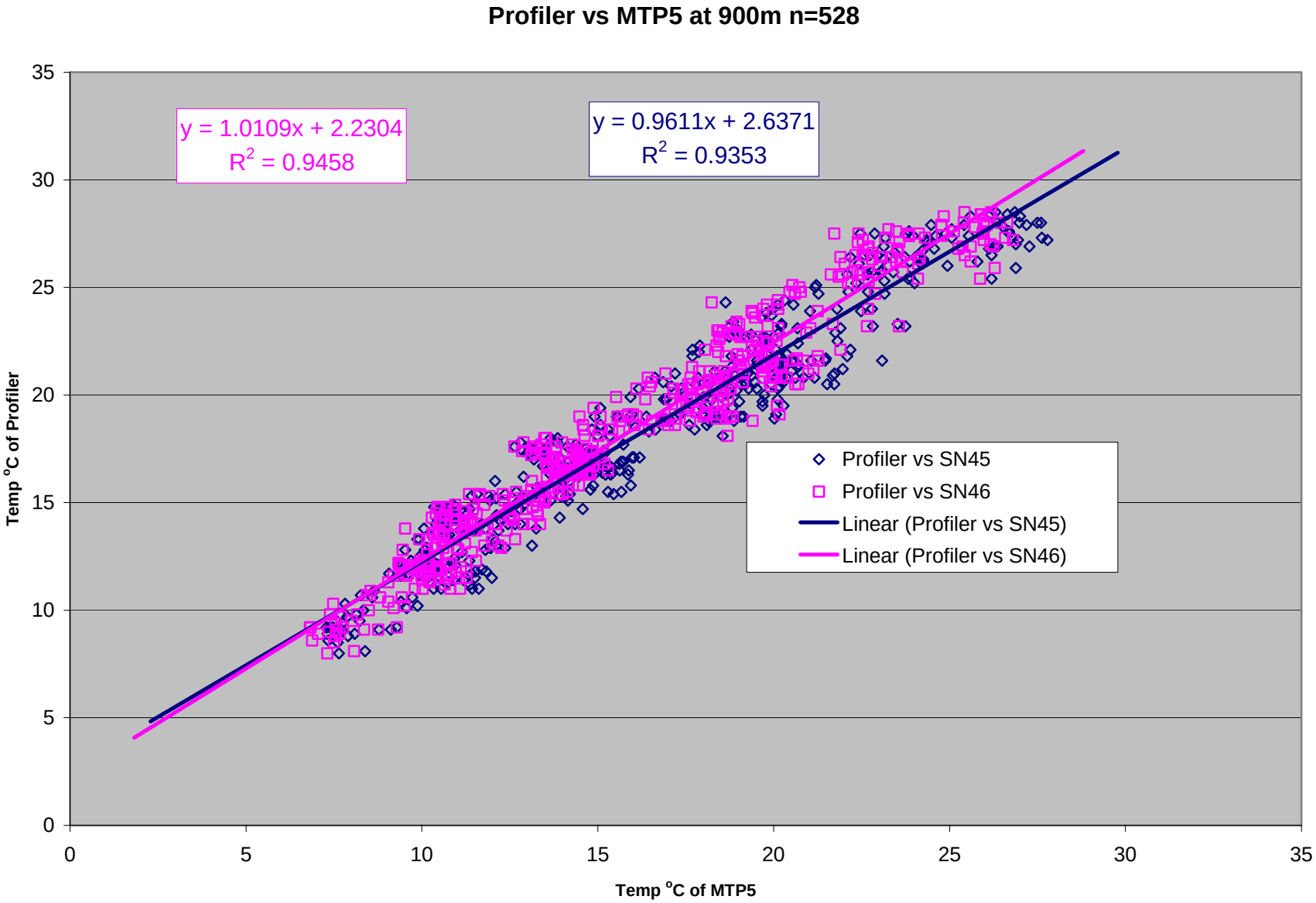

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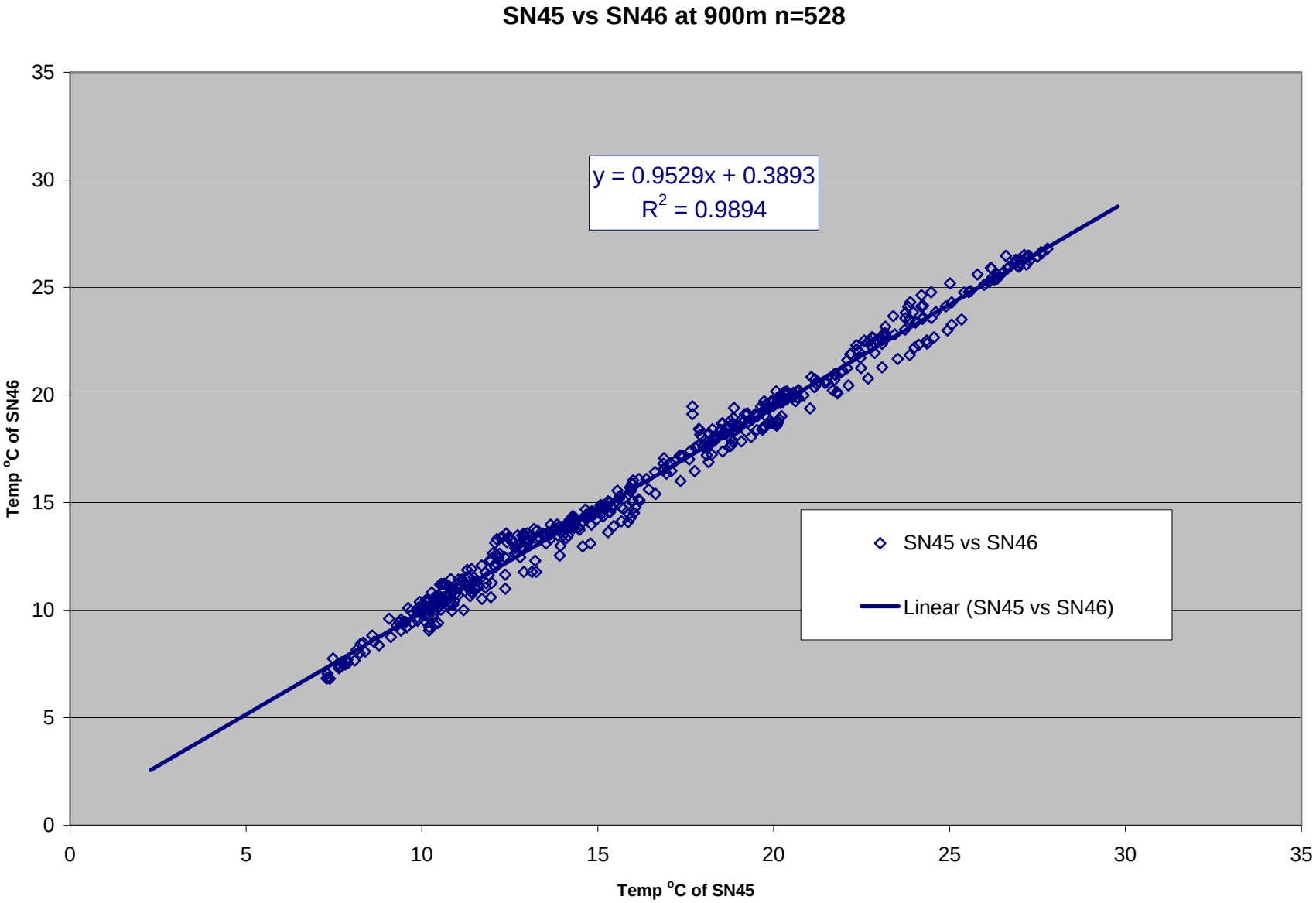

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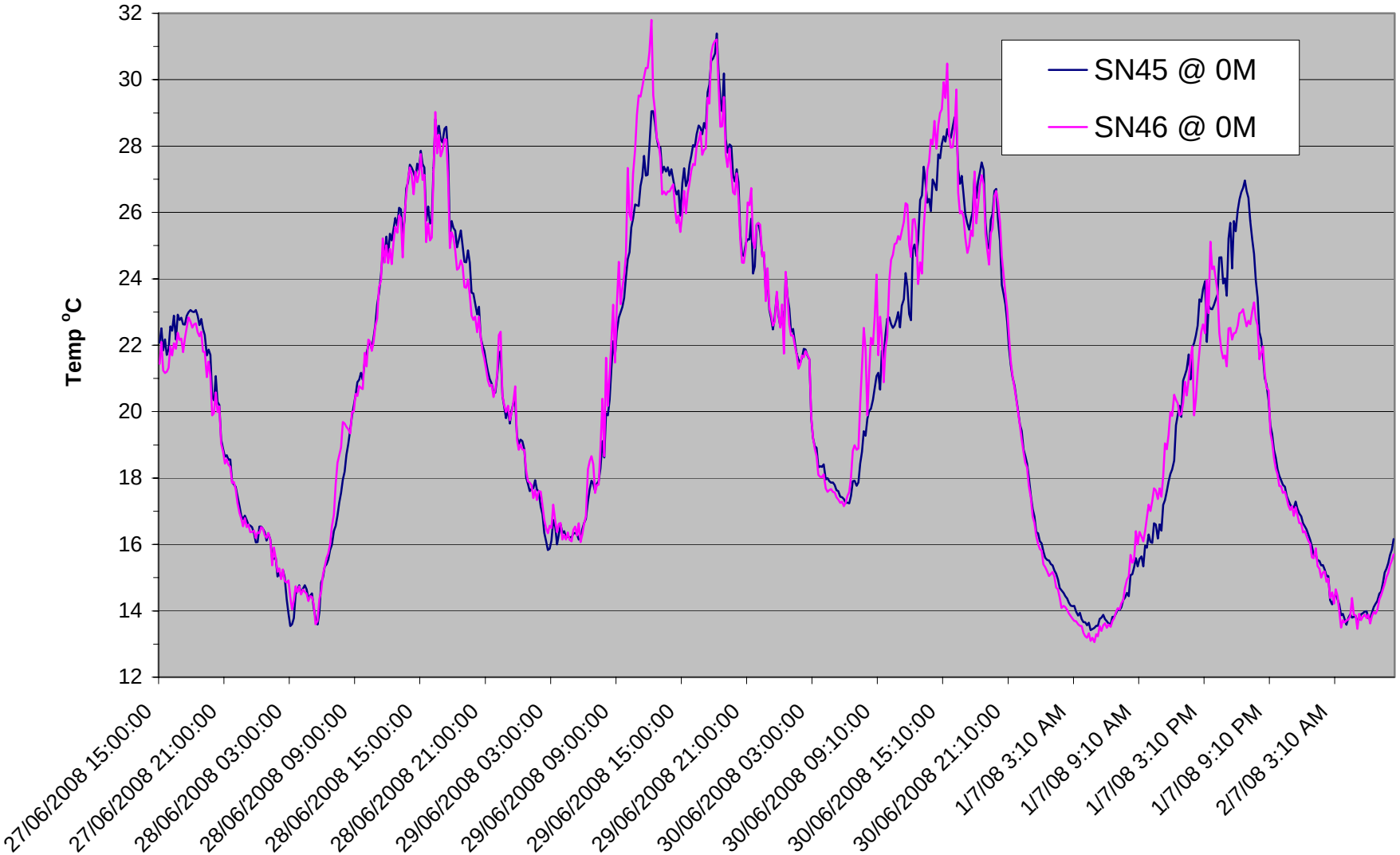
Ground Level Thermistor Comparison



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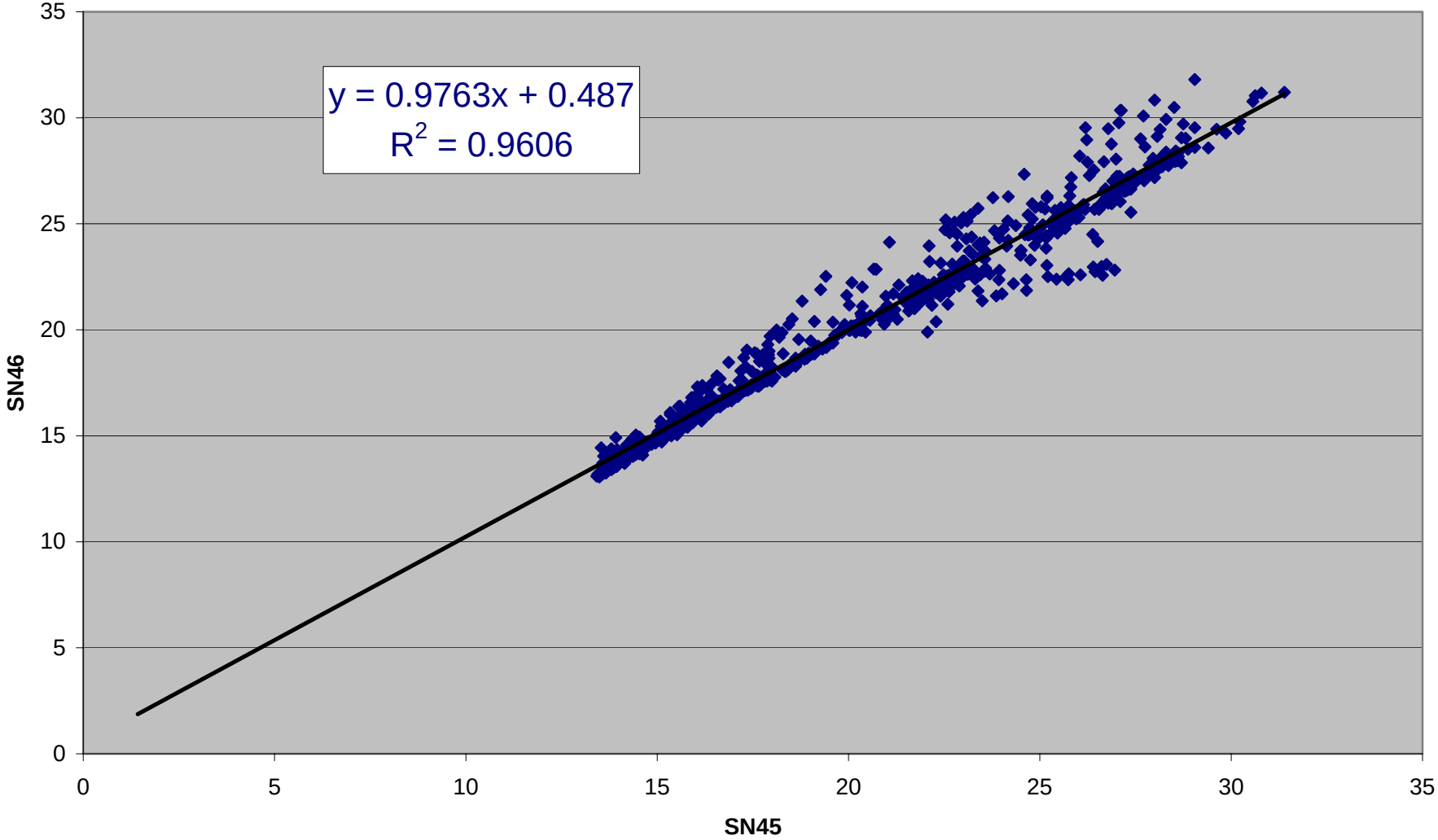
SN45 vs SN46 Ground Level Thermistors at 10 Minute intervals n=681



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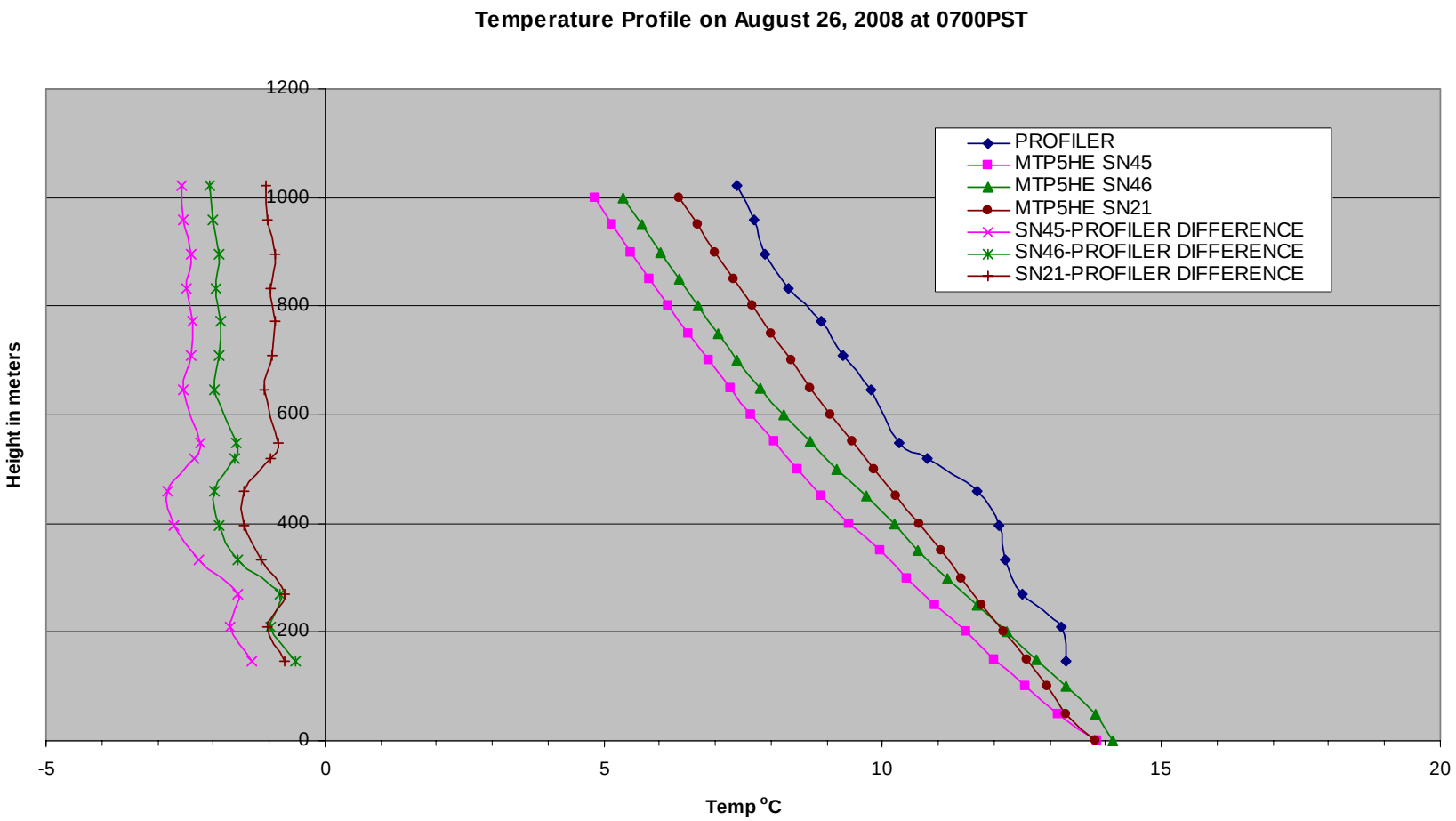
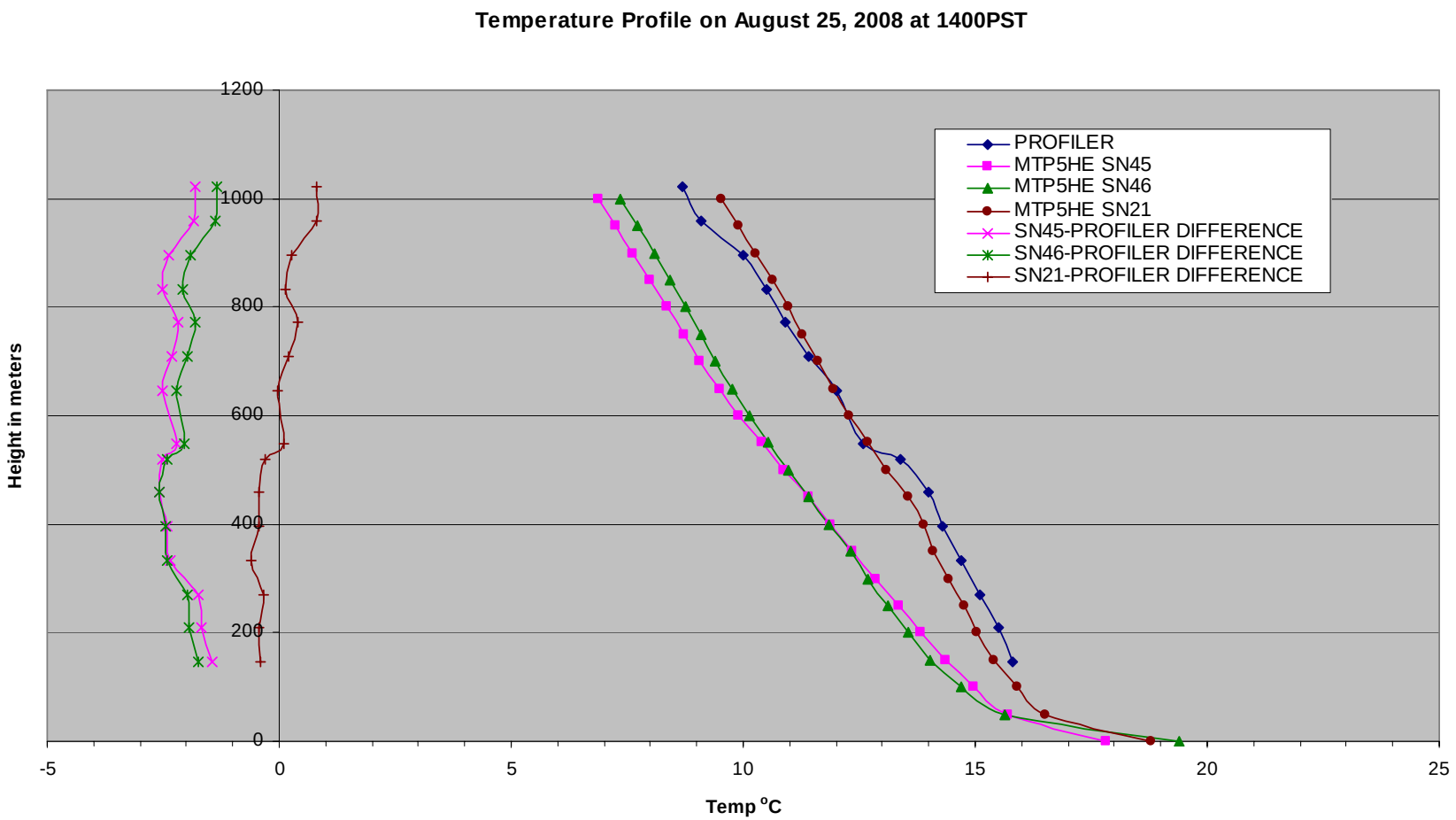
Current Evaluation

- **Examine unexpected differences with new units**
  - **Electronics have changed**
  - **Radiometer?**
  - **Calibration**

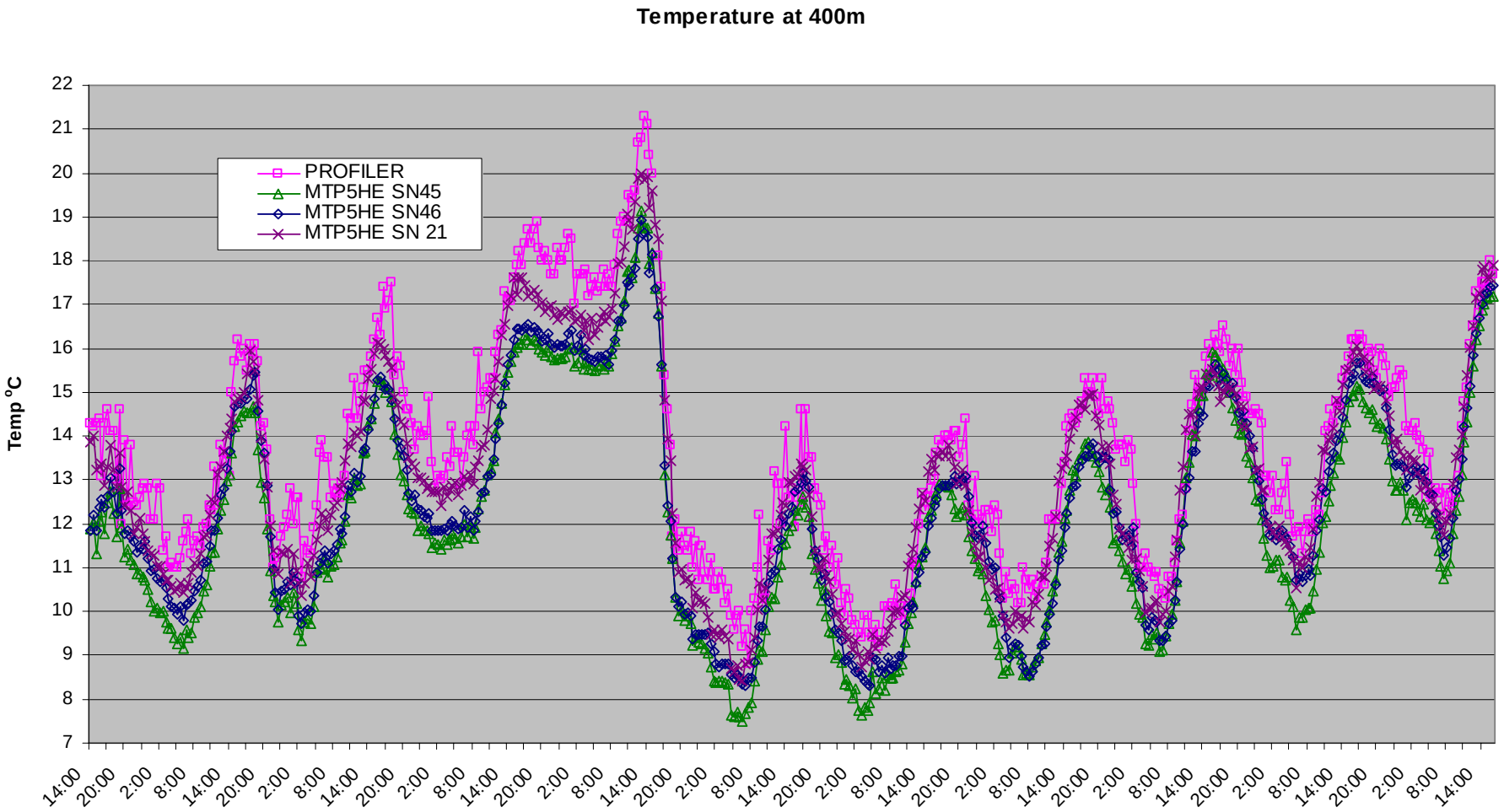
SN 45,46 and 21



SN 45,46 and 21



SN 45,46 and 21



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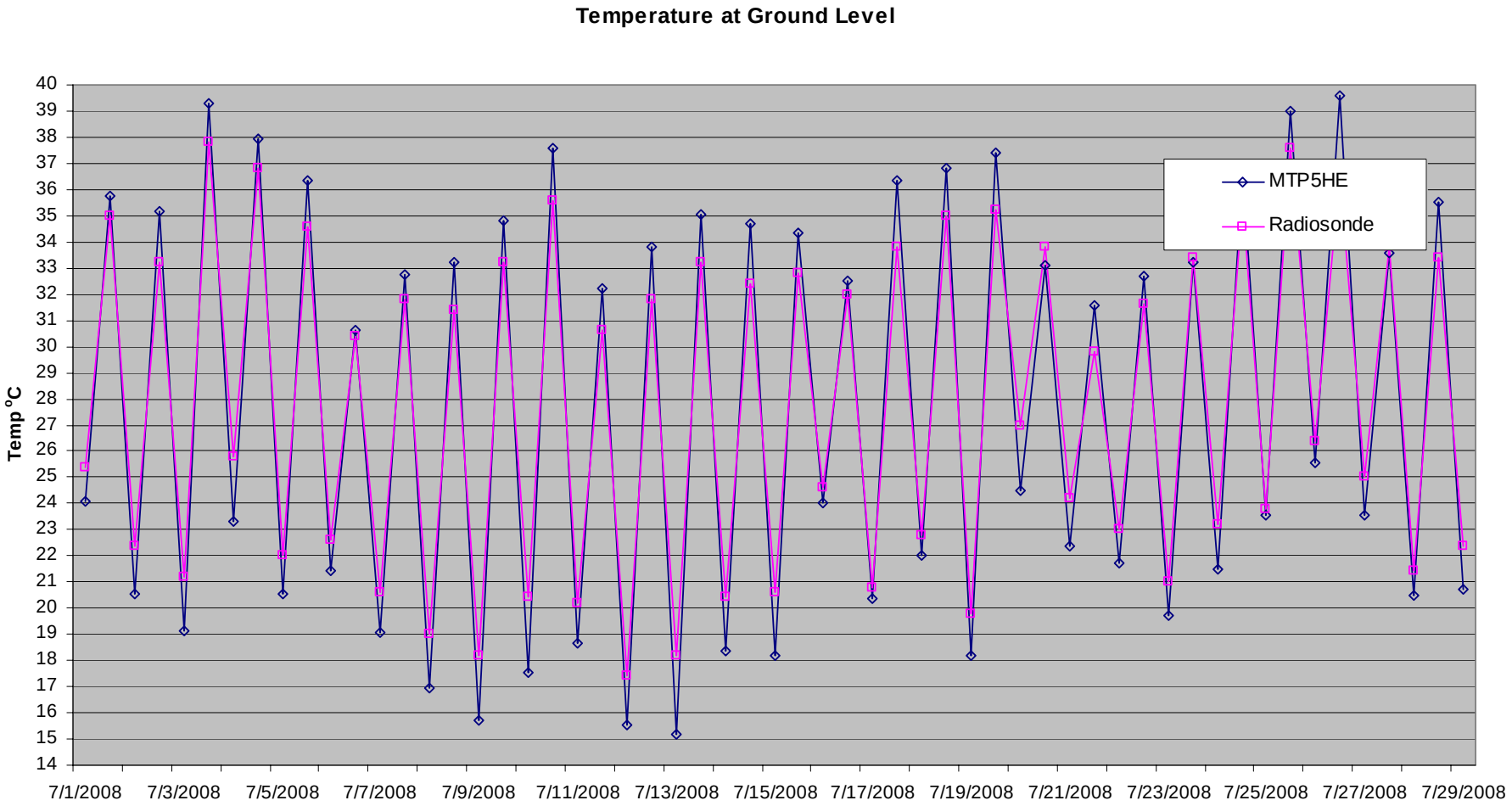
Summary

- **Systems passed initial acceptance testing**
- **Working to improve calibration of the systems**

MTP5 vs Salt Lake City Radiosondes



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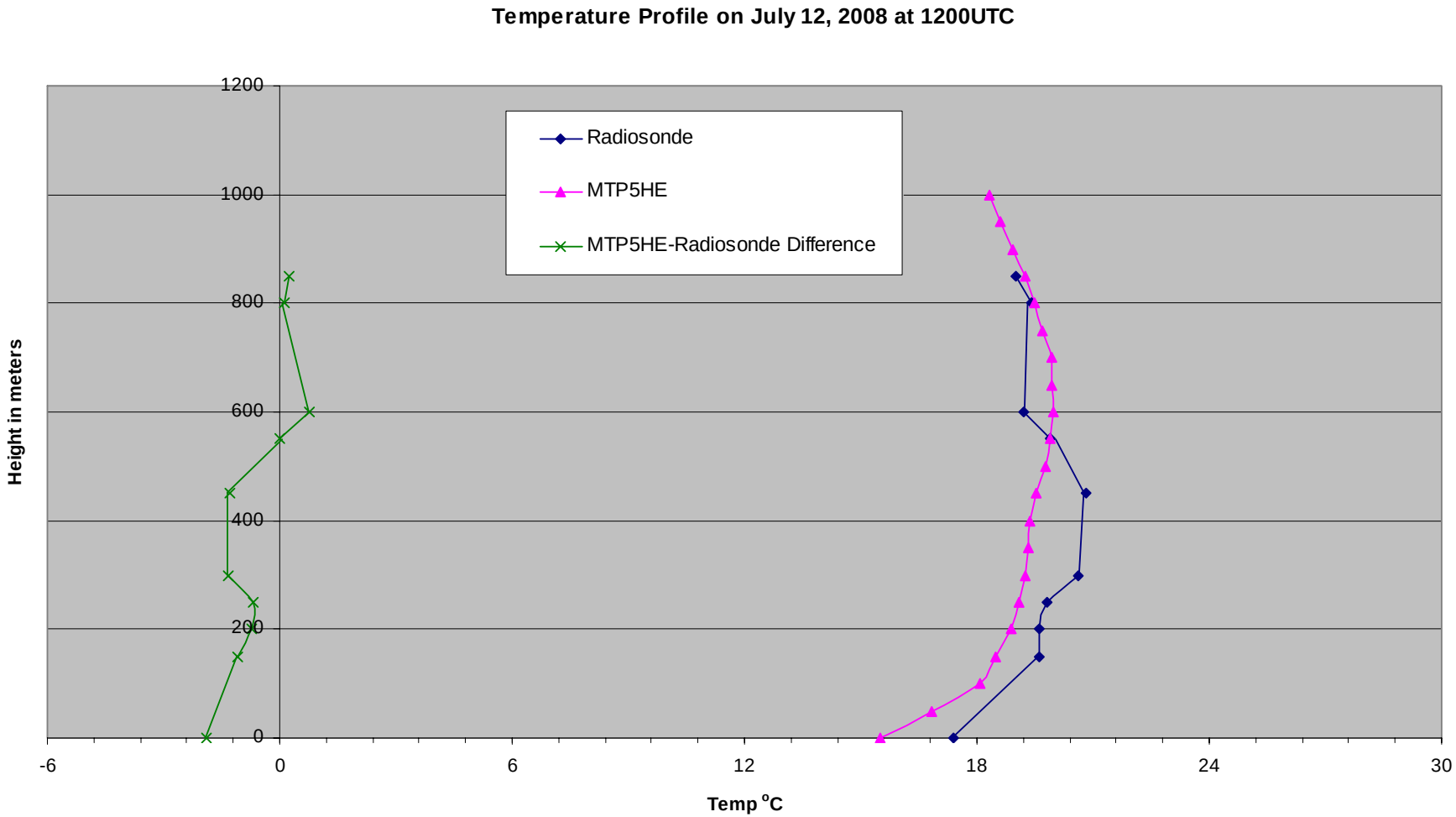
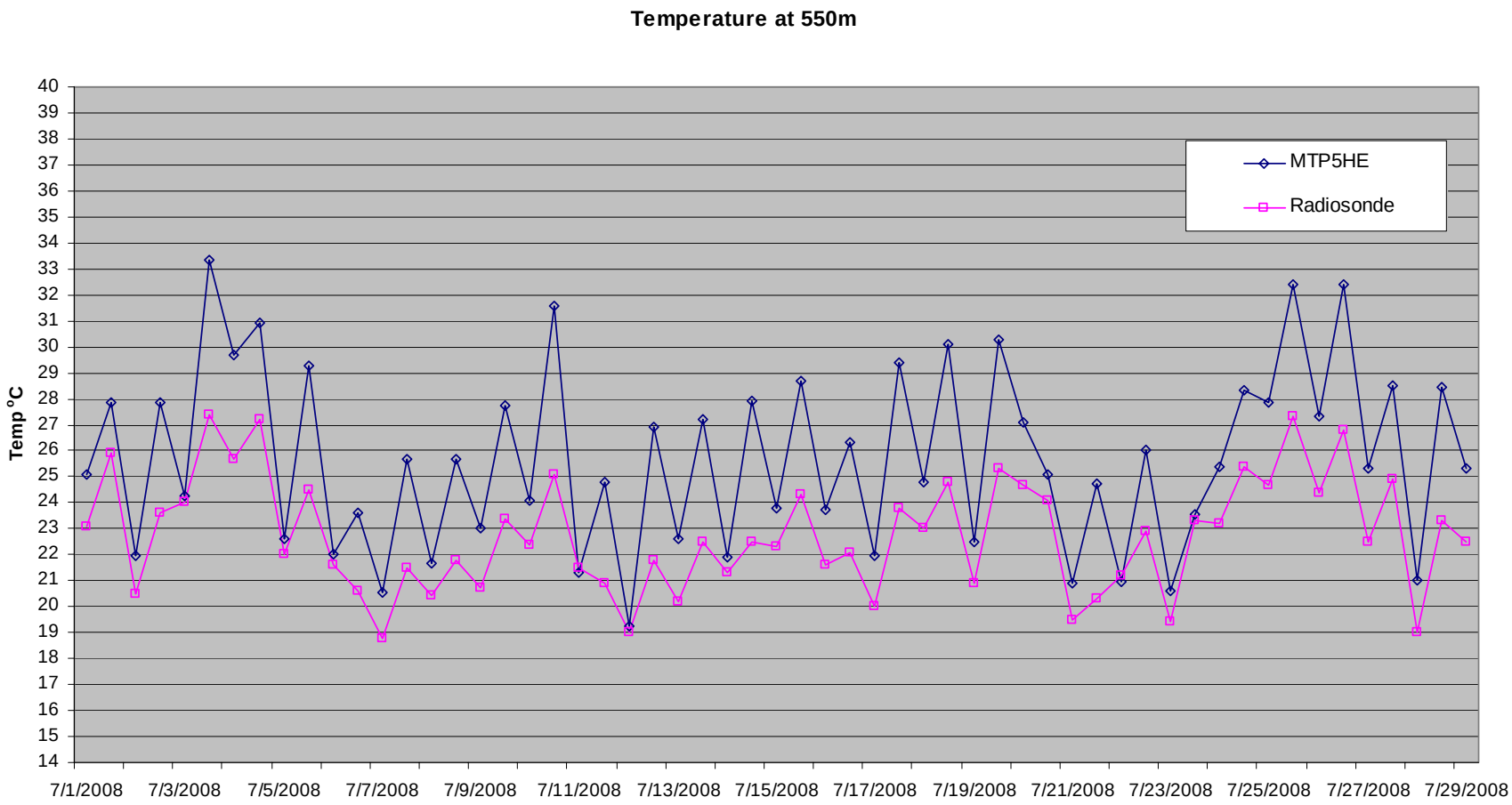
MTP5 Vs SLC


Temperature Profile on July 12, 2008 at 1200UTC
Radiosonde
MTP5HE
MTP5HE-Radiosonde Difference
Height in meters
1200
1000
800
600
400
200
0
-6
0
6
12
18
24
30
Temp °C

MTP5 Vs SLC radiosondes



Next steps

- **Deploy to air monitoring sites with Air Quality problems.**
- **Create “mini” network (RASS + MTP 5)**
- **Develop data path for submission to EPA, Washington State DOE**
- **Collaborate with NWAIRQUEST for model validation effort.**