

HU-Beltsville GRUAN site

Presented by Belay Demoz

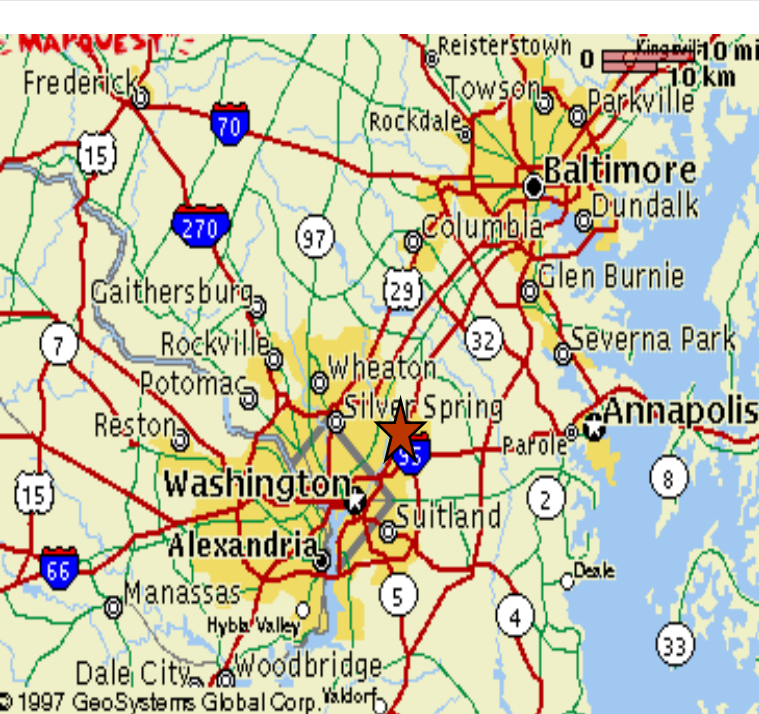
Contributions: E. Joseph, D. Venable, D. Whiteman, M. Adam, B. Gentry, H. Chen, K. Vermeesch, T. Bacha,

Content:

1. Response to GRUAN questions
2. Update on activities – wind and NDACC activities
3. Discussion and conclusion

Acknowledgment: NASA/GSFC, NASA/HQ/SMD/NWS, NCAS

The Howard University Beltsville Research Campus:



Site Advantages:

- A semi-urban pollution prone site
- Home to many Agencies and Colleges
- High population pressure

Goals:

- Enhance the capacity of HU to conduct research
- Contribute to national and international climate and environmental monitoring activities
- Facility for hands-on student training in instrumentation and atmospheric observation



Question-1. Which of your existing radiosonde launches already meet the mandatory requirements (GCOS 121: once weekly best production quality radiosonde, once monthly stratospheric water vapour; recommended twice daily),

Once Weekly:

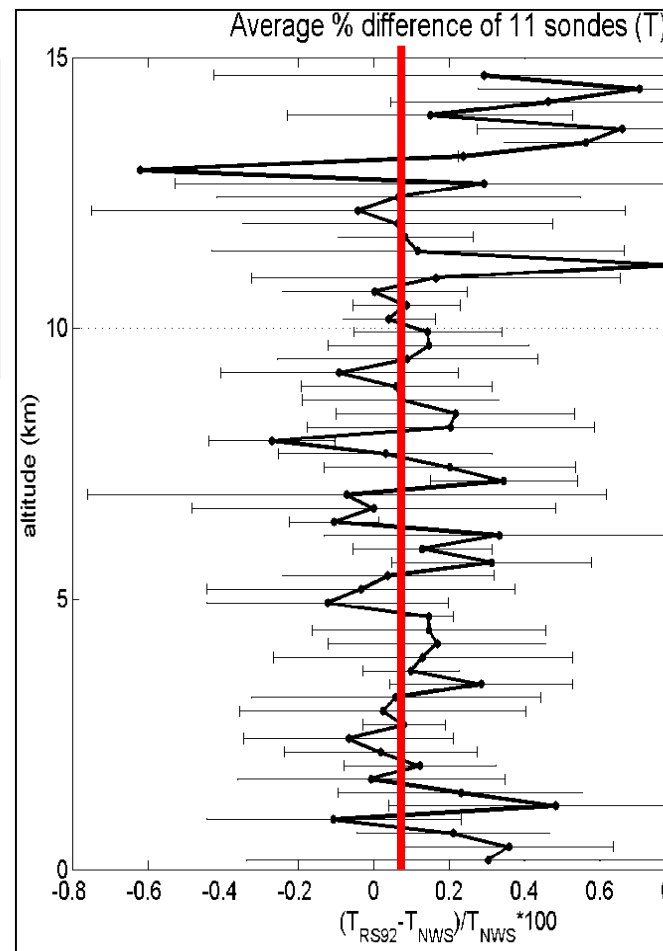
- Vaisala RS92
- *In collaboration with NASA, we can launch CFH , and we plan on redundancy.*

Twice daily launches.

- Possible but Tasking
- Proximity to IAD/NWS
- ~

Temp:

- < 0.1% Change
- nighttime
- Data is “as is”



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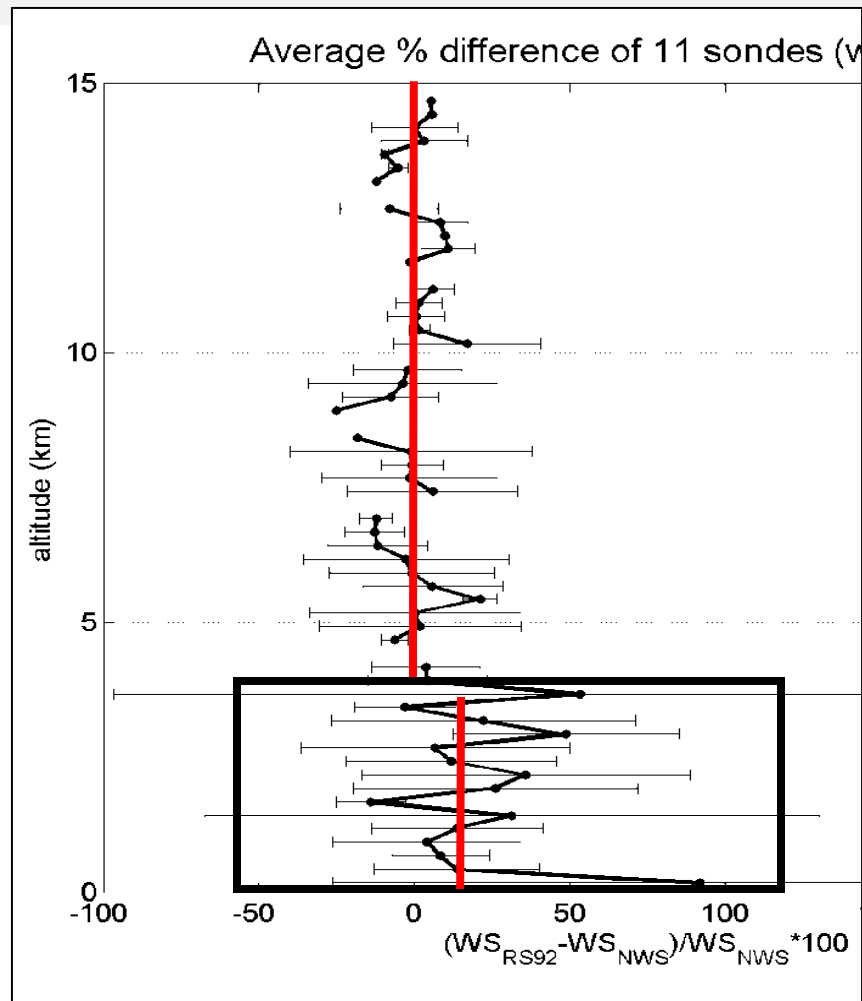
- Vaisala RS92
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Wind Speed.

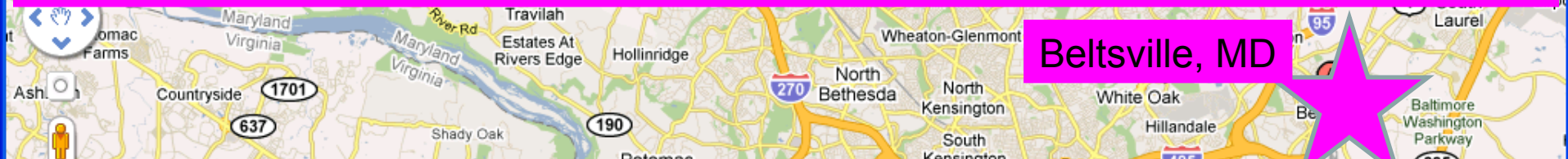
- large changes in PBL
- ~ better corr. in UT



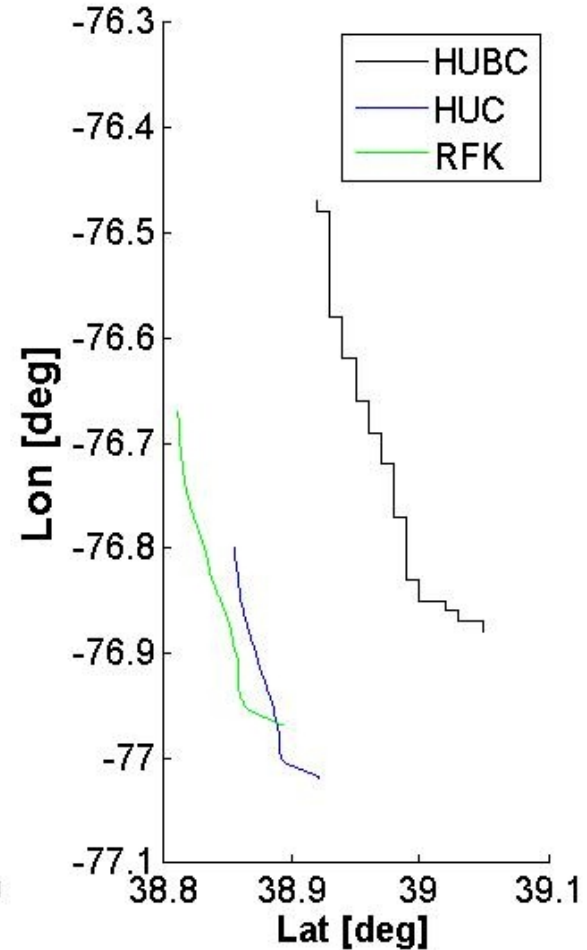
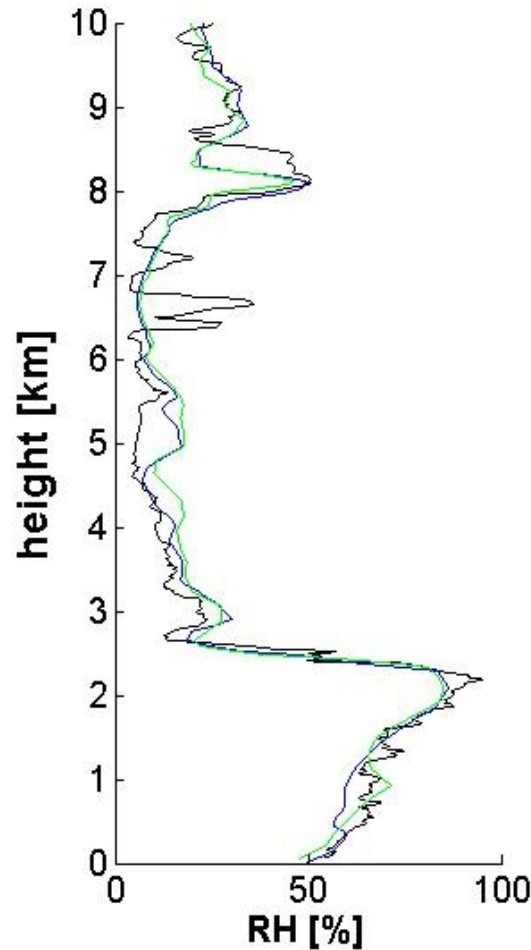
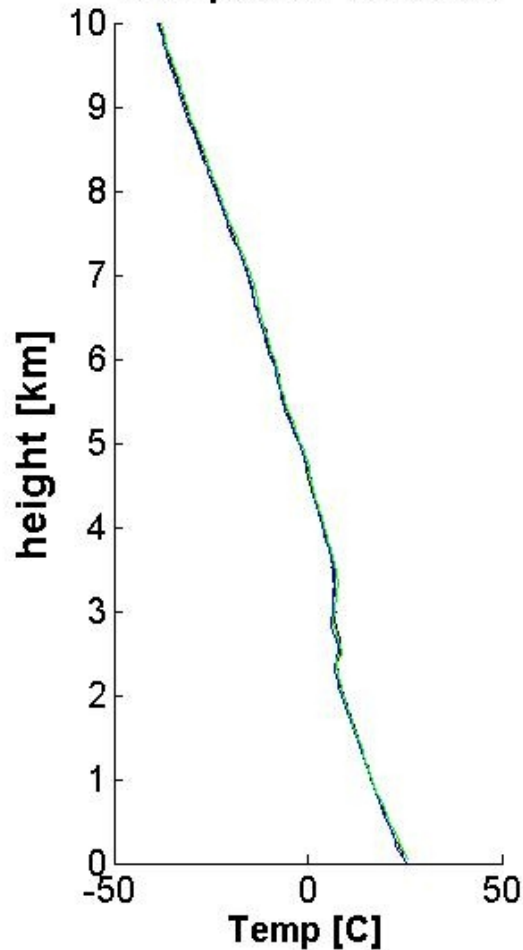
DC-PBL experiment (in progress)

DOD, NASA, NOAA, HU

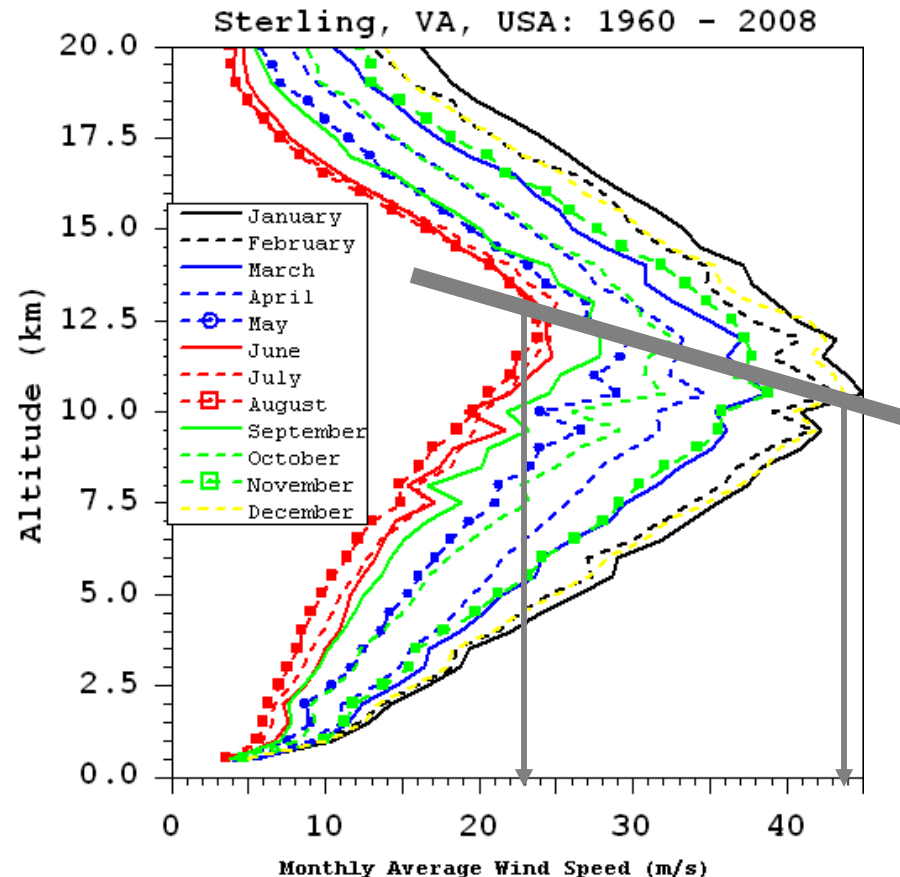
GRAW vs RS92



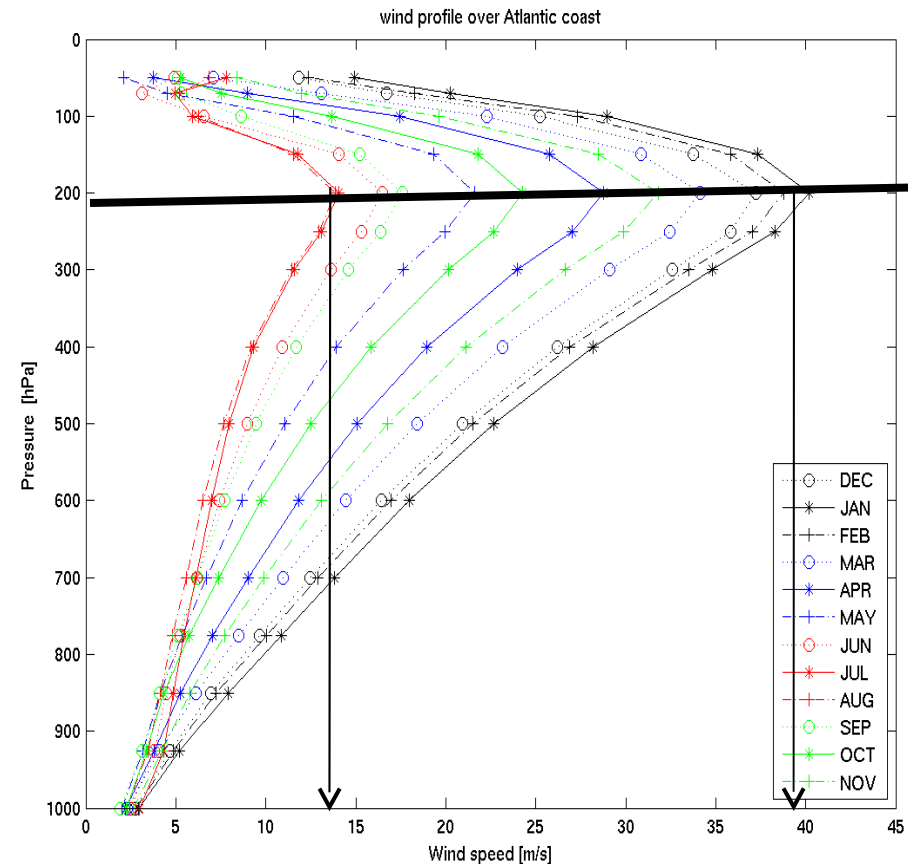
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Historical Wind (may be of interest)



Average monthly wind speed for Sterling, VA, from 1960 to 2008 plotted in a 1 km height bins.



Average monthly wind speed over the East (65W-85W, 25N-50N) from ECMWF reanalysis (1980-1999).

- Jet core altitude changes by about 2.5km (not in reanalysis).
- ➔ a resolution of 250m will do?

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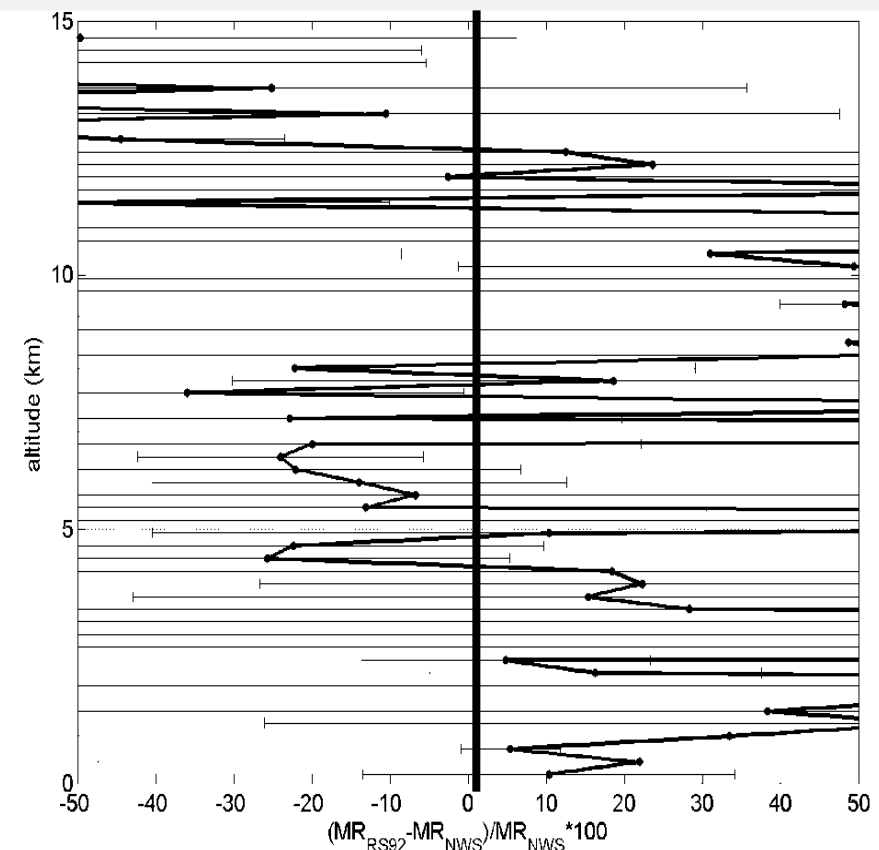
Twice daily launches.

- Possible but tasking in resources.
- proximity to IAD/NWS (GCOS site) should be adequate.

Mixing ratio diff.

- Diff. sensors (RRS/ RS92)
- Time difference (<1hr)
- # of profiles (only 11)
- others ...

**We will test this soon using
RS92 Ground station!!**



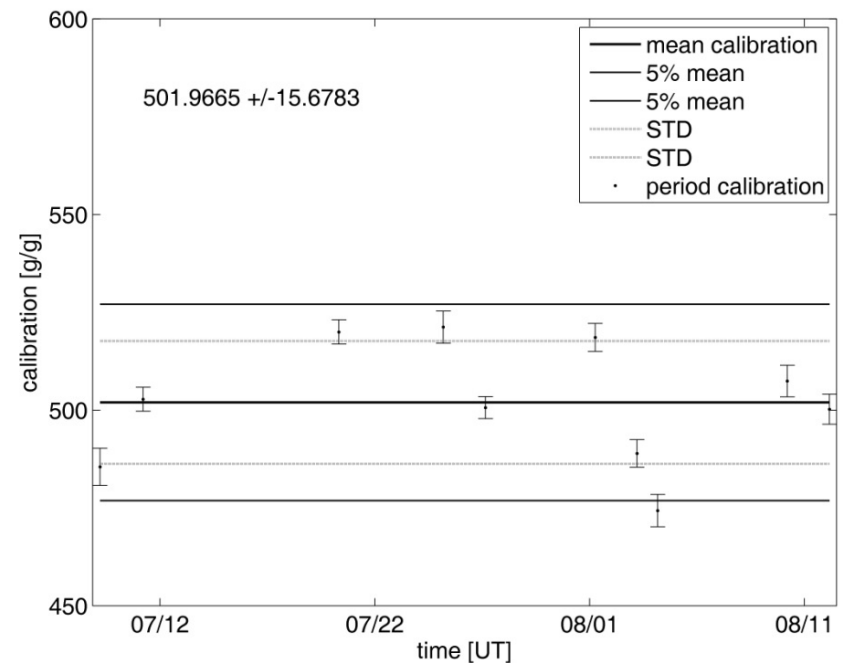
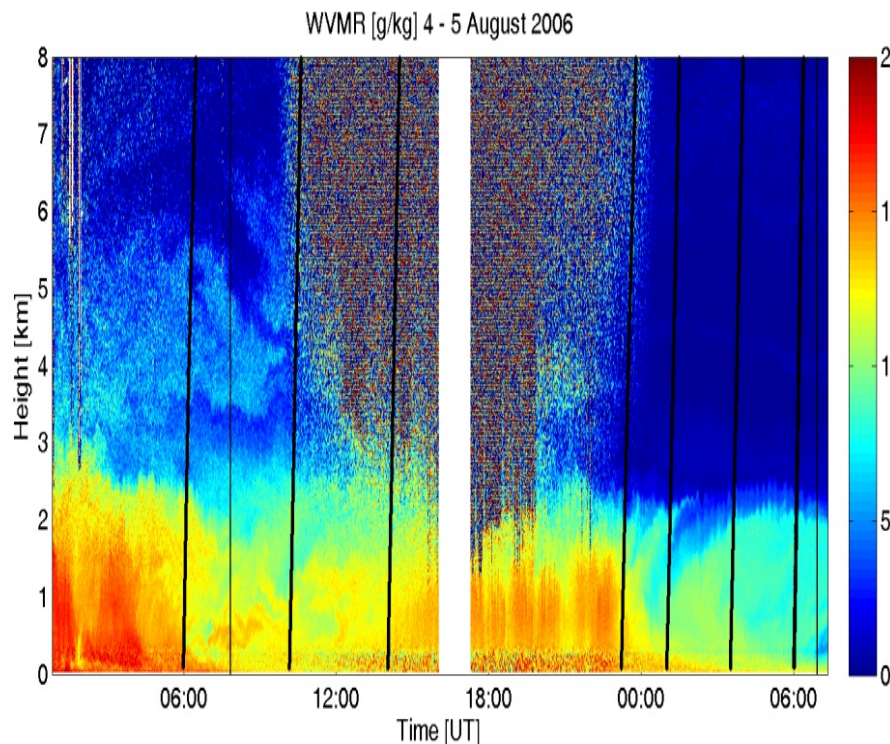
GPS IPW are highly correlated
→ May be humidity sensor issue

Question-2. Which ground based measurements can you provide in addition to the mandatory GPS total water vapour column (microwave, FTIR, lidar, ...) and how can you use these additional observations to make sure that measurement uncertainty estimates will be consistent?

- 24/7 MWR-profiling (water vapor, liquid water, cloud base temperature)
- MWR (IPW and ILW)
- **Lidar (water vapor mixing ratio)****

Continuous comparison of

- IPW from sonde, GPS, MWR
- Consensus reference (Facundo et al. 2009)

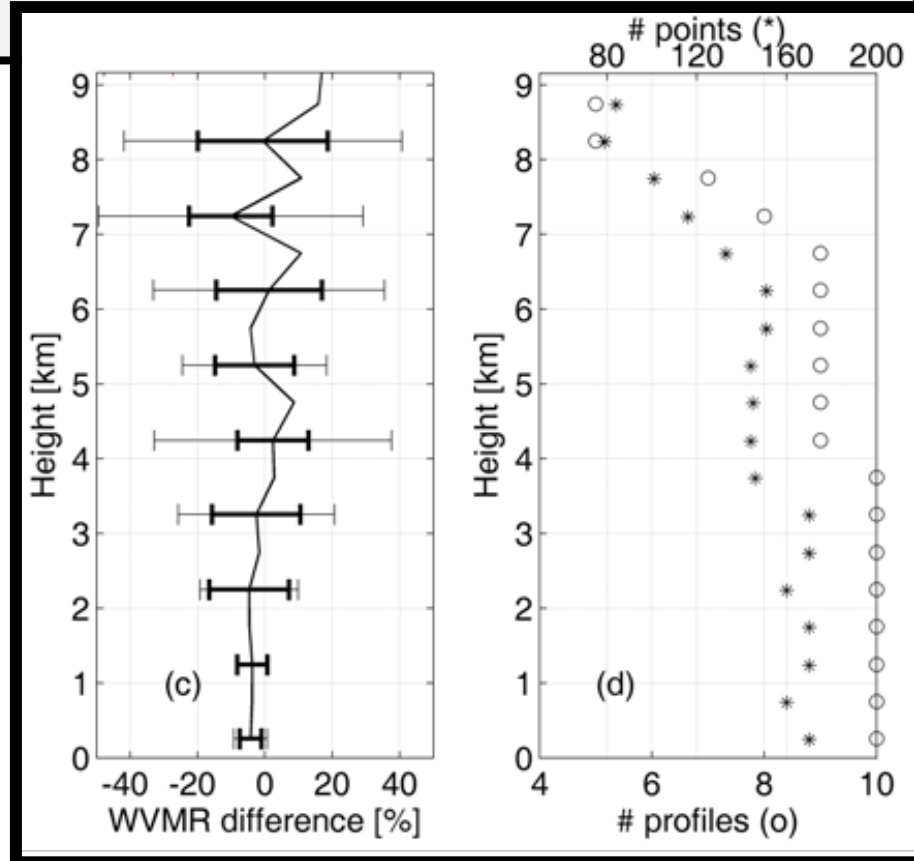
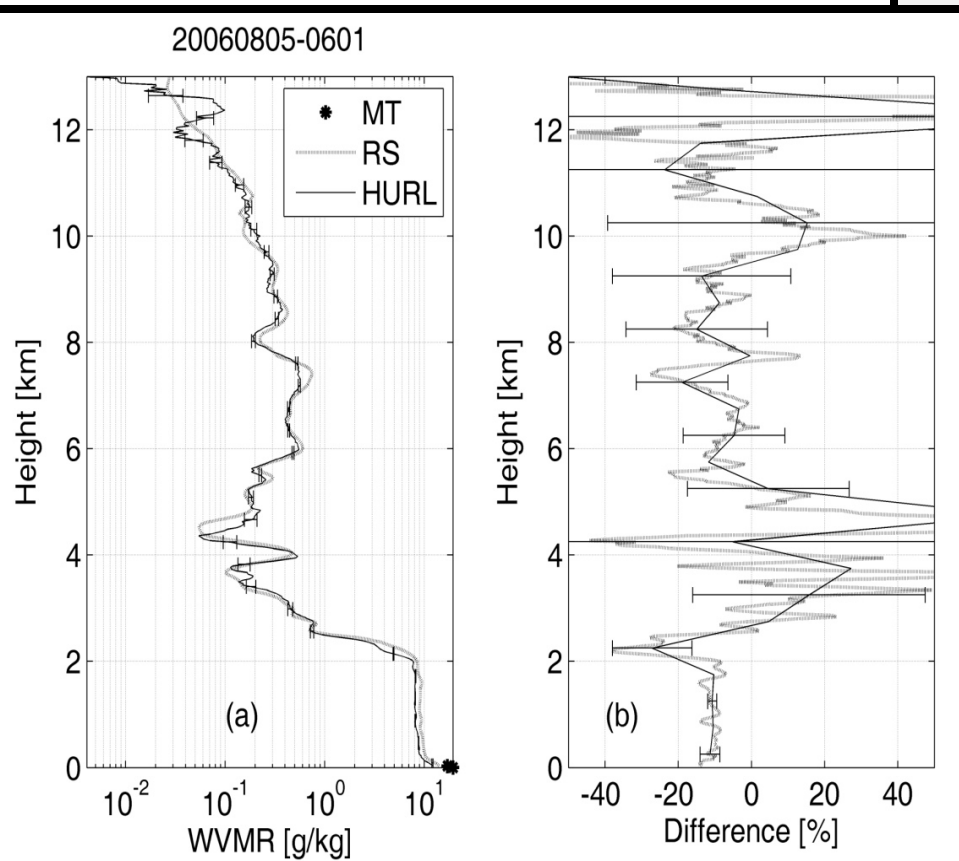


Although we can provide mixing ratio and aerosol backscatter profiles from the Raman lidar, this is tasking to do with high frequency. It is manageable for weekly operation but not for daily work without significant

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- 24/7 MWR-profiling (water vapor, liquid water, cloud base temperature)
- MWR (IPW and ILW)
- Lidar (water vapor mixing ratio)

- Periodic comparison of
- IPW from radiosonde, GPS, MWR
 - **Consensus reference (Facundo et al. 2009)**
 -



Question-3. Do you have any limitations regarding the development of GRUAN launch protocols for routine and reference sonde launches (e.g. the use of autosonde launchers)?

No. Our limitation is resource. Autosonde launchers?

Question-4. Do you have any limitations regarding the development of uniform GRUAN data processing schemes for remote sensing observations?

Not really, if the schemes are focused on the post processing data. If it requires modification of the instrument operating procedures, we need to discuss this with our partners.

Question-6. For sonde observations: Can you provide all raw data for central archiving?

Yes.

Question-7. For remote sensing observations: Will you be able to archive all raw data for possible future reanalysis and reprocessing?

This is instrument dependent and can be cumbersome. A better definition of “raw” instrument by instrument is required. As a rule we can share raw data that we save, but requires some uniform definition on what is meant by “raw.”

Question-8. What help do you need from the Lead Centre / WGARO/ GCOS Secretariat in moving forwards?

Requests have to be specific and less tasking.

Question - 9. Will you be able to host local intercomparison campaigns (yet to be scheduled)?

Yes. We have done this in the past and we can make it happen.

Question - 10. Are there any special infrastructure needs that should be addressed?

Yes. *Implementing the ARM – QA for example.*

The requests can only be met through cost sharing with existing funds. A question of identifying a source for augmentation of operational funds for GRUAN.

Question- 5. What local analysis can you provide to assure that measurements uncertainties will be consistent across the network (Analysis of redundant observations either **dual sonde launches or sonde + remote sensing observations**)?

Multi sonde launches:

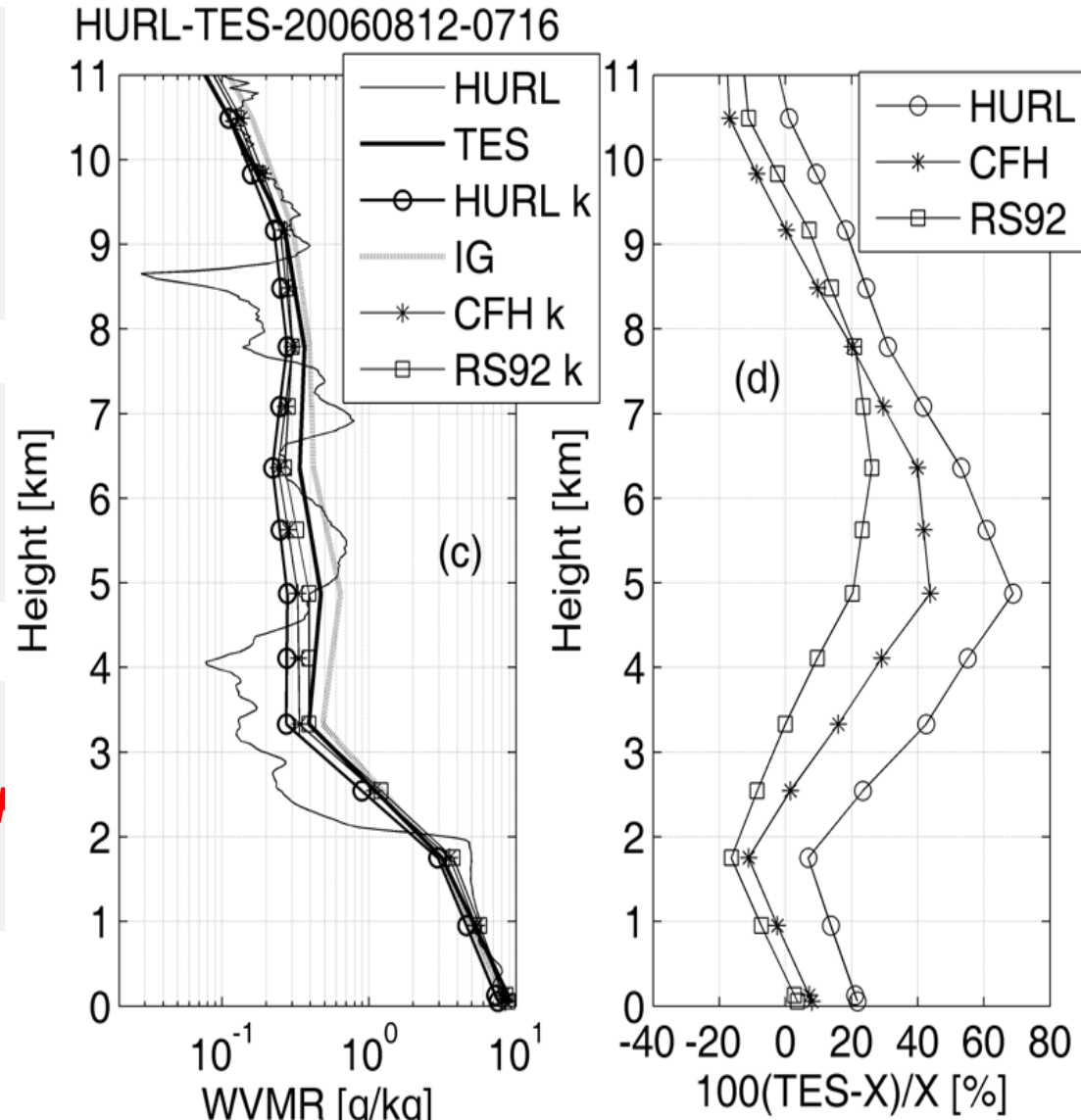
- **periodic launches of iMet, Modem, RS92**
- **possible dual launch of RS92**

Sonde + remote sensing:

- **Periodic lidar, MWR, GPS, sonde analysis**

Sippican (LMS; - near future)

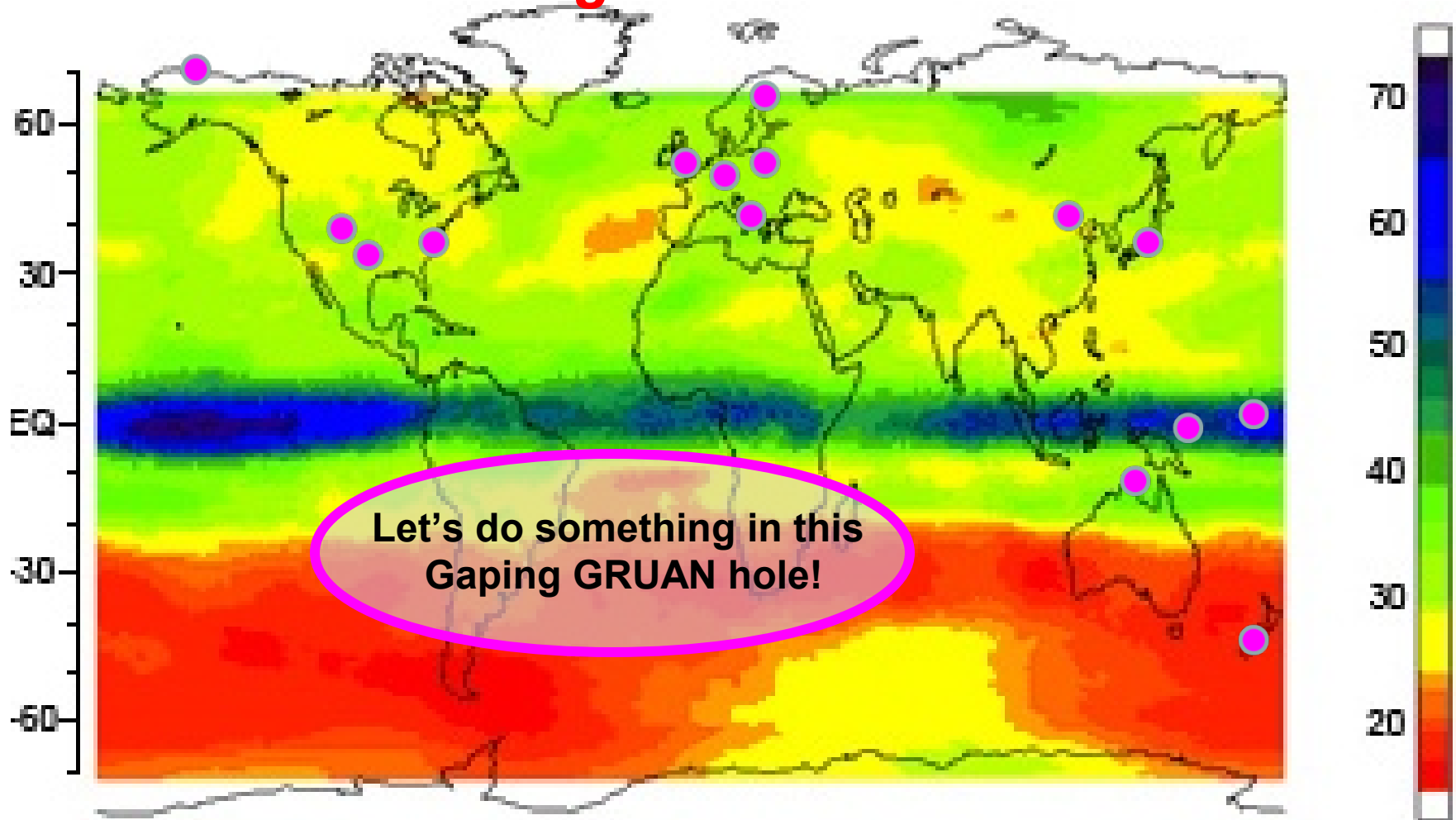
- **allows for multi-thermistor temp**
- **snowwhite sonde launches**



Years to Detect GSFC Predicted Trends in Ozone

From: <http://cires.colorado.edu/science/groups/weatherhead/>

Where will GRUAN go next?



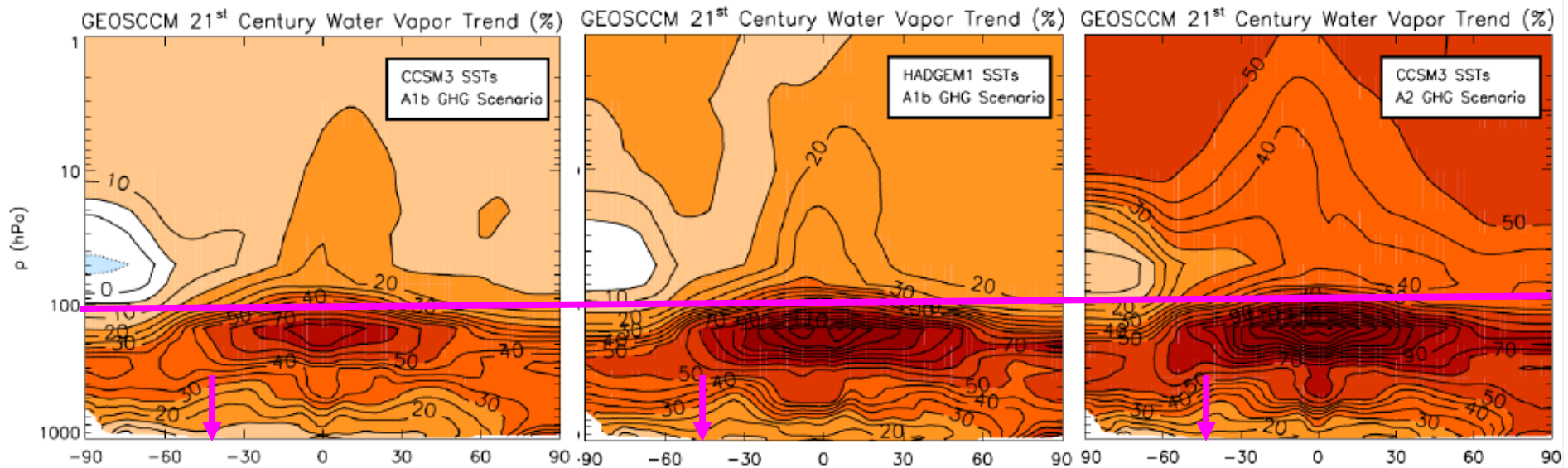
GRUAN Selection so far:

1-red (20yrs)

2-yellow (<25yrs)

~10-Green (~35yrs)

Going Forward ... Repeating Whiteman *(Tuesday talk)*



Number of Years to Detect Trends Using Two Different Sensors

Measurement Frequency	10% sensor	GRUAN required sensor
Daily	19	18
Every 4 days	24	22
Monthly	39	36

Implications for GRUAN?

- Cost/benefit on frequency
- Station locations (next page)
- Instrument mix: move beyond sondes soon.
 - e.g. Lidar+sonde mix

• Beltsville is @ 40N and SGP is at 36N; → 100hPa ~ 16km

Thank you!

PS: If you want to hear about wind comparisons please let me know.