

Additional inputs, comments and related information

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Please use this space to post any additional inputs, comments and related information.

Issues raised by Peter Thornton

As I made clear I think in December I'd like an auditable and complete analysis trail of uncertainties that could arise on climate timescales for the entire pathway raw measurement -> retrieved geophysical parameter in a single comprehensive published study.

I think I'd structure a comprehensive investigation along the lines of the trail of getting from measurement to final data and simply identify and parameterise every source of possible uncertainty that could arise along the way. This would make my head less likely to explode as much as anything else ...

* Time delay - Benchmark measure

* Bending angle - ionosphere assumption - what are plausible climate and cyclical changes (solar hugely important here we really don't want to alias in a solar cycle to our retrievals if it is really an ionospheric effect)

* upper boundary assumption - can check plausible range of changes.

* sampling issues - presumably average out but would be useful to know how plausible changing density of obs may impact timeseries characteristics.

* Geophysical T and q - dependencies on each other - current vogue for dry assumption to actual potential changes in q can be checked using CMIP 3 suite. Can also use these to infer possible error terms lower down e.g. use GFDL temperature but sub in Hadley model moisture to give a biased moisture condition and see what the T errors are.

I may have missed steps but I would urge adopting a framework that tries to answer in such a systematic way the issue as it is likely to be more compelling and useful than trying some approach that is raising specific points in a disjointed way. Make a skeleton that is the actual methodological trail and then add your flesh to that skeleton ...

John Bates:

A possible criteria to establish more clearly the expectations for a timeline for transition and use of GPSRO as well as a rigorous assessment metric for achieving a mature ('benchmark') climate data record (see Table 1 in the document linked below).

[Restoration of NPOESS Climate Capabilities: Climate Data Records](#)

Exchanges between Bomin Sun, Ben Ho and Tony Reale
Hi Ben ...

Seth Gutman just forwarded to me comments on your slides

are your slides posted on a web site where I can gain access...?

I would like to see them

Also, in preparing my comments to Seth, yourself, etc with respect to Dian questions I gravitate back to the issue of defining the priori when processing COSMIC T and H2O profiles.

More generally each of the following steps must be carefully considered; is there a "best" (consistent) way to do each with respect to a climate variable:

processing the refractivity and bending angle profile

the calculation of the dry T profile

supply priori information on the moist Temperature profile (i.e., I believe the NCAR stream uses ECMWF)

retrieving the final moist temperature and associated moisture (and respective qc tag)

respective approaches for each of these must include respective uncertainty estimates

My interest lies mainly in steps 3 and 4 and our NOAA Product Integrated Validation System (NPIVS) can play a key part in assessing each these aspect, especially 3 and 4.

I have attached a brief PPT (2-slides) on NPIVS and COSMIC

I am prepared to present some preliminary result wrt COSMIC , etc at the Workshop

I believe that upper tropospheric moisture, tropopause and stratospheric temperature are potential significant/critical parameters for climate (and NWP) from COSMIC ... and am prepared to support studies in these areas (particularly if some funding (partial) source can be identified)

A key question for climate is whether the bending / refractivity suffices or is the goal a derived meteorological profile (I would argue the later is the ultimate goal)

If so, I would recommend that "NWP independent" approaches to derive these product be pursued (as well) ...

will be in touch

Tony

Ben Ho wrote:

Bomin

O.K. Looking forward to see Tony and discuss more in mid-march in Boulder.

Regards

Ben

On Mar 3, 2008, at 7:24 AM, bomin.sun wrote:

Hi Ben,

The radiosonde measurements are globally distributed but most of them are over land. Again the statistics I showed you were based only on several days of data and we might get more robust results by the time Tony heads for the workshop in mid-March (as more collocation data will have been accumulated by that time).

We are interested in adding ECMWF data (which is used as the background for COSMIC sounding retrievals) to our system by unfortunately the data available at COSMIC data site at UCAR is not in near-real-time mode. Tony said he will talk to you and other people about this issue too at the workshop. Thanks and Talk to you later.

Bomin

Ben Ho wrote:

Bomin

The paper is

Wee, T.-K., and Y.-H. Kuo, 2008: One dimensional variational retrieval of GPS radio occultation soundings: OSSE and real-data studies. Mon. Wea. Rev., (to be submitted).

The title is still tentative.

For your questions:

- 1) We use ECMWF temperature and moisture as initial conditions for 1D var algorithm.
- 2) Your results are interesting. For very moisture regions that GPS RO refractivity may have "super-refraction" (see my JTECH paper) which may lead to negative moisture retrievals. Where are those radiosonde data ?

Good to know that Tony will come in mid-march. Looking forward to talk to him more then.

Ben

On Feb 29, 2008, at 11:14 AM, bomin.sun wrote:

Hi Ben,

We added COSMIC to our collocation validation system last week and now are in the process of examining the accuracy of our collocation code. At the same time based on 4 days of collocation data we have, I did a comparison of COSMIC sounding with raob (attached) and it appears they are very close. The COSMIC data we used is wetPrf from UCAR. I have a couple of questions... wonder if you have answers to them:

- 1) Which NWP, NCEP AVN or ECMWF, is used as first guess to derive wetPrf? is there any doc for the physical retrieval of wetPrf?
- 2) is there any connection between the low tropospheric dry and warm tendency in COSMIC data as seen in the attached tables?

The attached result is very preliminary so please keep it to yourself. Thanks.

By the way, Tony Reale is planning to attend the GPSRO climate application workshop next month in Boulder. He and you may have more discussions on COSMIC data.

Thanks

Bomin

Ben Ho wrote:

Bomin

The general inversion procedure used by COSMIC can be found in Kuo, Y.-H., T. K. Wee, S. Sokolovskiy, C. Rocken, W. Schreiner, D. Hunt, and R. A. Anthes, 2004: Inversion and error estimation of GPS radio occultation data. /J. Meteor. Soc. Japan,/ *82B, *507-531.

There is another paper describing how to separate COSMIC refractivity into temperature and moisture. I will let you know that next week.

Have a nice weekend
Ben

On Feb 22, 2008, at 12:25 PM, Bomin Sun wrote:

Hi Ben,

Do you have any references available that describe how the COSMIC temperature and moisture soundings (for examples, the ones included in wetPrf data) are derived? Thanks

Bomin

Ben Ho wrote:
Hi Bomin

It was very nice to see you too. Thanks for keeping me update
your satellite-radiosonde collocation work. Here is my JAOT paper.
Please let me know if you have any questions.
Some other current submitted or accepted papers can also be found in <http://www.cosmic.ucar.edu/~spho/> <<http://www.cosmic.ucar.edu/%7Espho/>>

Happy New Year

Ben

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Shu-peng Ben Ho

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On Feb 8, 2008, at 10:39 AM, bomin.sun wrote:

Hi Ben,

It was very nice meeting you at the AMS conference in New Orleans, LA. We are now in the process of getting COSMIC sounding product and will keep you updated on the progress of our satellite-radiosonde collocation work.

Do you happen to have the electronic version of your 2007 JAOT paper: improvement of Temperature and Moisture Retrievals in the Lower Troposphere Using AIRS and GPS Radio Occultation Measurements ; Journal of Atmospheric and Oceanic Technology, AMS, Vol. 24, 1726-1739. DOI: 10.1175? if so, can you email me a copy?

Regards,
Bomin

[NOAA Product Integrated Validation System](#)

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