

NWP Working Group

Fiona Smith and Brett Candy
and all our working group members and attendees

130 attendees!

Actions and Recommendations from Previous meeting

- All Actions were completed or otherwise closed, apart from one on the evaluation of FY-3E data
 - We're happy to hear we should be able to start on this action by the next conference
- We have 13 Standing Recommendations and 5 Actions that we want to keep making. The list grows every meeting (we added an extra 3 at this meeting)
 - We've decided to keep these as a separate list from now on as an Appendix to the WG report.

Standing Actions

- **Action DA/NWP- Standing 1 on ITSC Co-chairs:** To bring relevant recommendations to the attention of CGMS.
- **Action DA/NWP- Standing 2 on DA/NWP WG members:** Send any evidence of RFI to co-chairs of the RFI Technical SubGroup - Jean Pla (jean.pla@cnes.fr), Richard Kelley (richard.kelley@noaa.gov), Stephen English (stephen.english@ecmwf.int) and Nancy Baker (nancy.baker@nrlmry.navy.mil)
- **Action DA/NWP- Standing 3 on DA/NWP WG members:** If you have estimates of revised channel characteristics resulting from post-launch diagnostics, please email these to the radiative transfer working group chairs
(Benjamin.T.Johnson@noaa.gov & Marco.Matricardi@ecmwf.int).
- **Action DA/NWP- Standing 4 on NWP centres:** Continue to provide information on instrument channels assimilated and their observation errors via the working group survey spreadsheet in advance of each conference.
- **Action DA/NWP- Standing 5 on DA/NWP WG Members:** Make suggestions and corrections to the DA/NWP Working Group website

Standing Recommendations (1/4)

- **Recommendation DA/NWP-Standing 1 to all relevant space agencies:** The constellation of at least three orbits (early morning, morning, and afternoon), each with full sounding capabilities (IR and MW), should be maintained. The overpass times of operational satellites with sounding capability (IR and MW) should be coordinated between agencies to maximize coverage and include a satellite in early morning orbit.
- **Recommendation DA/NWP-Standing 2 to the Satellite Agencies:** In support of maintaining a robust global satellite observing system, instrumentation to allow continued sounding of the temperature of the upper stratosphere and mesosphere (as for the SSMIS UAS channels) should be explored.
- **Recommendation DA/NWP-Standing 3 to Space Agencies:** New operational data dissemination infrastructure should be tested at an early stage (well before launch) with simulated data.
- **Recommendation DA/NWP-Standing 4 to Space Agencies:** There should be open and early access to new satellite data for all NWP centres to help with calibration and validation.

Standing Recommendations (2/4)

- **Recommendation DA/NWP-Standing 5 space agencies:** Satellite agencies should work with their primary user communities to assess the limitations in the exploitation of satellite data, and also engage with users less closely connected to their agencies
- **Recommendation DA/NWP-Standing 6 to funding bodies of NWP centres and space agencies:** Consider, as part of the cost of satellite programmes, providing computational and personnel resources targeted at operational NWP centres to optimise the public's return on investment from these expensive measurement systems.
- **Recommendation DA/NWP-Standing 7 to Data providers:** Include azimuthal viewing and solar angles as appropriate in BUFR for present and future instruments.
- **Recommendation DA/NWP-Standing 8 to Space Agencies and data providers:** When designing new or modified BUFR formats, please circulate drafts to the NWP community via the NWP Working Group for feedback, prior to submission to WMO.
- **Recommendation DA/NWP-Standing 9 to Data Providers:** When using PC compression, noise normalisation should be performed using the full noise covariance matrix.

Standing Recommendations (3/4)

- **Recommendation DA/NWP-Standing 10 to Data Providers:** If a change to data processing results in a **change in brightness temperature of 0.1K or 20% of NEdT** (whichever is smaller), this should be made clear in notifications to users. These **notifications should be made no later than 8 weeks** before the change and test data should be provided if possible.
- **Recommendation DA/NWP-Standing 11 to Data Providers:** The **overlap period where one satellite resource is replacing another** should be chosen after consultation with the user community and should follow WMO guidelines.
- **Recommendation DA/NWP-Standing 12 to Data Providers:** In order to facilitate evaluation of new data by NWP centres, **aim for distribution in near-real time**.

Standing Recommendations (4/4)

- New Standing Recommendations this meeting:
- **Recommendation DA/NWP - Standing 13 to Data Providers:** Provide NedT estimates for inclusion within BUFR for microwave data.
- **Recommendation DA/NWP- Standing 14 to Data Providers:** Make NedT estimates from microwave instruments available as time series on publicly available websites to enable monitoring of instrument health in near real time.
- **Recommendation DA/NWP- Standing 15 to Instrument Developers:** Pre-launch calculation of NEdT should use the same algorithm as will be used in-orbit using warm target counts variability divided by the instrument gain
- **Recommendation Standing 16 to Data Providers:** Develop and maintain public instrument status monitoring web pages similar to ICVS from NOAA/NESDIS.

International activities

- We support the re-activation of the RFI technical subgroup and look forward to working with them to provide NWP evidence and monitoring information that will support them in the coming years
- WMO Expert Team for Space Systems and Utilization – encourage members to read the position paper on satellite Data Requirements for Global NWP and listen to the talk from Ken Holmlund

NWP-SAF support for EUMETSAT's future missions

- Nigel Atkinson presented the software packages that will be provided by the NWP-SAF
- Some changes from EPS missions
 - standard data format is netCDF – though NRT distribution likely to include BUFR
 - PC-compressed hyperspectral sounder data
- **ACTION DA/NWP 23-2 on WG Members:** Please review the software design documents for ISPP and MWIPP/AAPP on the NWPSAF website and provide feedback to Nigel Atkinson by the end of July 2021 (nigel.atkinson@metoffice.gov.uk)
- **ACTION DA/NWP 23-3 on WG Members:** Contact Nigel Atkinson by the end of July 2021 (nigel.atkinson@metoffice.gov.uk) to beta test IRSPP
- **ACTION DA/NWP 23-4 on Sreerekha TR:** Circulate EUMETSAT's data distribution plan to the DA/NWP WG when it is released.

NOAA Future Architecture (1/2)

- Sid Boukabara and Will McCarty presented the work of the System Performance Assessment Team providing feedback to NOAA from a science and user expectation perspective
- Various recommendation documents are available on their website
 - <https://www.star.nesdis.noaa.gov/sat/index.php>.
- Items discussed
 - Spectral coverage of infrared sounder
 - Instrument collocation
 - Footprint size
 - Role of small satellite missions vs JPSS follow-on
 - Range considered in trade-off envelope (performance vs constellation vs cost)
 - Intercalibration
 - RFI

NOAA Future Architecture (2/2)

- It was proposed to hold a meeting of interested WG members to collate feedback on the SAT's questions listed above.
- **ACTION DA/NWP 23-5 on WG members:** email Fiona and Brett if they are interested to be part of SAT feedback discussion group
- **ACTION DA/NWP 23-6 on WG chairs and Will McCarty:** organise an online meeting to discuss feedback to the SAT on the questions discussed during the WG meeting.
- All members are encouraged to review the SAT documents and to provide feedback, regardless of whether they join the discussion group.
- **ACTION DA/NWP 23-7 on WG members:** Review SAT recommendation documents and provide any feedback to Will McCarty (will.mccarty@nasa.gov) by the end of July 2021
- **ACTION DA/NWP 23-8 on WG members:** Contact Lihang Zhou (lihang.zhou@noaa.gov) by the end of June 2021 to be invited to the LEO Constellation Architecture Study workshop on future Microwave Sounders.

CrIS Status

- Mutual thanking of NWP WG and NOAA staff regarding consultation process for decisions around S-NPP configuration (LW+SW or MW+SW)
 - Majority of NWP users favour LW+SW for operations at the present time
- **ACTION DA/NWP 23-9 on WG members:** Forward any results of studies for the use of MW-only or MW+SW channels to the working group.
- Sub-pixel heterogeneity (long-running topic)
 - Users have a requirement for this information
 - Clusters vs first order statistics
 - Some lack of clarity from NOAA but we are pleased to report that the situation is evolving rapidly and work is underway to assess clustering and geolocation algorithms
- **Action DA/NWP 23-10 on WG co-chairs:** Follow progress on implementation of CrIS sub-pixel heterogeneity information at NOAA and report back to WG members bi-annually.

POES Continuation

- Orbital drift since launch has meant that these satellites help to improve data coverage for AMSU-A and MHS (NOAA-19). Several NWP centres have already sent evidence (FSOI and data denial studies) to help support the case for continuing the data dissemination from these satellites and there will be further discussions on this as part of the group meeting to discuss the SAT questions above. The orbital drift will continue and so these results provide a current snapshot of impact.
- **Recommendation DA/NWP 23-1 to NOAA:** Continue to produce POES L1 sounding products for near-real time dissemination
- **Action DA/NWP 23-11 on WG members:** send results of forecast studies that indicate the continuing impact on NWP of POES satellites to Mitch Goldberg (mitch.goldberg@noaa.gov)

GIIRS BUFR Sequence

- New BUFR sequence developed by Nigel Atkinson and Chris Burrow
 - Not based on CrIS or IASI because of unique characteristics of the data stream, for example, geolocation
- **ACTION DA/NWP 23-12 on Chris Burrows:** Provide Working Group with the draft GIIRS BUFR sequence and invite comment.
- **ACTION DA/NWP 23-13 on WG Members:** Provide feedback to Chris Burrows (chris.burrows@ecmwf.int) on the draft GIIRS BUFR sequence by the end of July 2021.

CGMS HLPP (1/2)

- PC Score hybrid compression
 - We thank EUMETSAT for their continued research in this area. Hybrid scores will be available from Nov/Dec 2021
 - We note the hybrid approach is also being investigated by the CrIS team
- **Recommendation DA/NWP 22-14 to NWP Centres:** All centres should use the IASI Hybrid PC-compressed dataset to ensure they are prepared for MTG-IRS. Users are requested to provide feedback to EUMETSAT on the use of these data.
- Mutually-agreed update strategy for PC basis
 - ECMWF and EUMETSAT are working together to investigate the impact of a change in eigenvector basis. (Poster by Cristina Lupu)

CGMS HLPP (2/2)

- NeDT in BUFR
 - Progress: ATOVS from EUMETSAT and ATMS from NOAA have NeDT included. ATOVS from NOAA does not but Yong Chen is looking into this (-> continuation of POES products)
 - Previous recommendation reworded and new ones added – consistency of algorithm is less important than consistency of time series
- **Recommendation DA/NWP - Standing 13 to Data Providers:** Provide NedT estimates for inclusion within BUFR for microwave data.
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Science Topics – not much time!

- Satellite data in convective scales, and challenges of increasing volumes of radiances
 - How to move towards higher density of observations (temporal and spatial error correlations)
 - Improvement in observation operators with sub-km scale grids
- Bias handling in LAMs
 - Still an area of active research
- Plans to hold a science meeting in the autumn (er... spring...)
- **ACTION DA/NWP 23-14 on WG members** - contact Roger Randriamampianina (rogerr@met.no) to join a group that will discuss bias correction in LAMs.
- **ACTION DA/NWP 23-15 WG members:** contact WG co-chairs by the end of July 2021 with topics for a science meeting (already proposed are assimilation in LAMs and how to deal with instruments on small satellites)
- **ACTION DA/NWP 23-16 on WG Co-chairs:** arrange another meeting in a few months to discuss the science issues.

Website - <https://groups.ssec.wisc.edu/groups/itwg/nwp>

- Reviewed by WG co-chairs prior to conference.
 - Thanks to Steve Swadley for helping us to maintain SSMIS status information
 - Further content review necessary, though very out-of-date pages have been retired
- **ACTION DA/NWP 23-17** on WG members to review Space Agency contacts page on the website
- The regional model page is still considered to be an important resource;
- **ACTION DA/NWP 23-18** on WG members: Provide impact recent LAM study references to WG co-chairs for inclusion on the website

AOB Recommendations

- **Recommendation 23-3 to Space Agencies:** Following the successful use of the SAPHIR instrument, future MW missions operating on a similar low inclination orbit are recommended.
- **Recommendation Standing 16 to Data Providers:** Develop and maintain public instrument status monitoring web pages similar to ICVS from NOAA/NESDIS .

A few recommendations to keep for now

- **Recommendation DA/NWP 23-2 to NOAA-NESDIS/NASA:** Continue to provide AIRS data in real-time to NWP centres for as long as calibration of the instrument is possible.
- **Recommendation DA/NWP22-3 to the NWP Centres:** Work to assess the impact of the upper atmospheric sounding channels of SSMIS in NWP and determine the information content unique to those channels e.g. via data denial experiments.
- **Recommendation DA/NWP 22-18 to NWP Centres:** Evaluate IKFS-2 data.

Thank you for your valued
input!