DBNet – Status and Plans

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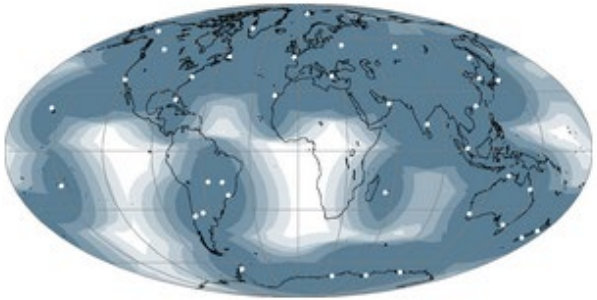
Chairman, DBNet Coordination Group

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

WMO OMM
World Meteorological Organization
Organisation météorologique mondiale

DBNet concept and objectives

- Global availability of near real-time LEO data received by a collection of Direct Broadcast stations distributed around the world
- Ensuring global consistency by using common software (i.e. AAPP) consistent with global processors, standardized coding and file naming, and quality monitoring
- Dissemination by the WMO Information System (primarily GTS)
- Coordinated by WMO Space Programme, supported by CGMS



DBNet-ATOVS coverage in February 2019

- Initial target established 2004: NOAA and Metop ATOVS$_a$ (L1b) from 90% of the globe available on the GTS in 30 min
- Latency goal revised 2015 to 20 minutes to reflect evolving SRNWP needs
- Goal achieved for ATOVS (2017)

a - ATOVS= HIRS, AMSU-A, AMSU-B, MHS

Case for DBNet (Sep 2019)

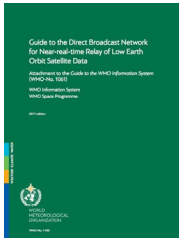
- Global LEO Data Latency – Summary (NWPSAF monitoring for ATOVS and ATMS)
  - Metop-B and NOAA-20 have overall latency of 50 min (90% of data) through use of Svalbard and McMurdo)
  - Metop-A, -C and Suomi-NPP have latency around 100 minutes (Svalbard only)
  - FY-3C has 290 min latency for MWHS. (Use of Kiruna and China Ground Stations)
  - FY-3D also uses Trollsat on Antarctica, thus improving the global latency, 180 min for MWHS.
- Case still remains clear for DBNet with goal of 20 minutes latency

DBNet components

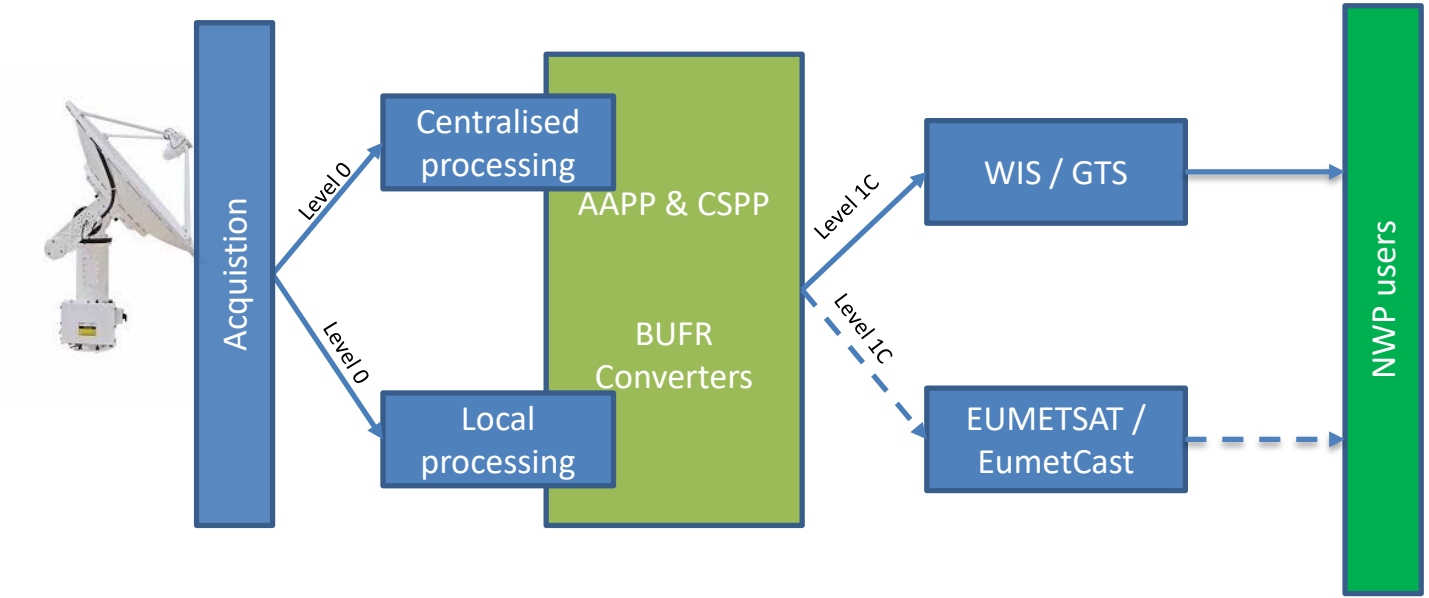
- DBNet is composed of regional networks coordinated by regional or sub-regional nodes and the global DBNet Coordination Group (https://community.wmo.int/direct-broadcast-network-dbnet)
- Global monitoring of product consistency is performed by the NWPSAF (http://nwpsaf.eu/site/monitoring/dbnet/)
- Last coordination meeting held in Paris, October 2018
- Inter-sessional meeting, July 2019

Regional Network	Regional or Sub-regional Node
DBNet – EUMETSAT (EARS)	EUMETSAT
DBNet - Asia-Pacific	JMA
	BoM
DBNet - South America	INPE
	SMN Argentina / CONAE
DBNet - NOAA	NOAA / CIMSS

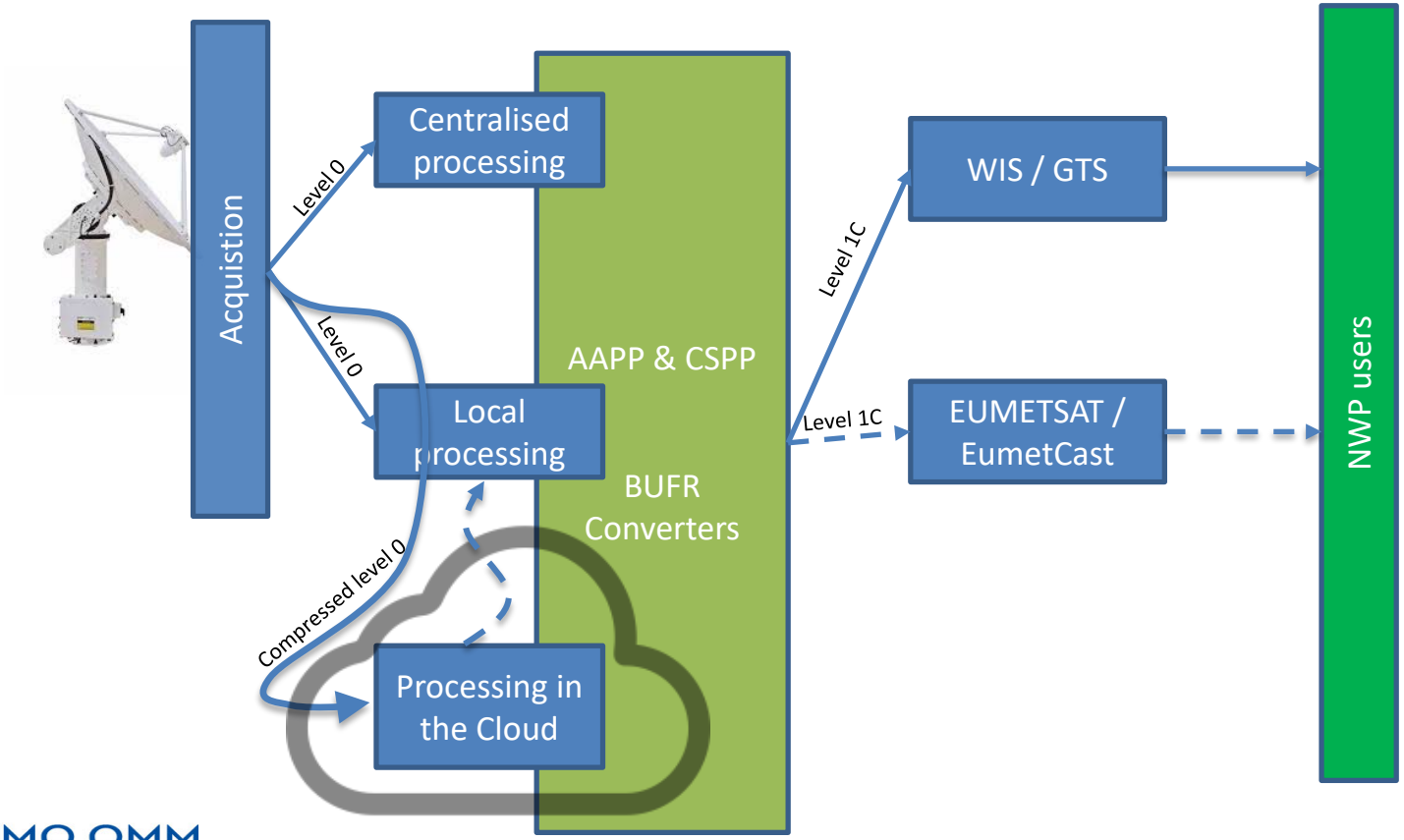
Guide endorsed by WMO Commission for Basic Systems in Nov 2016



DBNet processing



DBNet processing

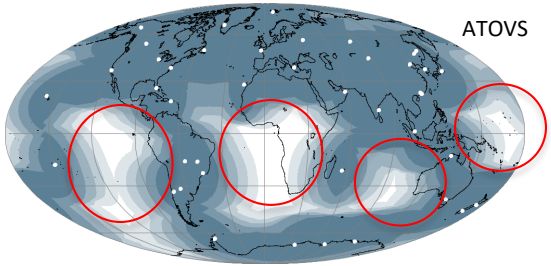


Current and potential DBNet services

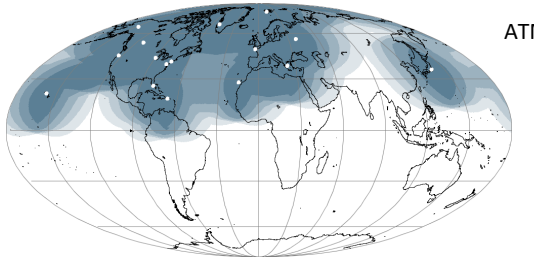
- Each DBNet regional network contributes to one or more “Services”
- A DBNet Service consists of Direct Broadcast acquisition, processing and relay of a category of satellite data

Categories of services	Services/Instruments	Data latency goal/threshold
IR/MW sounding	ATOVS (AMSU-A, MHS, HIRS) ATMS, VASS (MWTS, MWHS, IRAS)	20 min/ 30 min
Hyperspectral IR sounding	CrIS, IASI, HIRAS	10 min/ 20 min
IR/VIS imaging	VIIRS, AVHRR, MERSI	20 min/ 30 min
Scatterometry	ASCAT	20 min/ 30 min
MW imagery	MWRI, AMSR-2, MTVZA-GY	20 min/ 30 min

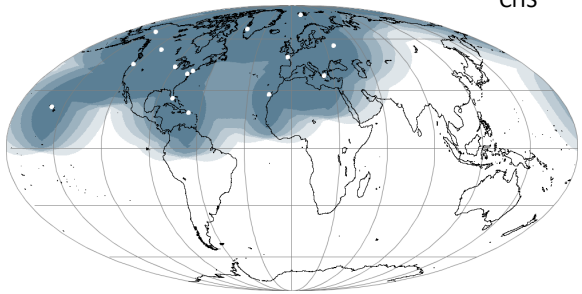
DBNet Coverage August 2016



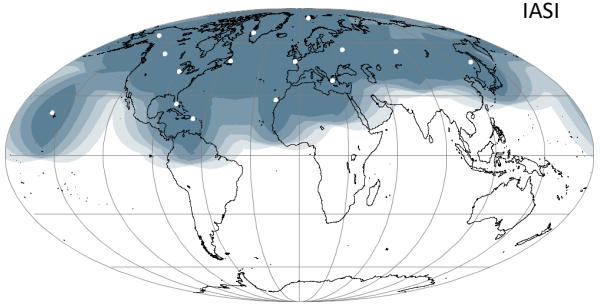
ATOVS



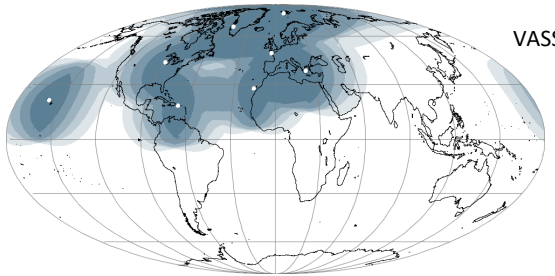
ATMS



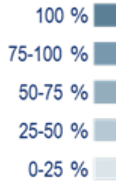
CrIS



IASI

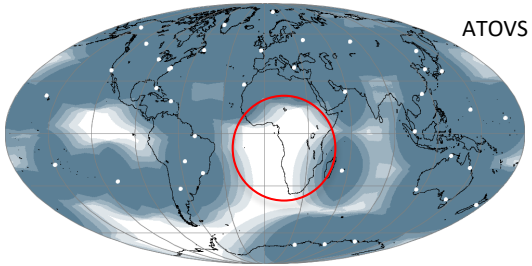


VASS (FY-3)

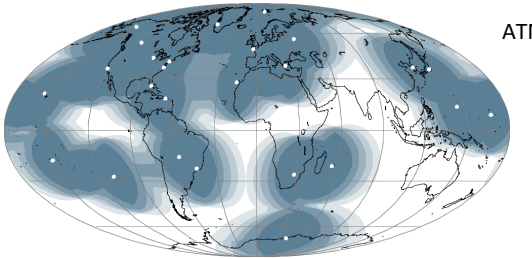


Plots from A. Meier Sørensen

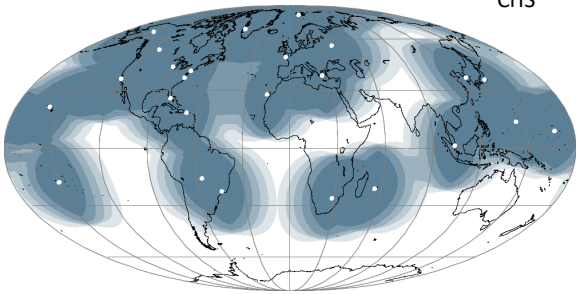
DBNet Coverage October 2019



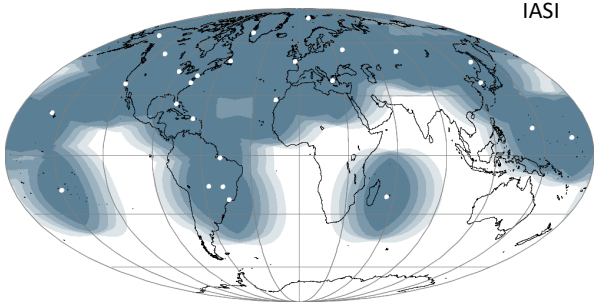
ATOVS



ATMS

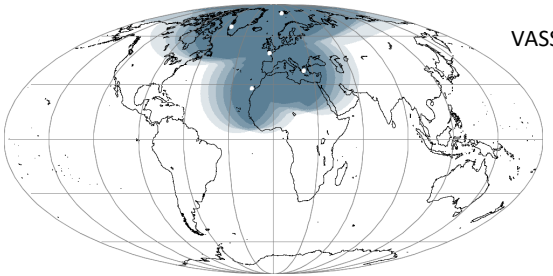


CrIS



IASI

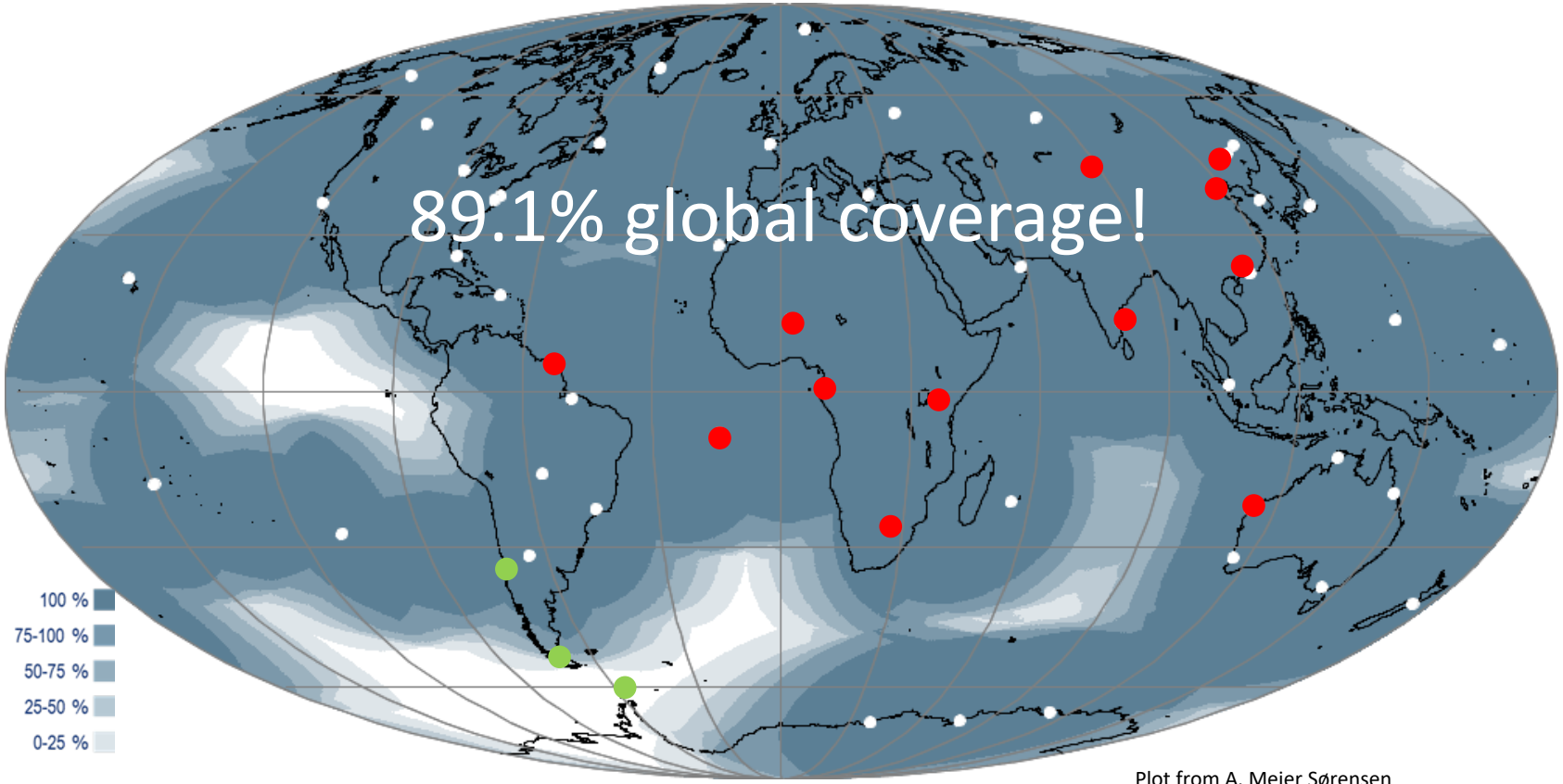
100 %
75-100 %
50-75 %
25-50 %
0-25 %



VASS (FY-3)

Plots from A. Meier Sørensen

DBNet ATOVS Expected Coverage 2021



Plot from A. Meier Sørensen

WMO OMM

Further DBNet coverage extension

- South America
  - INPE cooperation with SIPAM (Sistema de Proteção da Amazônia) regarding new stations in Manaus, Porto Velho and Belem.
  - New Argentina station in Tierra del Fuego
- Southeast Pacific
  - Chile DMC: Santiago, Punta Arenas (53°S) and Base Frei (62°S); fills the gap SE Pacific and SW Atlantic. Hope to get cooperation agreement.
  - Chile DMC: Isla de Pasqua: ATMS and ATOVS products now available, cooperation between CIMSS and station operator (CLS)
- Southwest Indian Ocean
  - Station in Learmonth planned by BoM (~2021)

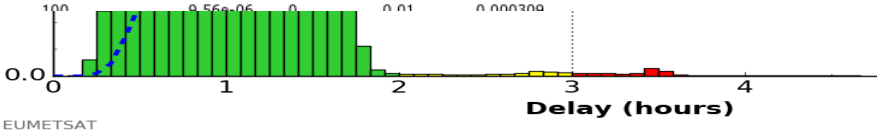
EUMETSAT

DWD Delay Statistics for ATMS (DBNet)

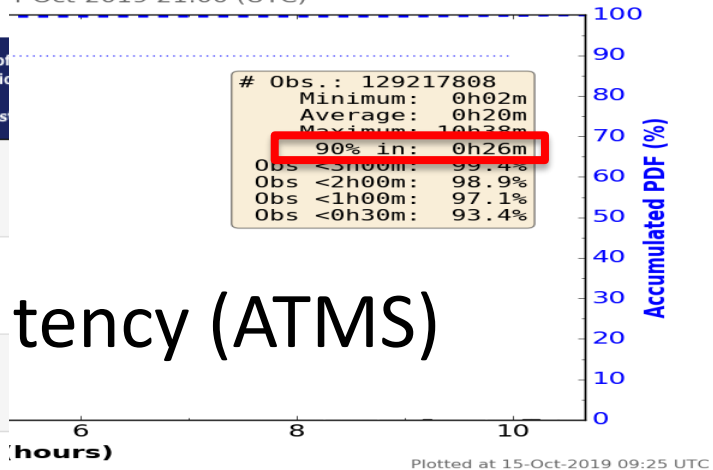
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

nings: All Overpasses Search:

Mean Navigational Difference/m	Percentage of valid BTDs	Mean BTD	Min BTD	Max BTD	STD of BTD	No. of spuri local times
7	100	1.25e-05	0	0.01	0.000354	0
	100	1.06e-05	0	0.01	0.000326	
	100	1.45e-05	0	0.01	0.00038	
	100	6.27e-06	0	0.01	0.000251	
9	100	9.3e-06	0	0.01	0.000305	0
	100	1.3e-05	0	0.01	0.000361	
	100	1.24e-05	0	0.01	0.000352	
	100	8.07e-06	0	0.01	0.000284	
8	100	1.41e-05	0	0.01	0.000376	0
	100	8.15e-06	0	0.01	0.000285	
	100	1.03e-05	0	0.01	0.000321	
	100	7.6e-06	0	0.01	0.000276	
10	100	1.99e-05	0	0.01	0.000445	0
	100	7.45e-06	0	0.01	0.000273	
	100	9.93e-06	0	0.01	0.000315	
	100	3.72e-06	0	0.01	0.000193	
6	100	9.51e-06	0	0.01	0.000308	0
	100	1.53e-05	0	0.01	0.000391	
	100	1.12e-05	0	0.01	0.000334	
	100	5.79e-06	0	0.01	0.000241	
6	100	6.6e-06	0	0.01	0.000257	0
	100	1.56e-05	0	0.01	0.000395	
	100	1.11e-05	0	0.01	0.000333	
	100	6.6e-06	0	0.01	0.000257	
9	100	9.17e-06	0	0.01	0.000303	0
	100	1.06e-05	0	0.01	0.000326	
	100	1.06e-05	0	0.01	0.000326	
	100	6.28e-06	0	0.01	0.000251	
	100	9.56e-06	0	0.01	0.000309	



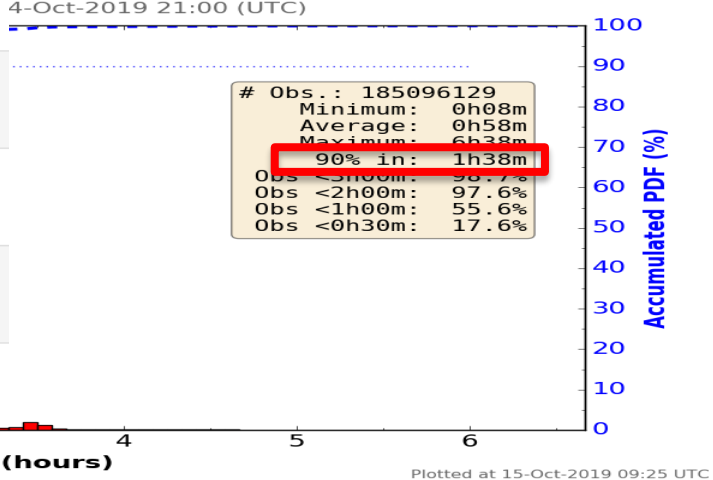
Suomi-NPP
4-Oct-2019 21:00 (UTC)



tency (ATMS)

Plotted at 15-Oct-2019 09:25 UTC

4-Oct-2019 21:00 (UTC)



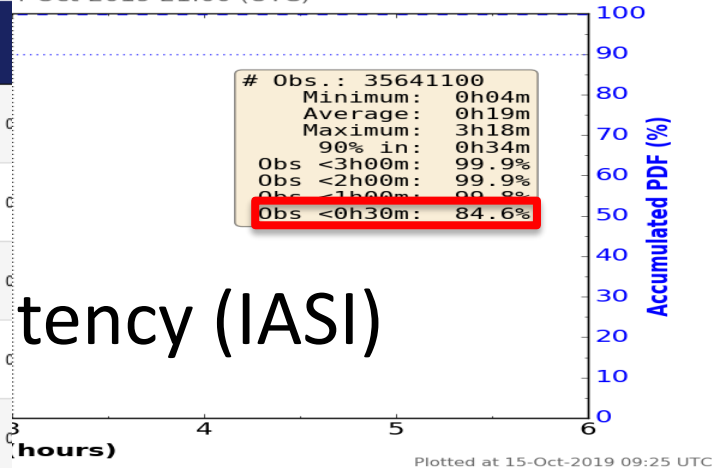
Plotted at 15-Oct-2019 09:25 UTC

View overpasses with warnings: All Overpasses Search:

Mean Navigational Difference/m	Percentage of valid BTDs	Mean BTD	Min BTD	Max BTD	STD of BTD
255	100 100 99.8	2.24e-05 -2.59e-05 -1.46e-05	-0.00714 -0.00203 -0.0297	0.0143 0.00406 0.0297	0.0028 0.00108 0.00426
527	100 100 99	-9.95e-05 7.33e-06 -6.29e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00203 0.0297	0.00198 0.00107 0.00428
540	100 100 99.1	-0.000163 -6.85e-06 -6.49e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00203 0.0297	0.00181 0.00107 0.00445
516	100 100 99.4	5.81e-05 4.47e-05 1.19e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00609 0.0297	0.00227 0.00108 0.00482
517	100 99.8 99.4	9.12e-05 5.94e-05 1.35e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00609 0.0297	0.00218 0.00108 0.00481
751	100 100 99.1	-0.00018 -4.12e-05 1.69e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00203 0.0297	0.00208 0.00114 0.00452
425	100 100 99.2	0.000213 9.21e-05 4.28e-05	-0.00714 -0.00203 -0.0297	0.0143 0.00406 0.0297	0.00204 0.00125 0.00535
333	100 99.8 99.4	0.000124 7.21e-05 3.67e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00203 0.0297	0.00201 0.00119 0.00527
480	100 100 99.1	8.7e-05 4.32e-05 -3.18e-05	-0.00714 -0.00203 -0.0297	0.00714 0.00406 0.0297	0.00199 0.00112 0.00466

cs for IASI (DBNet)
op-B, Metop-C
4-Oct-2019 21:00 (UTC)

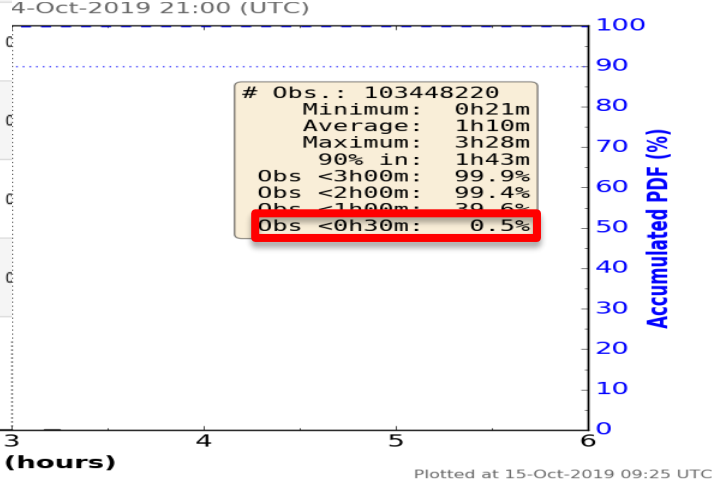
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

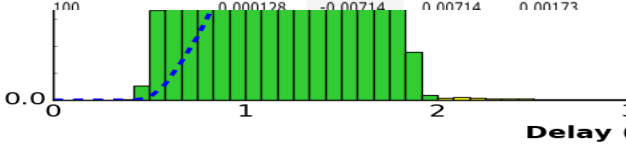


Plotted at 15-Oct-2019 09:25 UTC

tency (IASI)

4-Oct-2019 21:00 (UTC)





Plotted at 15-Oct-2019 09:25 UTC

DBNet NWP users survey

- Survey was issued to all GODEX-NWP members in January 2019
  - GODEX-NWP reviews and consolidates the operational data needs for Global Numerical Weather Prediction.
  - Members are NWP centres assimilating data for global models and major data producers (EUM, NESDIS)
- Responses received from 10 centres
  - KMA-Korea, JMA-Japan, BoM-Australia, ECMWF, INPE-Brazil, DWD-Germany, Météo-France, Environment Canada (EC), Metoffice-UK, NCEP-USA

DBNet NWP users survey

- ATOVS: all centres receiving, no comment
- ATMS: all centres assimilate or plans to assimilate
- VASS: ECMWF, EC and JMA assimilate MWHS; MetOffice, KMA, INPE, MF and BoM plans to assimilate MWHS
  - Low interest in MWTS.
- CrIS: All centers assimilate or plan to assimilate.
  - DWD has no plans
- IASI (Metop A/B): All centers assimilate or plan to assimilate.
  - EC has no plans

High priority DBNet activities in the coming years (as agreed by DBNet Coord Group Sep 2016)

- Consolidate the existing network for IR/MW sounding services, solving specific local problems
- Complete the infrastructure for Metop and S-NPP/JPSS (ie Asia)
- Implement consistent monitoring of DBNet part of overall latency and address specific timeliness problems
- Extend the geographical coverage of DBNet, capitalizing on existing capabilities (e.g. Tierra del Fuego, Isla de Pasqua, NW South America, Santa Maria Madre del Dios, Guam)
- Improve the user-friendliness of release process for processing software
- Advance the implementation of Hi-res IR services (IASI, CrIS)
- Contribute to the implementation of the new WIS metadata standard for DBNet products
- Strengthen the dialogue with global and regional WMO groups responsible for WIS capacity planning
- Advance the implementation of FY-3

DBNet outlook

- HIRAS
  - Hyper-spectral IR sounder launched on FY-3D in November 2017.
  - Level-1 pre-processing software available
- FY-3E
  - Planned for launch 2020
  - First full sounding suite in early morning orbit (~6:00 AM)
  - Is now confirmed to use RH circular polarization of X-band downlink, allowing acquisition with existing antenna feeds
- African coverage
  - EC-funded project (SAWIDRA) for local processing in Africa. Could potentially become part of DBNet
- Microwave Imaging
  - Relevant for regional NWP assimilation. Direct Broadcast available on FY-3/MWRI, GCOM-W1/AMSR-2 (restricted), Meteor/MTVZA-GY
- Radio occultation
  - Space Weather community has expressed interest in very-low-latency (target TBD) data for ionospheric monitoring and Direct Broadcast available for RO instruments on Metop-SG and FY-3
  - Could be provided by DBNet network, if fast processing is feasible
- EPS-SG local processing
  - EUMETSAT action on-going; some information before end of 2019.
  - *Reception: >=2.4m antenna, new bandwidth filter, Kongsberg: MEOS5 mandatory, Orbital System: demodulator HRD300.*

Thank you
Merci

Acknowledgements

- Nigel Atkinson, Anders Sørensen, Mitch Goldberg, Liam Gumley, Vincent Gabaglio
and the whole DBNet Coordination group

- All DBNet station operators

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TEMPS CLIMAT EAU

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