



Cloud products improvements in the frame of the CDOP4

NWCSAF Users' workshop
Madrid 10-12 march 2020

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Outline

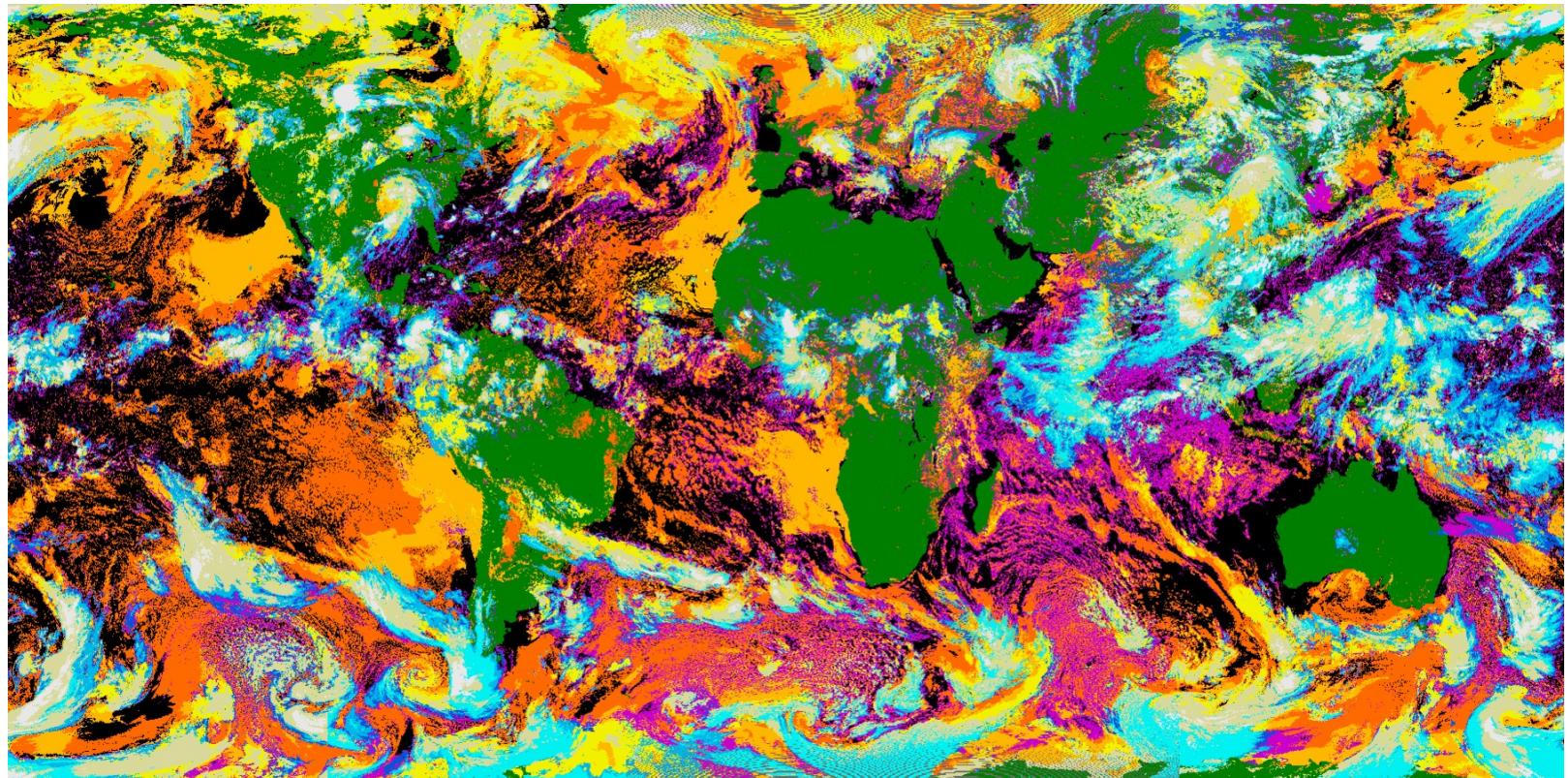
- Presentation of NWCSAF/GEO v2018
- Improvements for cirrus detection
- Stratiform/cumuliform distinction, first illustrations
- Further enhancements during CDOP4

NWC/GEO Cloud products v2018

- NWC SAF GEO v2018 has been released on 14th February 2019
- Patch v2018.1 (31th january 2020) includes the support to GOES-16
- Cloud products v2018 are validated for MSG1-4, Himawari8, and Goes16
- Parallelization using OpenMP standard
 - MSG: 3712x3712 pixels at NR resolution
 - Goes16 : 5424x5424 pixels
 - MTG : 5568x5568 pixels



Global coverage GOES, MSG and Himawari



Goes17

Goes16

MSG4

MSG1-IO

Himawari8

Cloud type 15th of July 2019 at 09UTC



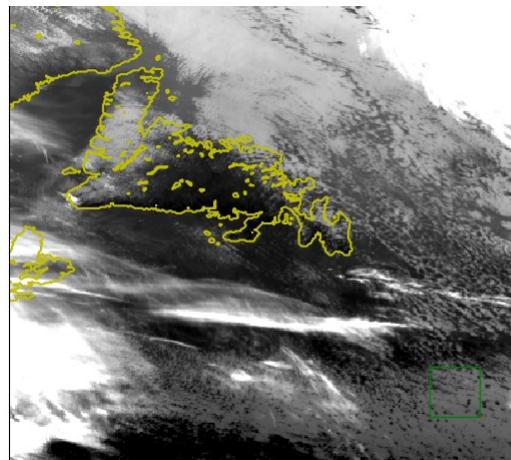
V2018 scientific improvements

- CMA : use of new channel 1,38 μm (Goes/ABI) for cirrus detection
- CT : use of new channels 1,38 μm (Goes/ABI) and 10.4 μm (Himawari/AHI and Goes/ABI) for semi transparent clouds identification
- CTTH : better CTTH retrieval near tropopause by extrapolating NWP profile above the tropopause. Use of RTTOV bias (between measurements and simulations)
- CMIC : use of 2,25 μm for cloud phase identification. Improvement of the rayleigh computation in the simulated cloud reflectances
- ⇒ Ready to use MTG/FCI new channels (1,38 μm , 2,25 μm and 10,5 μm) (MTG will be launched early 2022?)

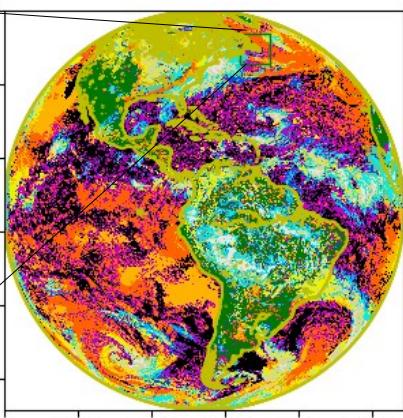
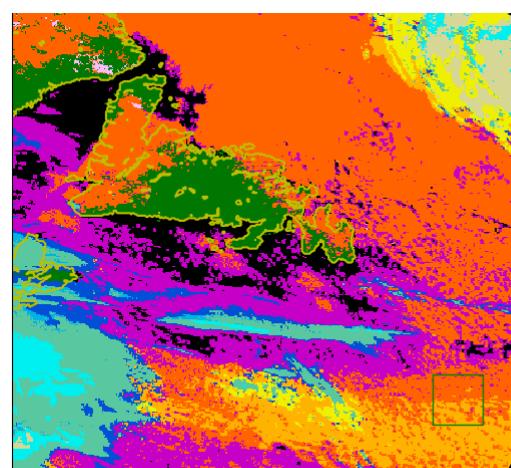
Label band for GEO imaging missions

LABEL	Himawari -8 & -9	GOES-16 & -17	MSG	MTG FCI
VIS04	0,455 µm	0,470 µm		0,444 µm
VIS05	0,510 µm			0,510 µm
VIS06	0,645 µm	0,640 µm	0,635 µm	0,640 µm
VIS08	0,860 µm	0,860 µm	0,810 µm	0,865 µm
VIS09				0,914 µm
HRV			0,750 µm	
NIR13		1,380 µm		1,380 µm
NIR16	1,610 µm	1,610 µm	1,64 µm	1,610 µm
NIR22	2,260µm	2,260 µm		2,250 µm
IR38	3,85 µm	3,90 µm	3,92 µm	3,80 µm
WV62	6,25 µm	6,15 µm	6,25 µm	6,30 µm
WV70	6,95 µm	7,00 µm		
WV73	7,35 µm	7,40 µm	7,35 µm	7,35 µm
IR87	8,60 µm	8,50 µm	8,70 µm	8,70 µm
IR97	9,63 µm	9,70 µm	9,66 µm	9,66 µm
IR103	10,45 µm	10,30 µm		
IR108	11,20 µm	11,2 µm	10,80 µm	10,50 µm
IR120	12,35 µm	12,3 µm	12,0 µm	12,30 µm
IR134	13,30 µm	13,3 µm	13,4 µm	13,30 µm

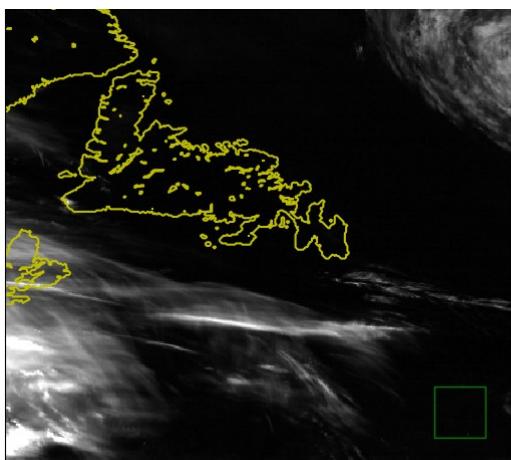
Cirrus distinction with channel $1.38\mu\text{m}$



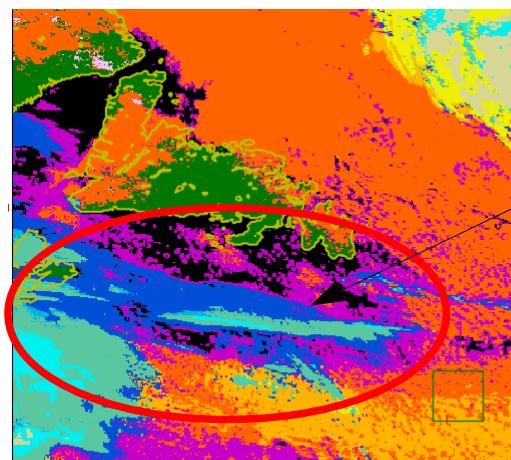
IR $11.2\mu\text{m}$



Goes16 cloud type
20181105 at 16h45



NIR $1.38\mu\text{m}$



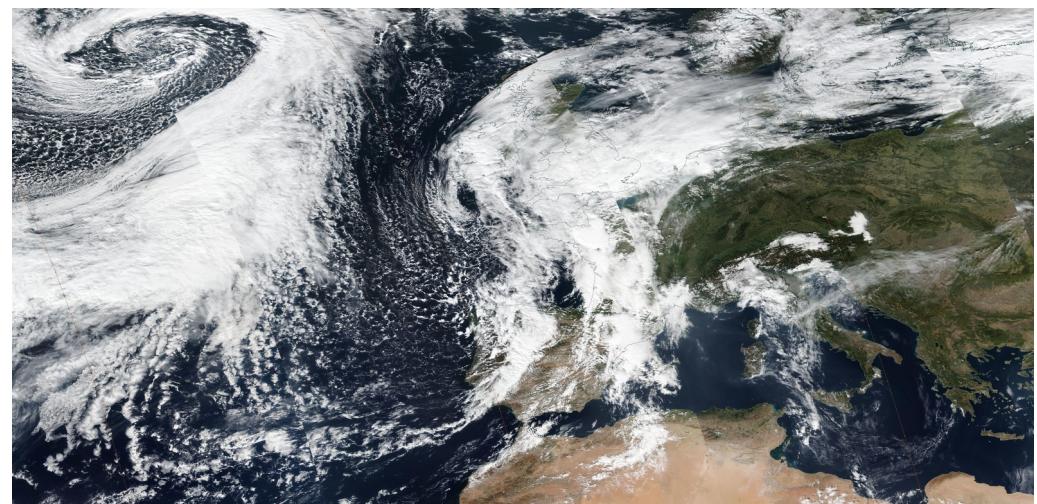
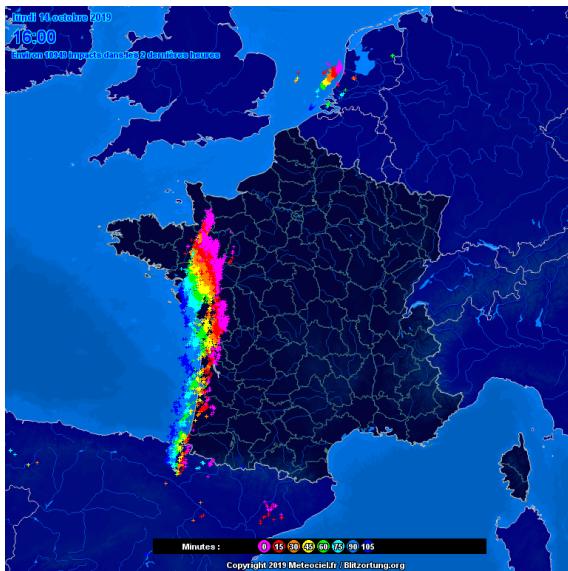
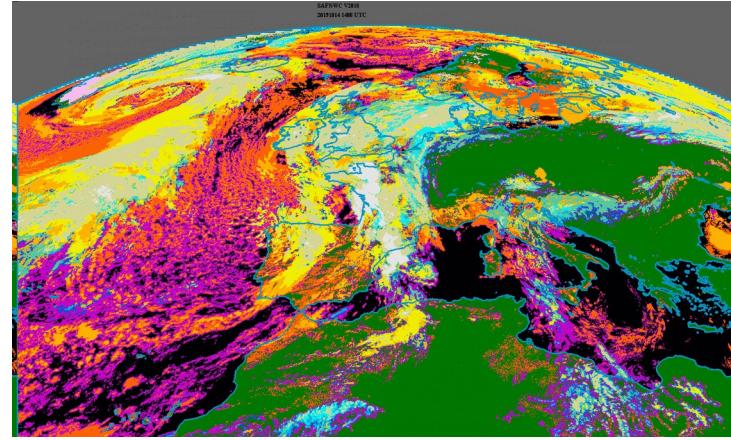
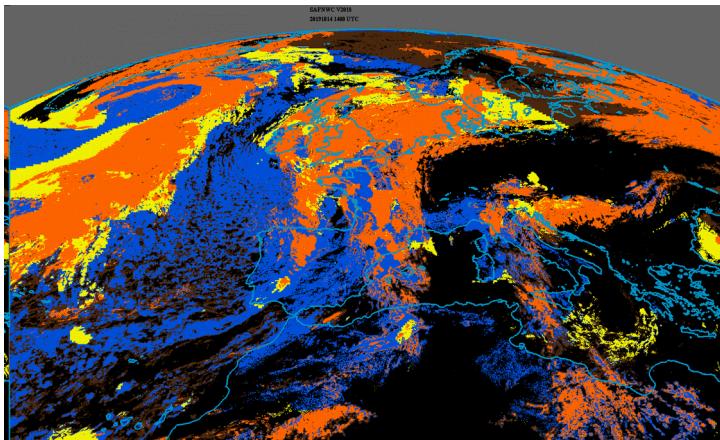
Better identification
of thin cirrus

Stratiform/Cumuliform distinction

- This distinction has been requested for long by users
 - Input for estimation of fog occurrence
 - Input for identification of convection
 - Support for NWP modelisation
- Study has been performed (for Msg) on methods based on the **use of texture** and pattern recognition techniques
 - Separation of opaque clouds with GLDV (Grey Level Difference Vector)
 - Better results with high resolution visible channel
- Flag in the cloud type: stratiform/cumuliform/mixed/undefined

Cloud type and strat/cum flag

Msg4 14th october 2019 14UTC

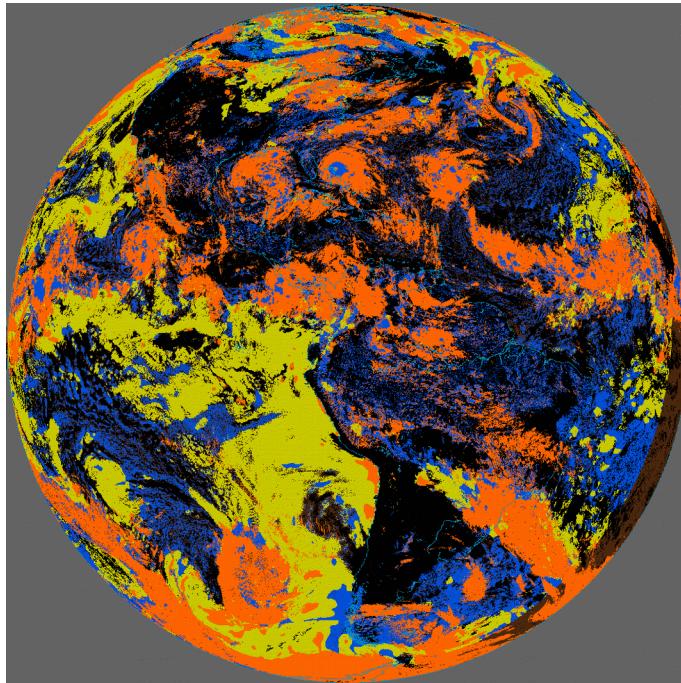


NPP/VIIRS at 1330 UTC
Corrected reflectance (True color) **NWC SAF**

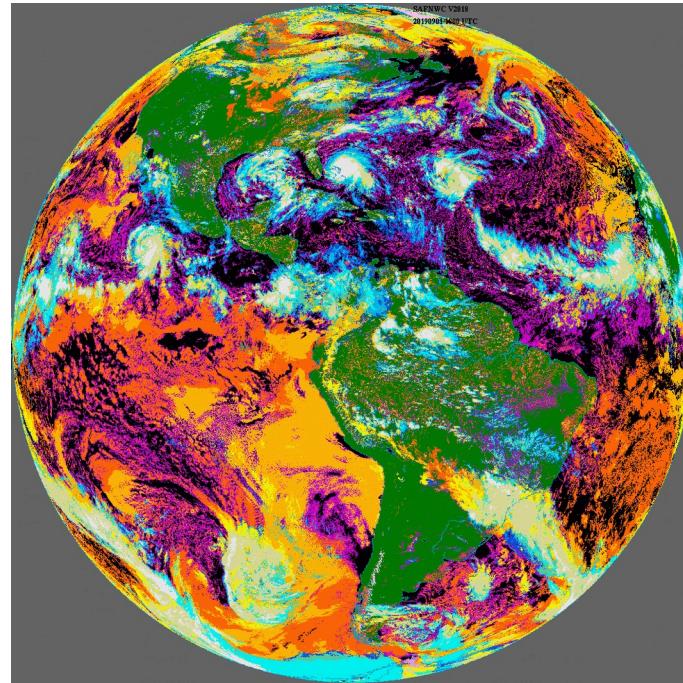


Lightning impacts 12-14UTC

Stratiform/Cumuliform Adaptation to Goes16



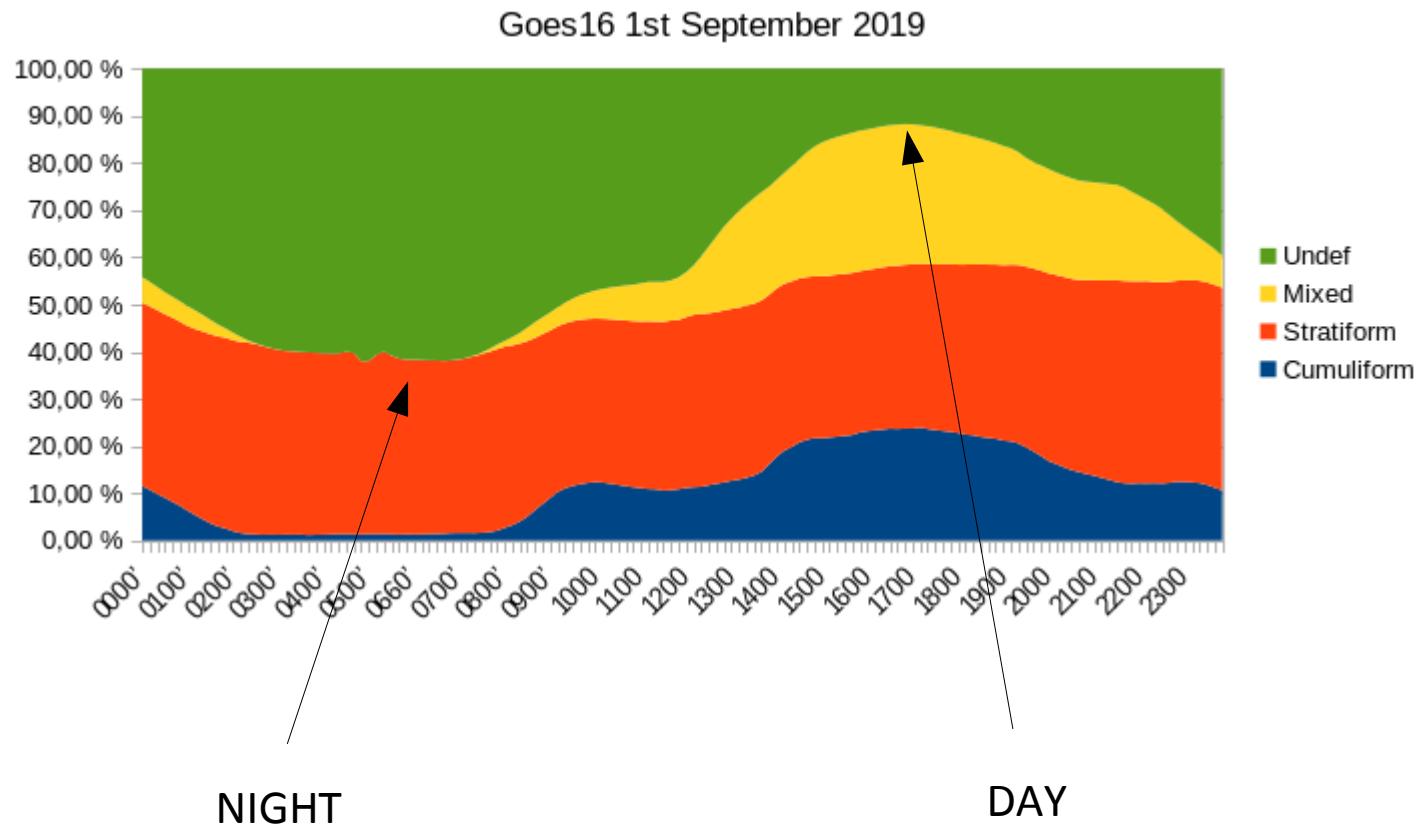
Goes16 1st of september 2019 at 18UTC
Flag cumuliform/stratiform



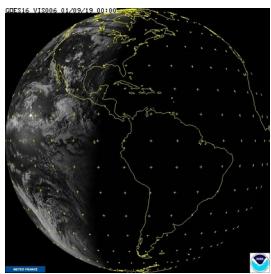
Cloud classification



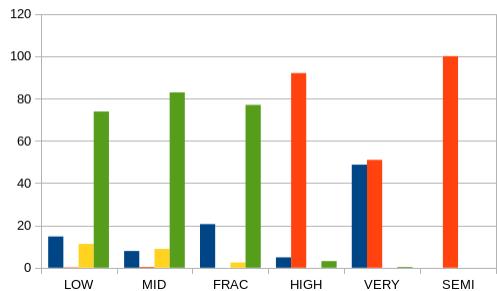
Stratiform/Cumuliform Adaptation to Goes16



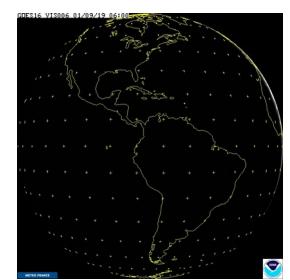
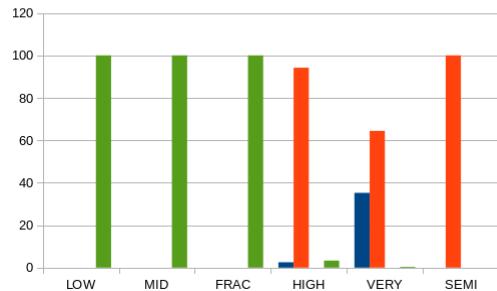
Stratiform/Cumuliform Adaptation to Goes16



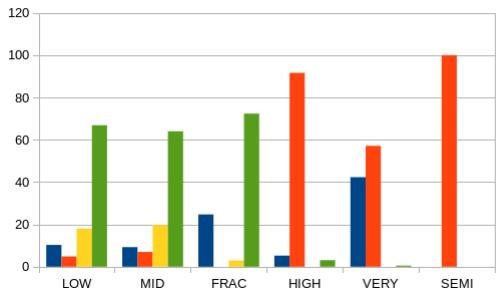
Goes16 1st September 2019 at 00UTC



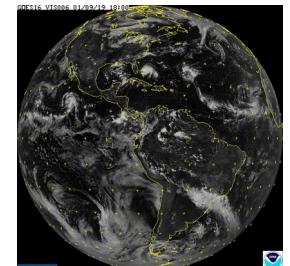
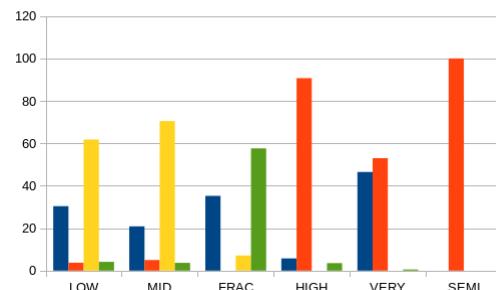
Goes16 1st September 2019 at 06UTC



Goes16 1st September 2019 at 12UTC



Goes16 1st September 2019 at 18UTC

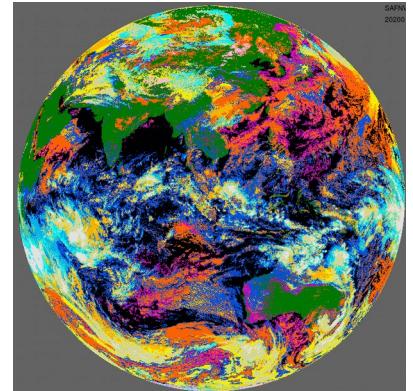


Further developments in CDOP4

- MTG-I day1 algorithm tuning with first set of MTG/FCI data
- Improvements for dust detection (⇒ Sonia's presentation)
- Stratiform/cumuliform separation:
 - Adaptation (tuning) for Goes16/17 and Himawari8/9
 - Validation
 - Use of lightning imager
- Better assessment of multi-layers (Cloud Type with new channels)
- Cloud products at high spatial resolution

Further developments in CDOP4

- CMA : add a flag smoke ? (With RGB vis06, vis05, vis04)
- Microphysic only using IR channels
- Cloud top height computation for fractional clouds
- Extend to other satellites ?
Ex : FY4 in case no MSG satellite over Indian Ocean



FY4 20 January 2020 at 06UTC

Conclusion

- NWCSAF/GEO v2018 software
 - Validated for Msg, Msg_io, Himawari8 and Goes16
- MTG-day1 release for cloud products
 - Based on v2018
 - **Ready to use new channels 1.38 and 2.25**
 - Work on infrared channels (⇒ Jean-Marie's presentation)
- Improvements for CDOP4 have been presented
- **Gather your requirements during this workshop**



Thanks for your attention !
Questions ?

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