SAFNWC/Cloud mask tuning for MTG

ICWG2 Madison, USA

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Plan

- Background

- What's new with MTG ?
  - Focus on IR window channels

- Prototype with Himawari8
  - First results

- Prototype with Goes16

- Conclusion and perspectives

Background - Schedule

- Software developped within the framework of the SAFNWC
  - http://www.nwcsaf.org

- Next release SAFNWC/GEO V2018 (Q1 2019)
  - MSG 2-4
  - MSG1 over Indian ocean
  - Himawari 8-9
  - Goes 16-17

- MTG I1 planned launch Q4 2021

- SAFNWC/cloud products MTG Day1

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Background

- Cloud products applicable to a wide set of imager on board GEO
  - SEVIRI (Msg1-4), AHI (Himawari 8&9), ABI (Goes16&17)

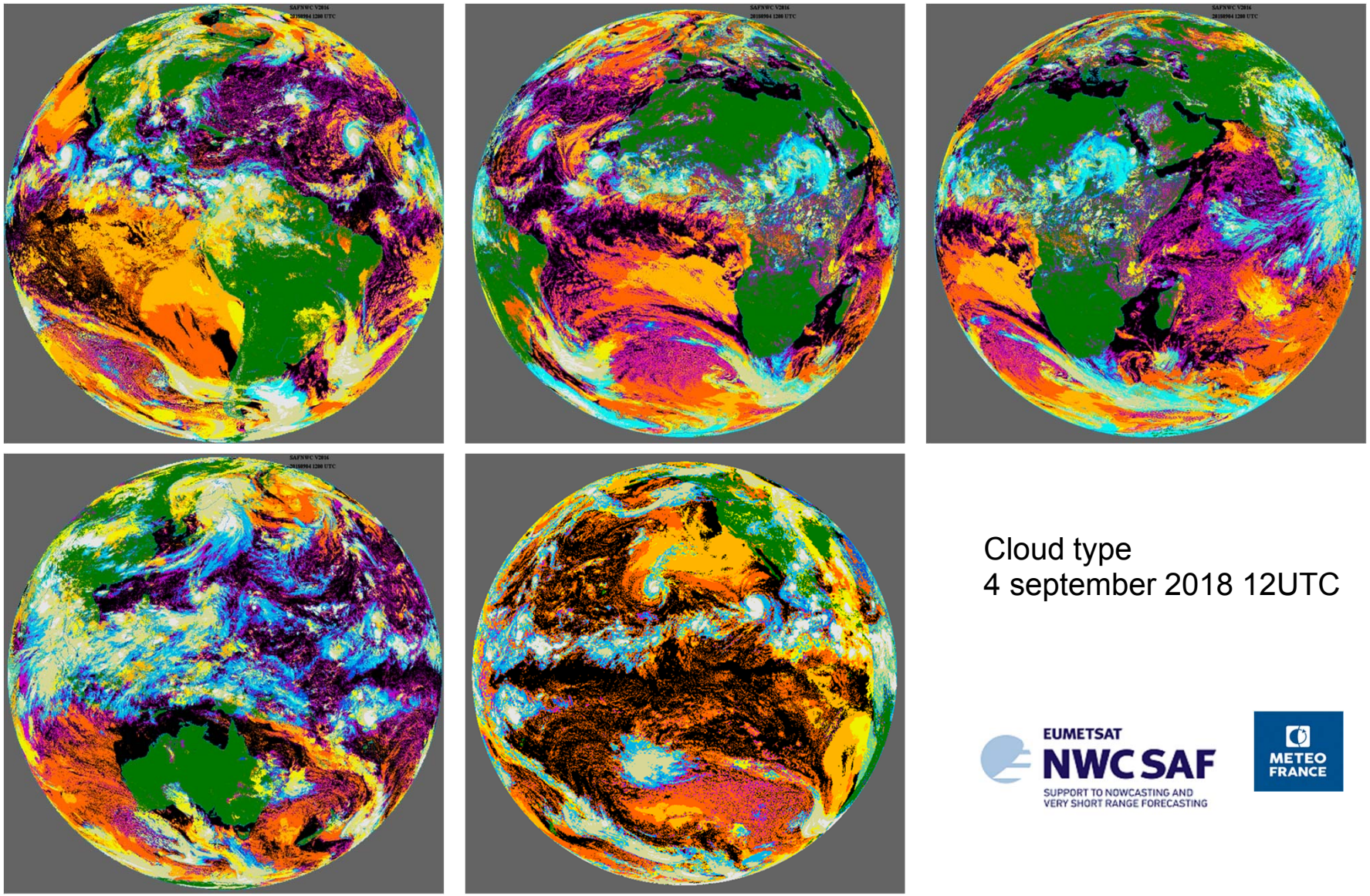
- The use of labels allows to access the spectral bands in a similar manner for all the satellites (The exact central wavelengths of the corresponding channels depending on the satellite)

- Multispectral thresholds method (Cloud mask and Type)

- A limited set of spectral bands is mandatory

- Use of RTTOV, DISORT, 6S to tune the spectral

Cloud type Goes16, Msg4, Msg1, Himawari8, Goes15



Cloud type
4 september 2018 12UTC

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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

MTG - Impact for cloud detection

LABEL	Himawari -8 & -9	GOES-16 & -17	MSG	MTG FCI
IR103	10,45 µm	10,30 µm		
IR108	11,20 µm	11,2 µm	10,80 µm	10,50 µm

Main feature to account for :

- MTG/FCI central wavelength : 10.5µm different from MSG/SEVIRI 10.8µm
- For Goes16/17 and Himawari8/9 two channels: 10.3µm/10.45µm **and** 11.2µm
  - **No T11.2µm channel on MTG/FCI**
- T108-T38 for low cloud detection
- T87-T108 and T108-T120 for semi-transparent cloud

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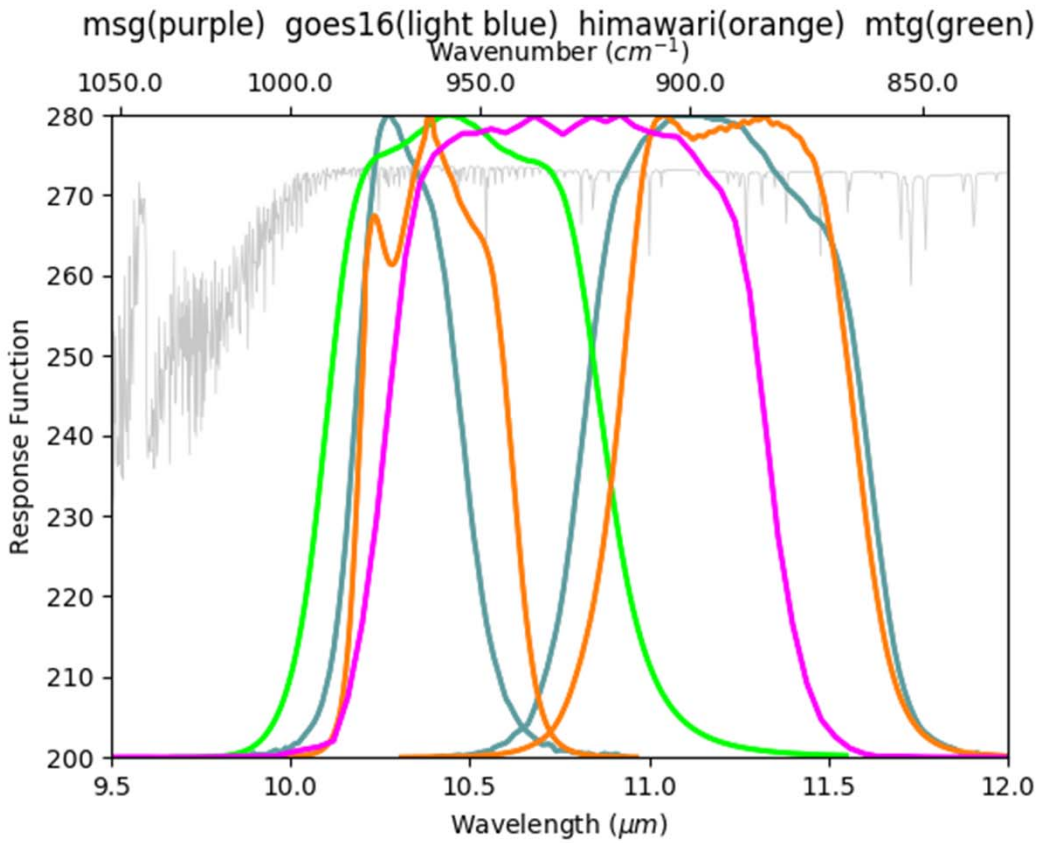
Spectral response comparison



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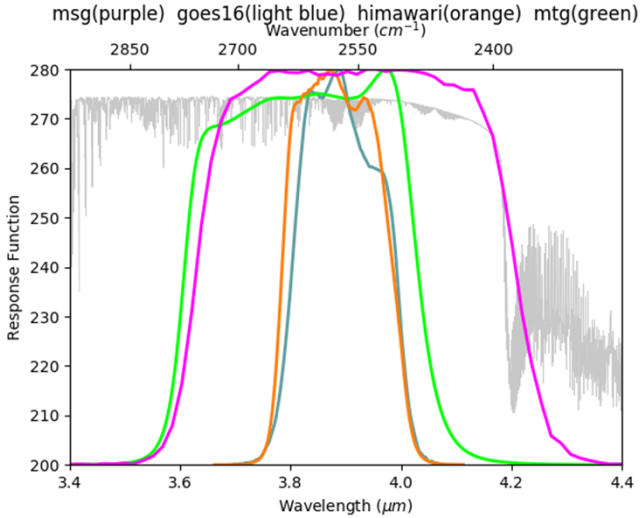
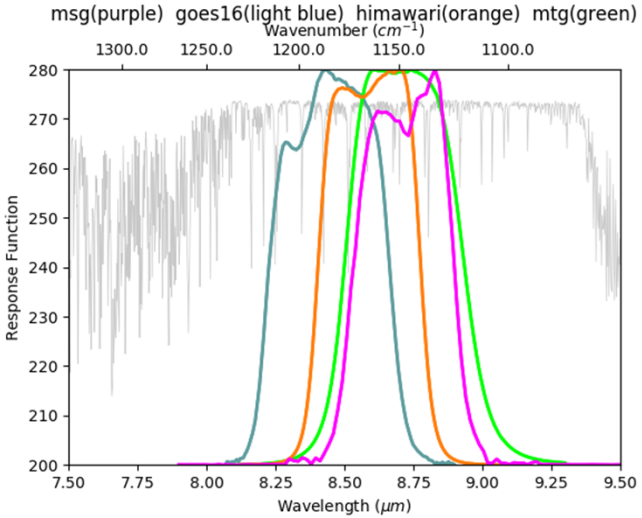
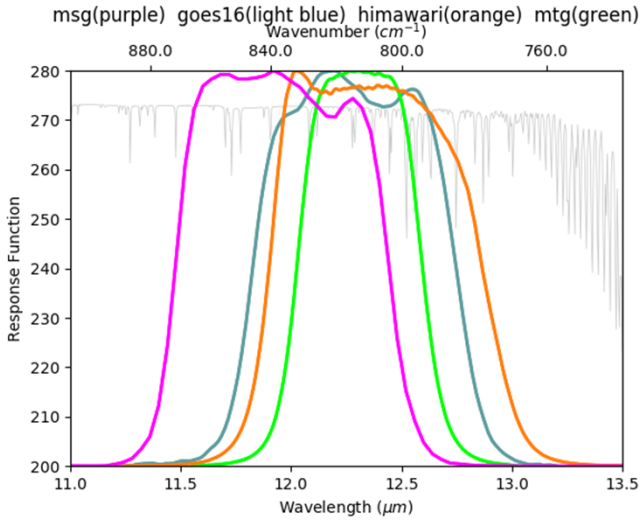
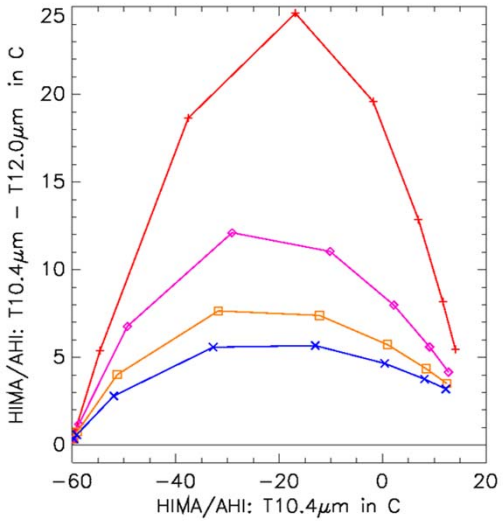
Spectral response comparison

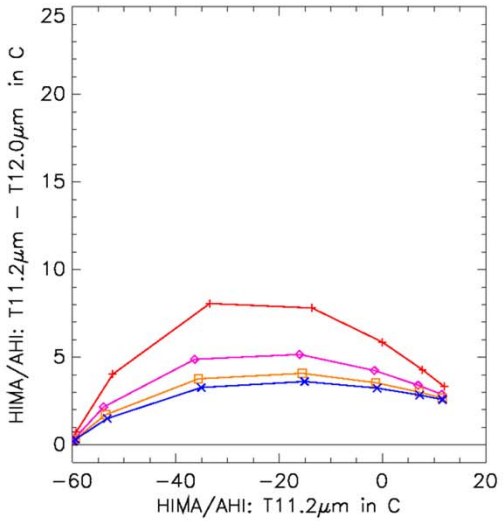


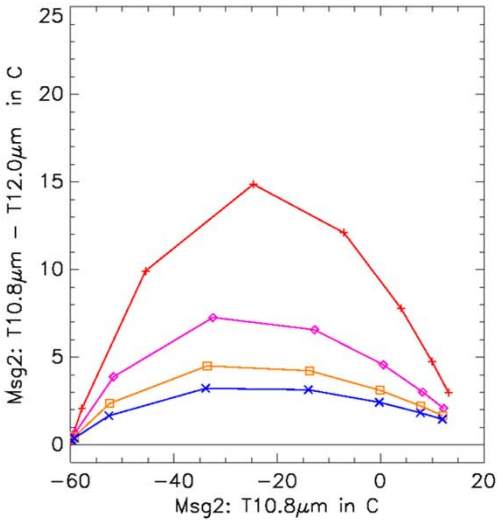




T108-T120 for semi-transparent clouds

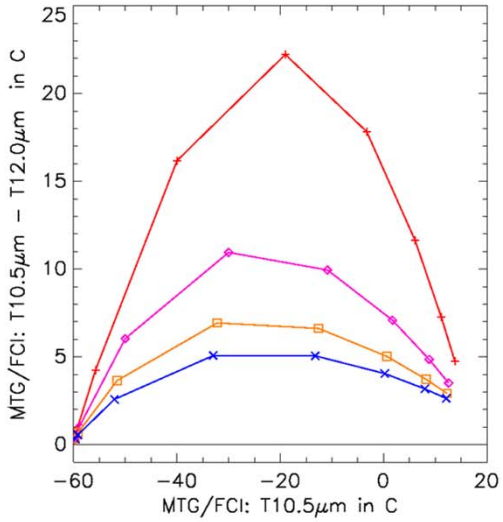




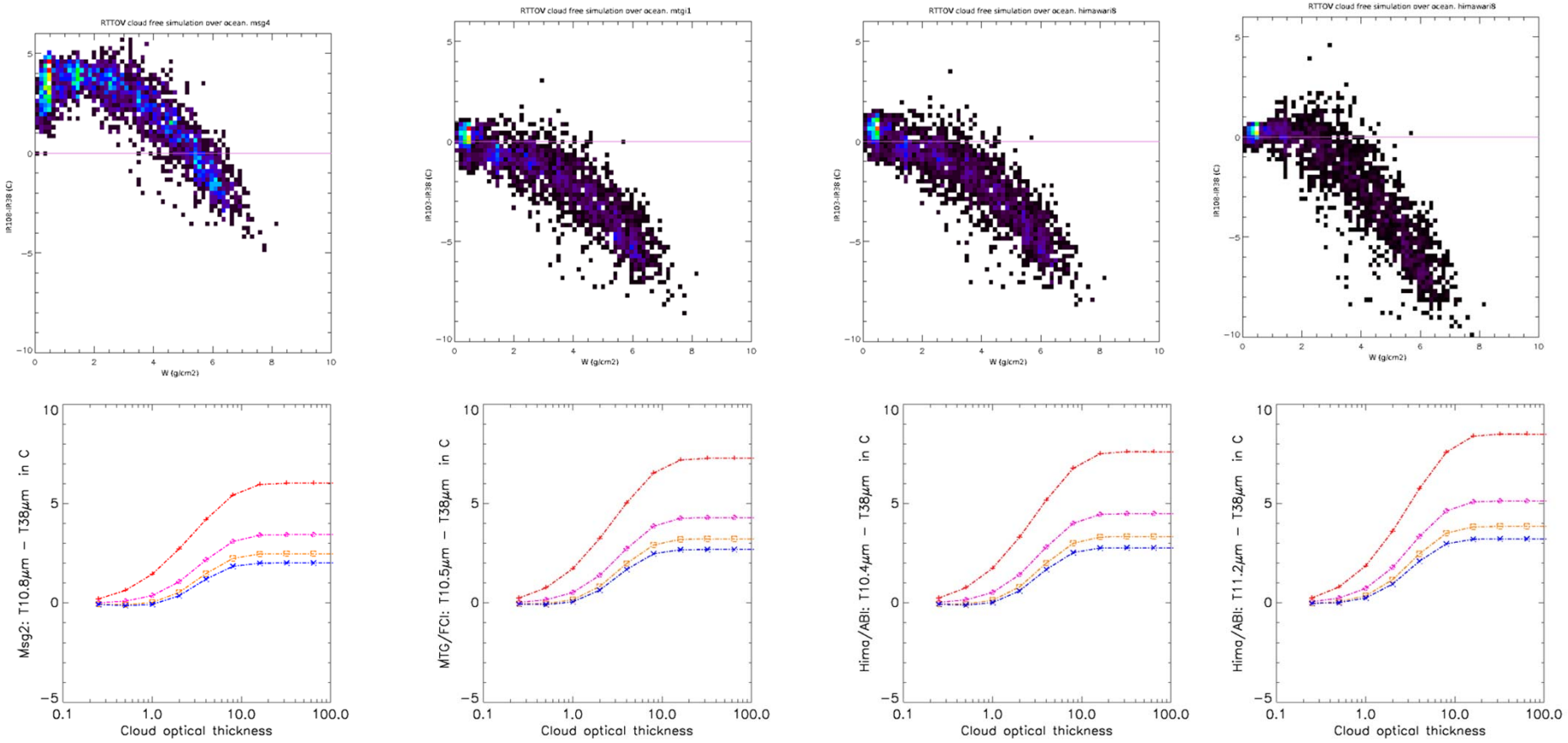


Satellitaire angle 50◦

Ice clouds at 200 Hpa
Red r_eff 10
Pink r_eff 30
Orange r_eff 50
Blue r_eff 70

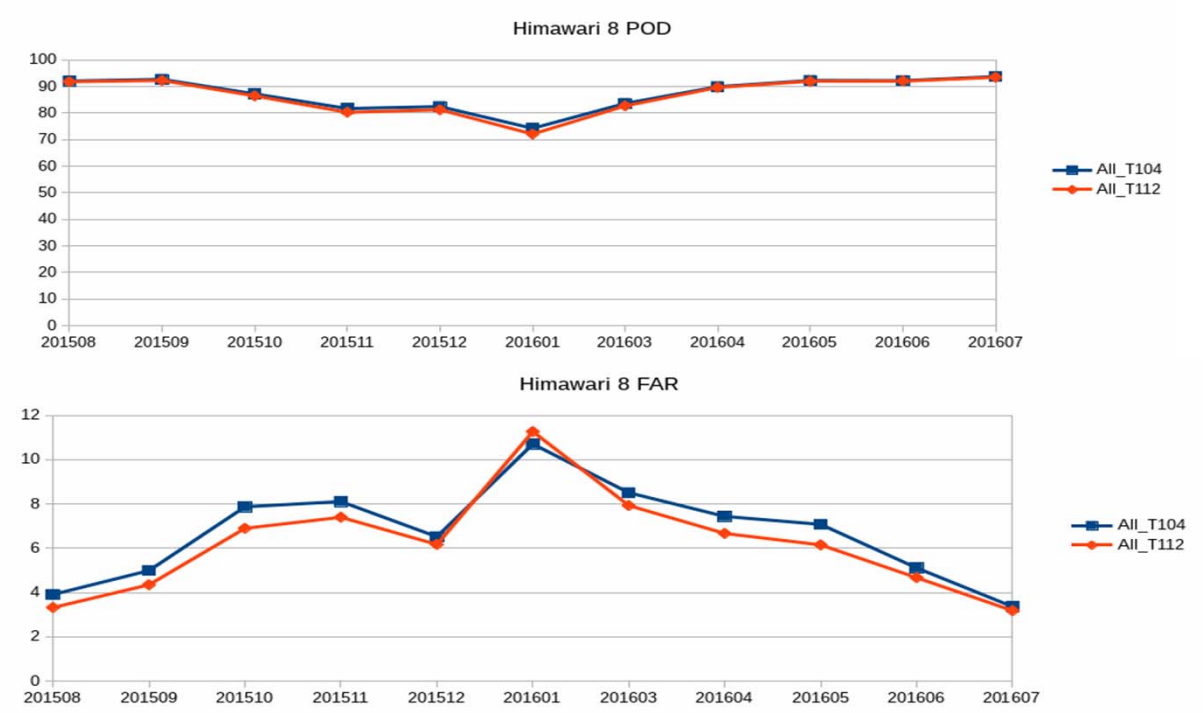


T108-T38 for low water cloud detection at night-time



A pixel is classified as cloud contaminated if :T10.8µm - T3.8µm > T10.8T3.8threshold

Prototype with Himawari8 - Scores Cloud mask Vs Synops



First outcomes

T108T120 more efficient with T10.4µm but triggers false alarms

T108T38 more efficient with T10.4µm

T87T108 less efficient with T10.4µm

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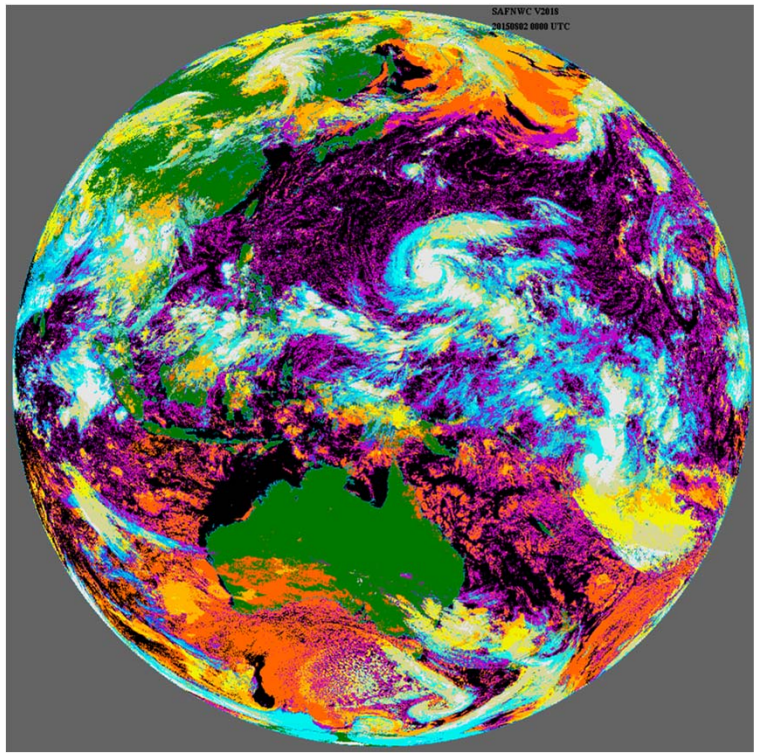
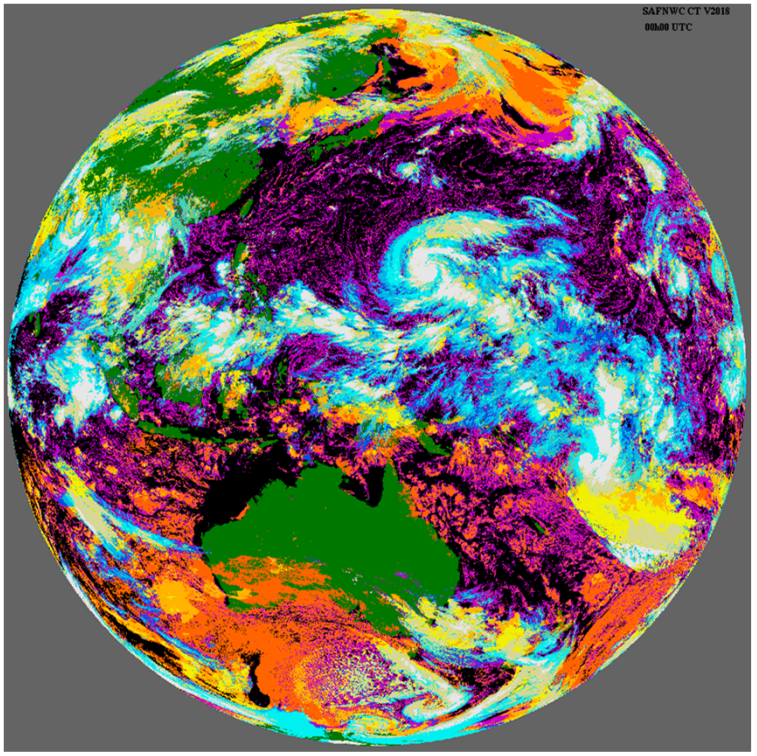
Himawari8 Cloud type 10.4µm vs 11.2µm





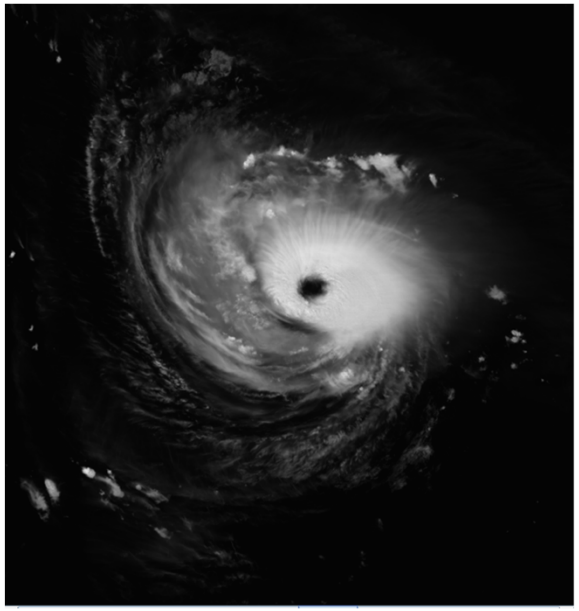
20150802 00UTC

Use of T10.4µm (cloud mask)

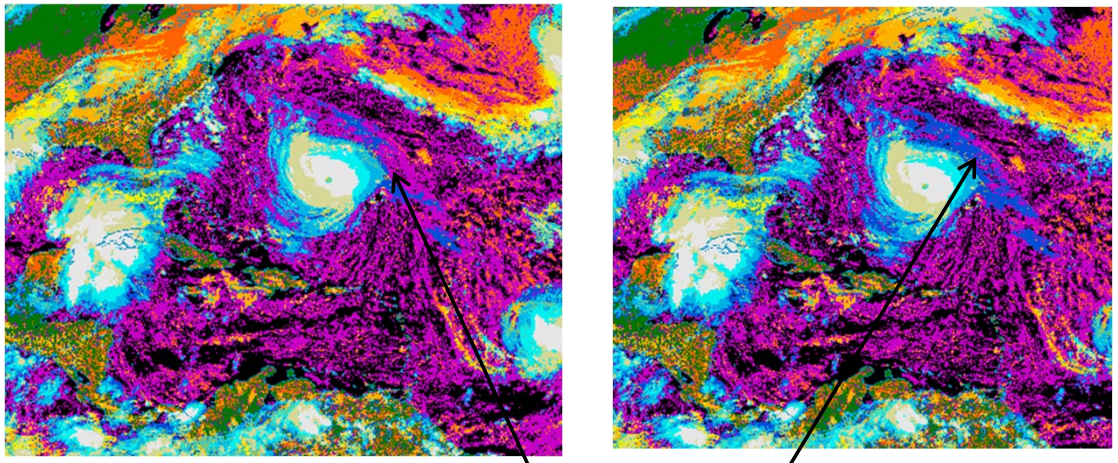
Use of T11.2µm (cloud mask)

No noticeable differences

New channel 1.38µm: prototype with Goes16



Goes16 channel 1.38µm
September 11th 2018, 1730UTC
Cyclone Florence



Cloud type 20180911 1730UTC without and with channel 1.38µm

More clouds are classified as semitransparent thin

- Allows the detection of thin clouds over snow

Conclusion and perspectives

- Preliminary work with radiative transfert models to tune the spectral response depending of the exact central wavelength

- Cloud mask : prototype with Himawari, use of channel 10.4µm, close to the channel 10.5µm on MTG/FCI
  - Fine tuning to avoid false alarms

- Use of new channel 1.38µm, prototype with Goes16

- Use of Goes16/GLM to prototype MTG/LI

- However some difficulties could arise for cloud phase retrieval

- Postdoc position to analyse in depth the impact for cloud phase identification (Météo-France Lannion)


Thanks for your attention !
Questions ?
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