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 developed within the framework of the SAFNWC
  - [http://www.nwcsaf.org](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
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
## Label band for geo imaging missions

<table>
<thead>
<tr>
<th>LABEL</th>
<th>Himawari -8 &amp; -9</th>
<th>GOES-16 &amp; -17</th>
<th>MSG</th>
<th>MTG FCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIS04</td>
<td>0,455 µm</td>
<td>0,470 µm</td>
<td></td>
<td>0,444 µm</td>
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<tr>
<td>VIS05</td>
<td>0,510 µm</td>
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<td></td>
<td>0,510 µm</td>
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<tr>
<td>VIS06</td>
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<td>0,640 µm</td>
<td>0,635 µm</td>
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<td>VIS08</td>
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<td>0,860 µm</td>
<td>0,810 µm</td>
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<td>VIS09</td>
<td></td>
<td></td>
<td></td>
<td>0,914 µm</td>
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<tr>
<td>HRV</td>
<td></td>
<td></td>
<td>0,750 µm</td>
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<tr>
<td>NIR13</td>
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<td>1,380 µm</td>
<td>1,380 µm</td>
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<tr>
<td>NIR16</td>
<td>1,610 µm</td>
<td>1,610 µm</td>
<td>1,64 µm</td>
<td>1,610 µm</td>
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<td>NIR22</td>
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<td></td>
<td>2,250 µm</td>
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<tr>
<td>IR38</td>
<td>3,85 µm</td>
<td>3,90 µm</td>
<td>3,92 µm</td>
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<td>WV70</td>
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<td>8,70 µm</td>
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<tr>
<td>IR97</td>
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<td>IR103</td>
<td>10,45 µm</td>
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</tr>
<tr>
<td>IR106</td>
<td>11,20 µm</td>
<td>11,2 µm</td>
<td>10,60 µm</td>
<td>10,50 µm</td>
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<td>IR120</td>
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<td>12,3 µm</td>
<td>12,0 µm</td>
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<td>IR134</td>
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<td>13,3 µm</td>
<td>13,4 µm</td>
<td>13,30 µm</td>
</tr>
</tbody>
</table>
MTG - Impact for cloud detection

Main feature to account for:

- MTG/FCI central wavelength: 10.5 μm different from MSG/SEVIRI 10.8 μm

- For Goes16/17 and Himawari8/9 two channels: 10.3 μm/10.45 μm and 11.2 μm
  -- No T11.2 μm channel on MTG/FCI

- T108-T38 for low cloud detection

- T87-T108 and T108-T120 for semi-transparent cloud
Spectral response comparison
Spectral response comparison
T108-T120 for semi-transparent clouds

Satellitaire angle 50°

Ice clouds at 200 Hpa
Red $r_{\text{eff}}$ 10
Pink $r_{\text{eff}}$ 30
Orange $r_{\text{eff}}$ 50
Blue $r_{\text{eff}}$ 70
T108-T38 for low water cloud detection at night-time

A pixel is classified as cloud contaminated if:

\[ T_{10.8\mu m} - T_{3.8\mu m} > T_{10.8T3.8\text{threshold}} \]
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
Himawari8 Cloud type 10.4μm vs 11.2μm

Use of T10.4μm (cloud mask)                    Use of T11.2μm (cloud mask)

No noticeable differences
New channel 1.38μm: prototype with Goes16

Cloud type 20180911 1730UTC without and with channel 1.38μm

- Allows the detection of thin clouds over snow

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

More clouds are classified as semitransparent thin
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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