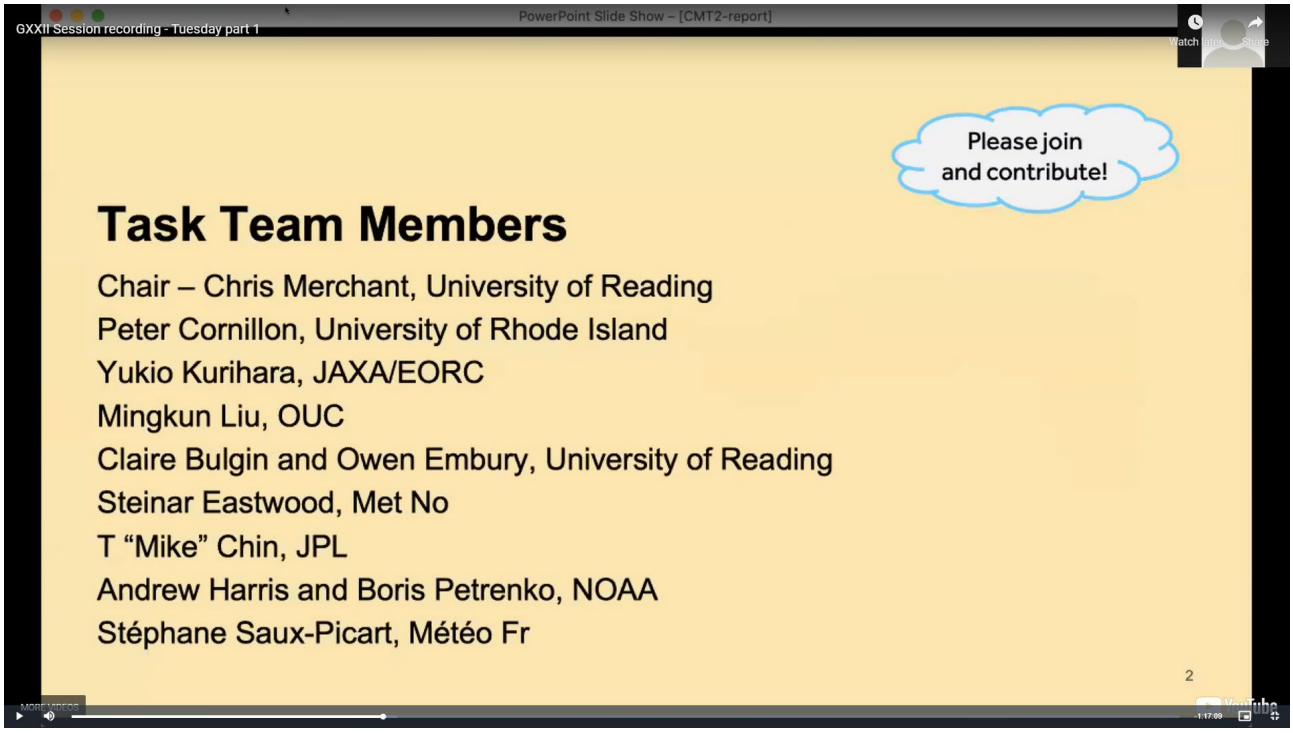
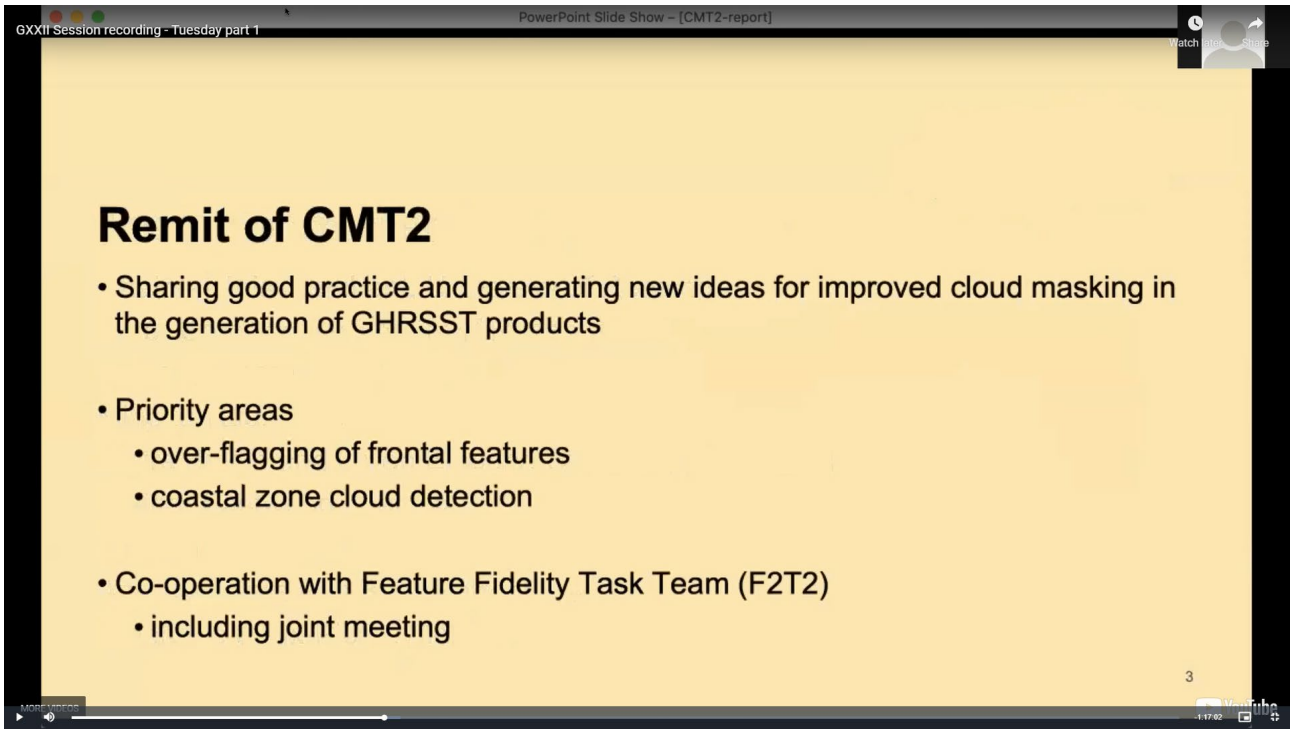
GHRSST
GROUP FOR HIGH RESOLUTION
SEA SURFACE TEMPERATURE

Slides presented at the Science Team Meeting in June 2021


GXXII Session recording - Tuesday part 1
PowerPoint Slide Show – [CMT2-report]
Please join and contribute!
Task Team Members
Chair – Chris Merchant, University of Reading
Peter Cornillon, University of Rhode Island
Yukio Kurihara, JAXA/EORC
Mingkun Liu, OUC
Claire Bulgin and Owen Embury, University of Reading
Steinar Eastwood, Met No
T "Mike" Chin, JPL
Andrew Harris and Boris Petrenko, NOAA
Stéphane Saux-Picart, Météo Fr
2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PowerPoint Slide Show – [CMT2-report]
Remit of CMT2
• Sharing good practice and generating new ideas for improved cloud masking in the generation of GHRSST products
• Priority areas
• over-flagging of frontal features
• coastal zone cloud detection
• Co-operation with Feature Fidelity Task Team (F2T2)
• including joint meeting
3

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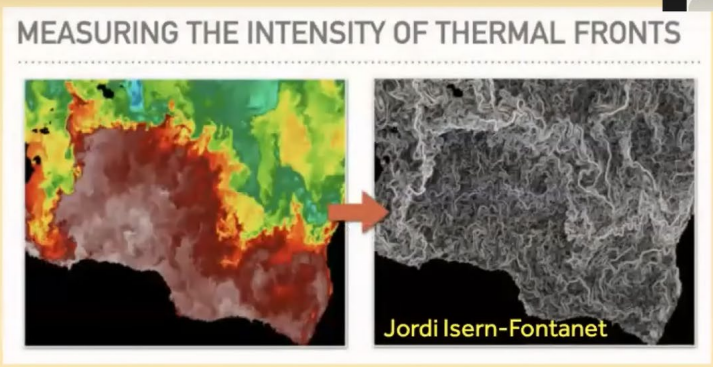
Overflagging

- Fronts are a rich source of oceanographic information



- Overflagging (false detection of fronts as cloud) arises when IR spatial variability is used as a discriminator between ocean and clouds
- Overflagging can also arise from spatial variability considerations away from fronts when imagery displays problems such as striping

4

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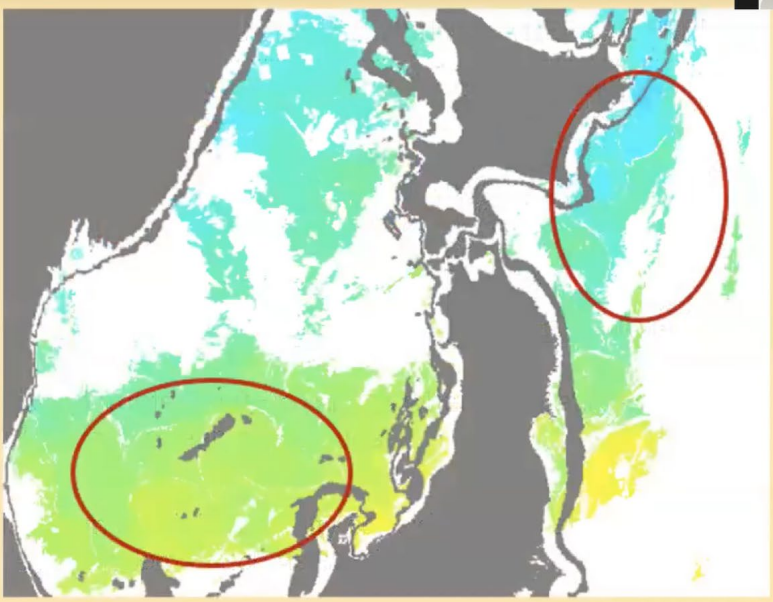
Examples

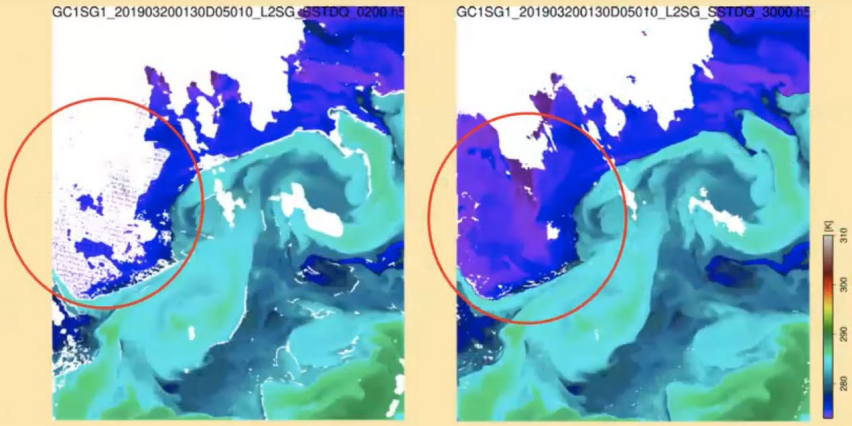
White pixels are cloud masked and are seen along the boundaries of SST contrasts

This example from Mingkun Liu, showing results from implementation of Bayesian cloud detection on COCTS of HY-1C.

Radiance bias adjustments and destriping were applied first before cloud detection



5



Yukio Kurihara

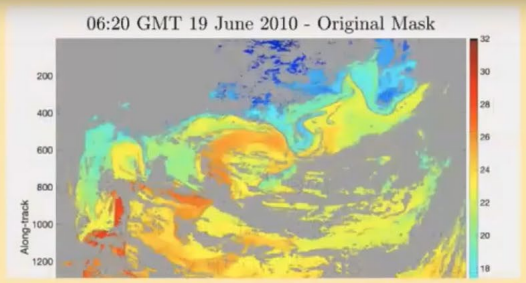
SGLI example

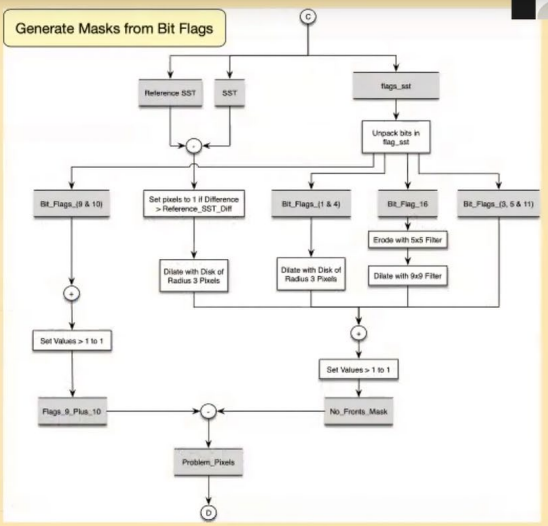
False masking at SST fronts generated by poor SST front detection. White space in the red circle is generated by stripe noise in original SST field.

Cloud masks improved by modified SST front detection. White space in the red circle is improved by the introduced destriping filter.

Reducing false flagging of fronts

- Fundamental problem
  - Spatial variations in BT over fronts are comparable in magnitude to spatial variability from clouds targeted by thermal spatial tests
  - SGLI improvement was obtained by turning off those tests only for day time scenes and relying on appropriate reflectance (SWIR) measures
- The eye is not (generally) misled to think fronts are clouds because of larger-scale contextual information that enables interpretation of objects.
  - Aspect ratio, scale and form of curves, presence at SST contrasts
- Another approach is to attempt to use such context to unflag





Peter Cornillon: Unflagging

A: pixels flagged by spatial variability tests

- Using test-wise bits in MODIS flags

B: Identify pixels unlikely to contain fronts based on a reference SST and other bits (flow-chart) processed as objects

Only for A and not(B) pixels apply unflagging

- based on temperature contrasts and gradients

See F2T2 report

8

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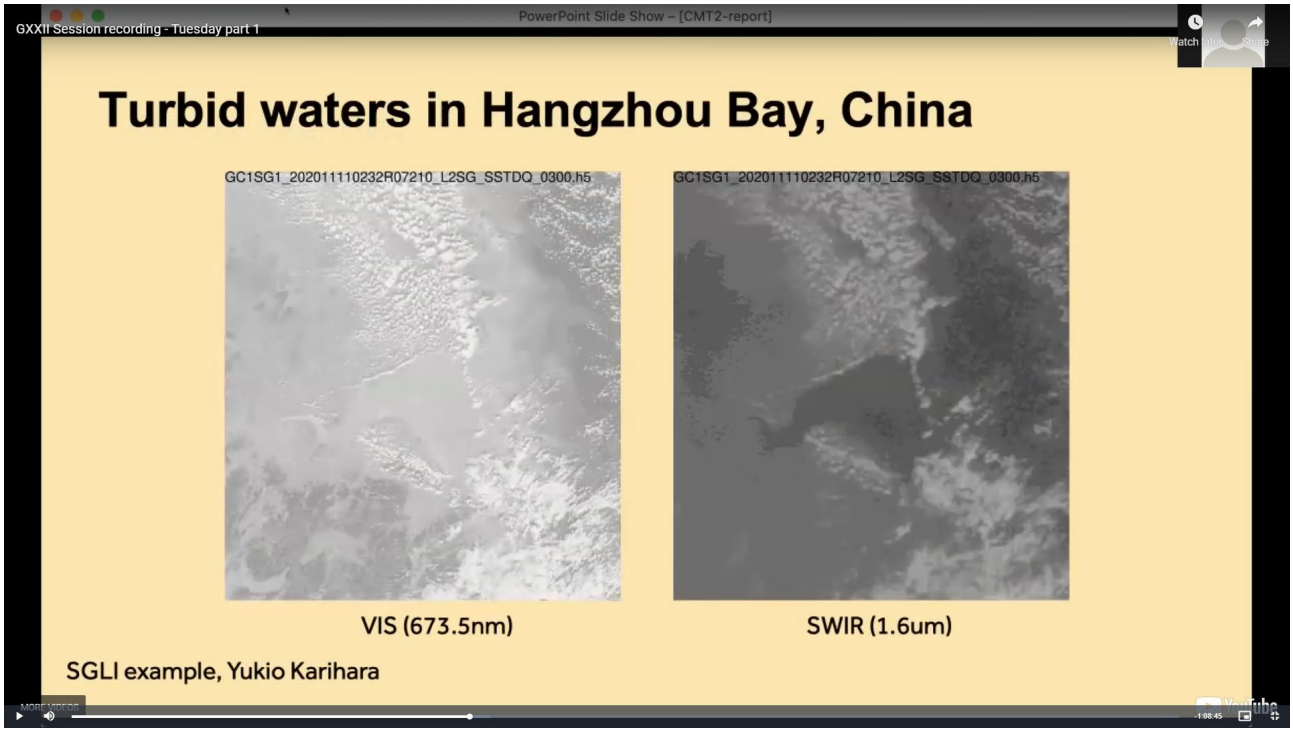
Coastal zones

- Problems that make coastal zone different to open ocean
  - Clear-sky reflectance can be higher from turbidity and bottom reflection
  - (Like fronts) thermal spatial variability can be high for reasons were are positively interested in observing
  - Want to measure SST as close as possible to coast for users, but minimize risk of SSTs being biased by partial land in the pixel
- Turbidity problem is again fundamental for visible-wavelength channels:
  - the reflectance relevant to sensitive cloud detection is comparable to that introduced by turbidity

9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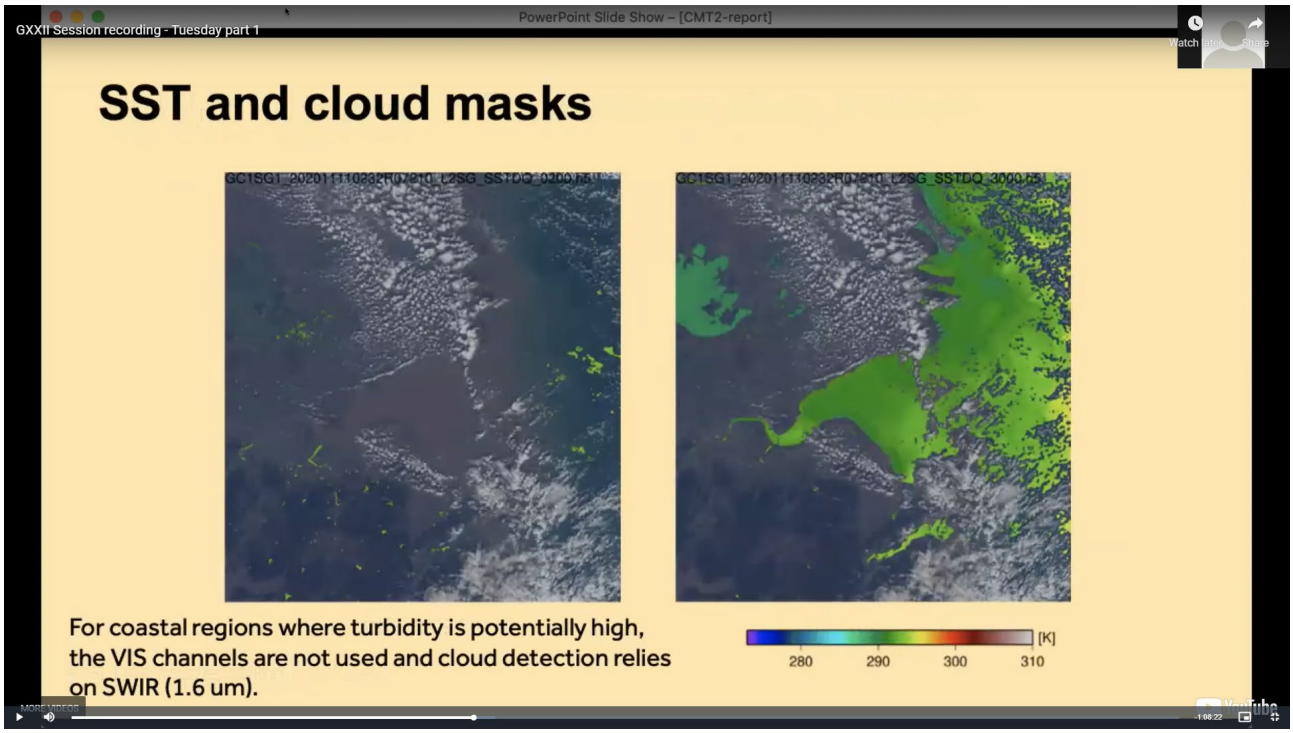
Turbid waters in Hangzhou Bay, China
GC1SG1_202011110232R07210_L2SG_SSTDQ_0300.h5
GC1SG1_202011110232R07210_L2SG_SSTDQ_0300.h5
VIS (673.5nm)
SWIR (1.6um)
SGLI example, Yukio Karihara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SST and cloud masks
For coastal regions where turbidity is potentially high, the VIS channels are not used and cloud detection relies on SWIR (1.6 um).
[K]
280
290
300
310

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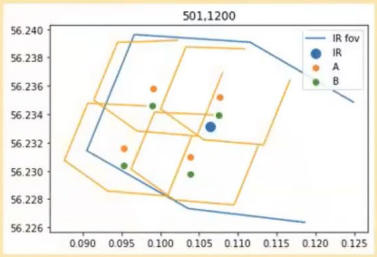
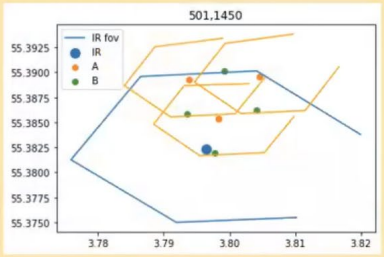
SLSTR-specific coastal zone study

Reflectance and IR channels are quite commonly different resolutions, but for SLSTR there is the additional issue that they are not co-registered.

Reflectance and IR are put on an "image grid" in a manner that is *independently* optimized for the different resolution channels. This means they are not optimized for joint use for cloud detection.





Reasonable

Not great

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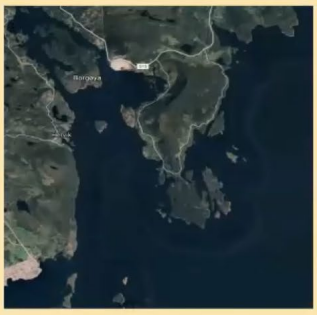
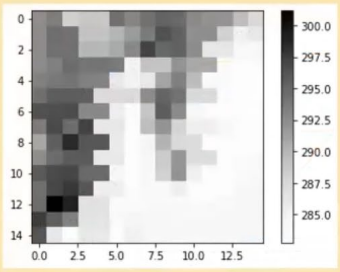
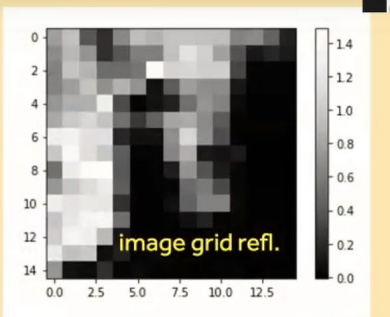
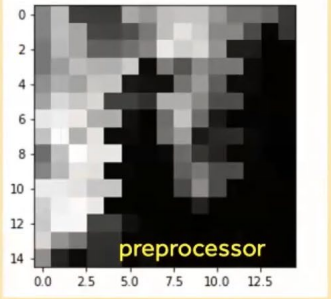
"C stripe" pre-processor

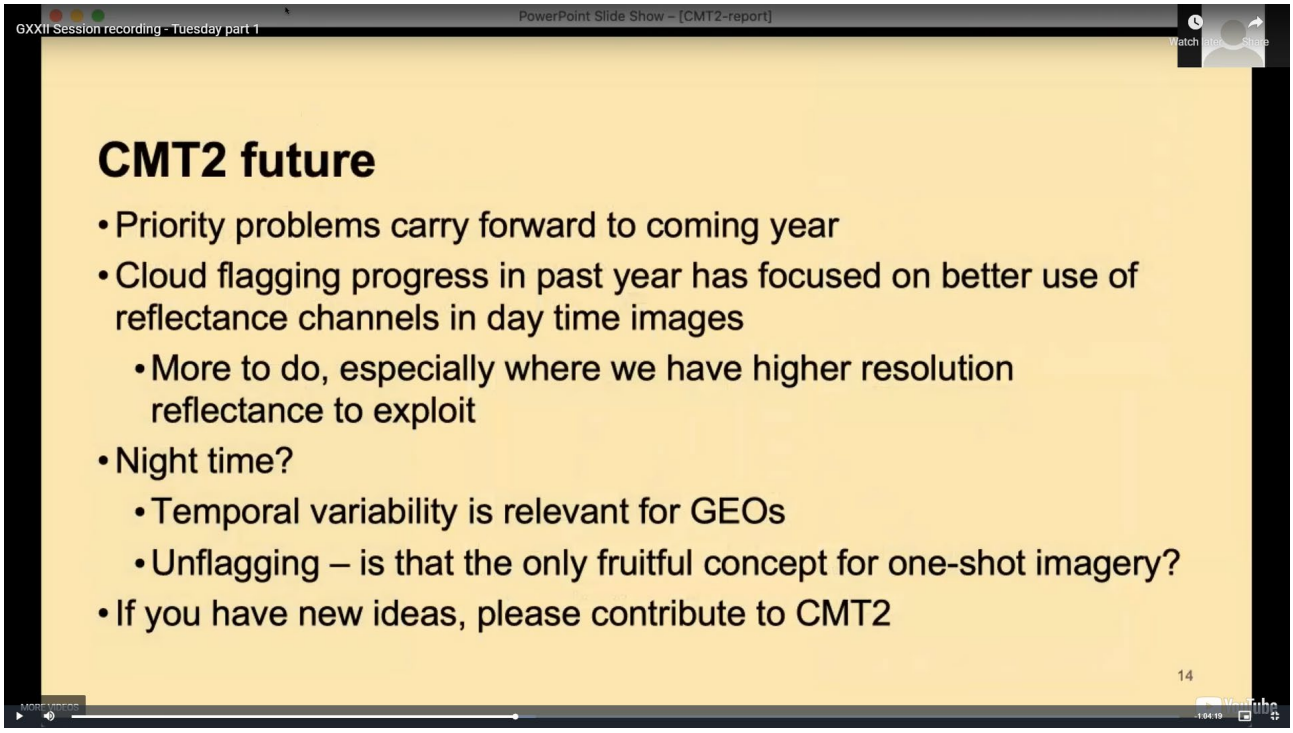
- Averages the N (configurable) reflectance pixels that are closed in centroid to the IR pixel of interest – i.e., the reflectance channel is optimized to work with the IR







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CMT2 future
• Priority problems carry forward to coming year
• Cloud flagging progress in past year has focused on better use of reflectance channels in day time images
• More to do, especially where we have higher resolution reflectance to exploit
• Night time?
• Temporal variability is relevant for GEOs
• Unflagging – is that the only fruitful concept for one-shot imagery?
• If you have new ideas, please contribute to CMT2
14