European Developments : - Meteosat & SLSTR

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and
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European Geostationary Active Fire Products

- Recoded into Python
- Similar Code & Harmonised Formats Across Geo-Platforms

Welcome to the LSA SAF

Secure | https://landsaf.ipma.pt

Bookmarks GMAIL Measuring Methane, 1 Martin Wooster KC 3 Keats 4 M Wooster Google 10 Google Scholar 5 KCL Onespace Two orbits,

LSA SAF
LAND SURFACE ANALYSIS

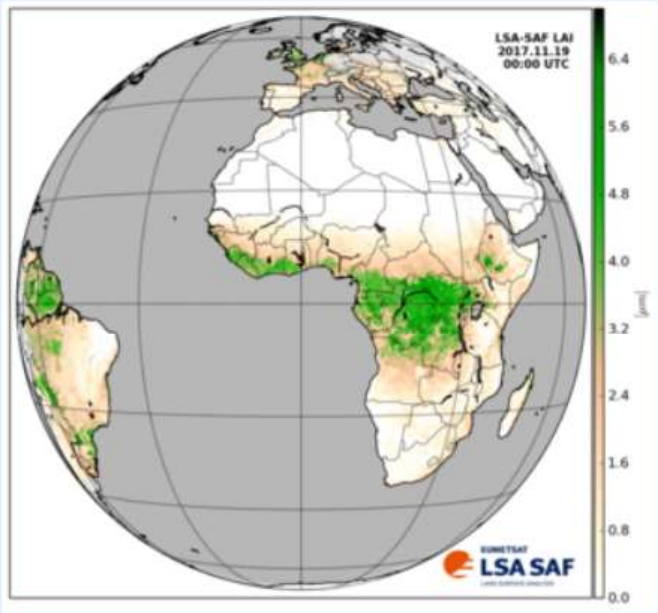
Home

The scope of Land Surface Analysis Satellite Applications Facility (LSA SAF) is to increase benefit from EUMETSAT Satellites (MSG and EPS) data related to:

- Land
- Land-Atmosphere interaction
- Biospheric Applications

The LSA SAF performs:

- R&D Programs.
- Operational Activities
  - Generation of land surface products
  - Archiving long time series
  - Dissemination to users



Show Cases:

Energy emitted by wildfires in Iberian Peninsula

SEVIRI FRP-Pixel: Quality Product

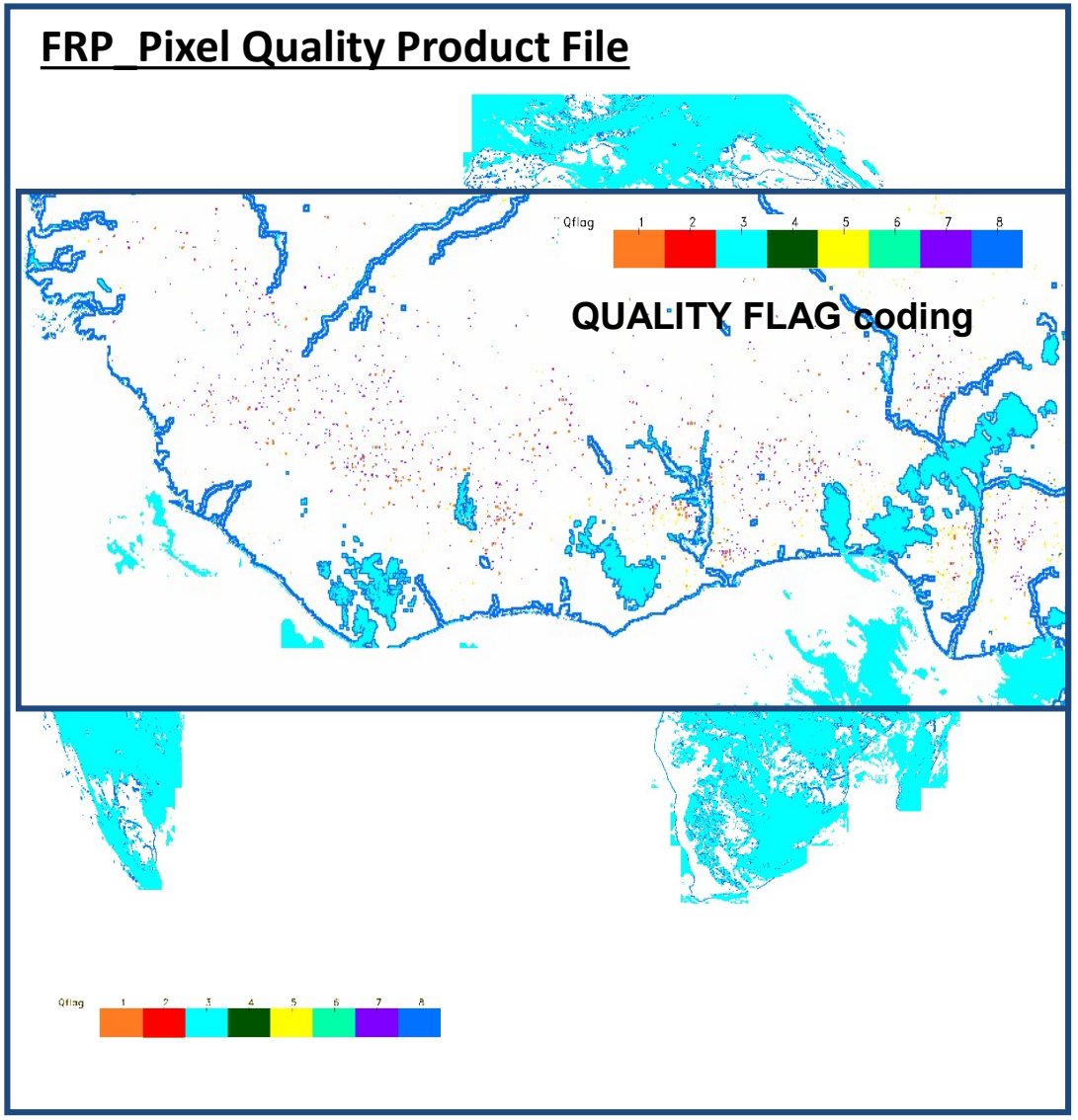
Two HDF files for each slot

- "List Product"- Fire Data only

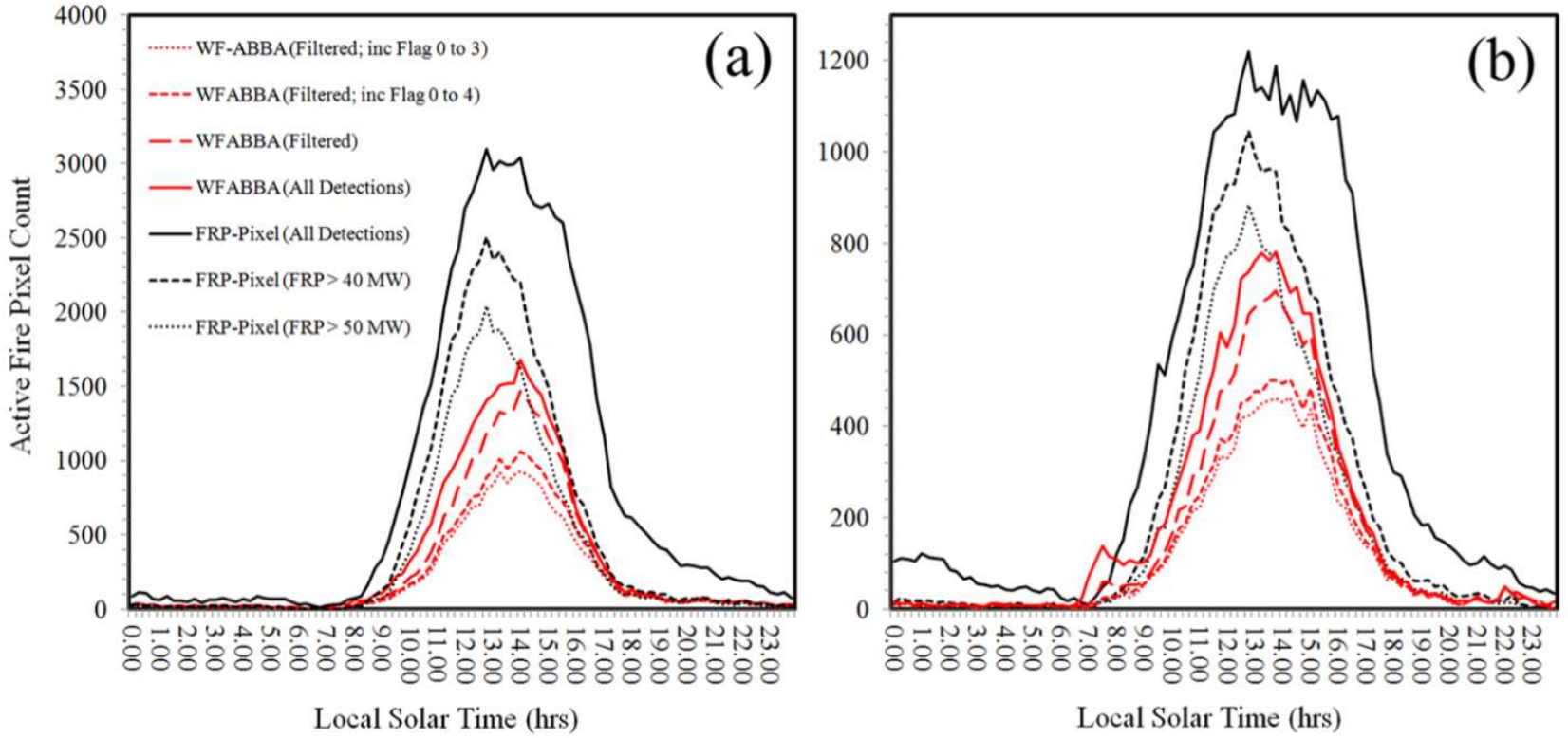
VALUE	MEANING
0	NOT POT FIRE
1	FRP OK
2	FRP SAT
3	CLOUDY
4	SUN GLINT
5	SUN GLINT RATIO
6	NO BCK
7	BAD BCK
8	CLOUD EDGE
254	NOT PROCESSED

LSA SAF Meteosat FRP products-Part 1 : Algorithms, product contents, and analysis. / Wooster, M. J.; Roberts, G.; Freeborn, P. H.; Xu, W.; et al. In: Atmospheric Chemistry and Physics, Vol. 15, No. 22, 30.11.2015, p. 13217-13239.

FRP_Pixel Quality Product File



SEVIRI FRP-Pixel – Intercomparison



LSA SAF Meteosat FRP products-Part 1 : Algorithms, product contents, and analysis. / Wooster, M. J.; Roberts, G.; Freeborn, P. H.; Xu, W.; Govaerts, Y.; Beeby, R.; He, J.; Lattanzio, A.; Fisher, D.; Mullen, R. In: Atmospheric Chemistry and Physics, Vol. 15, No. 22, 30.11.2015, p. 13217-13239.

METEOSAT LSA-SAF FRP Climate Data Record

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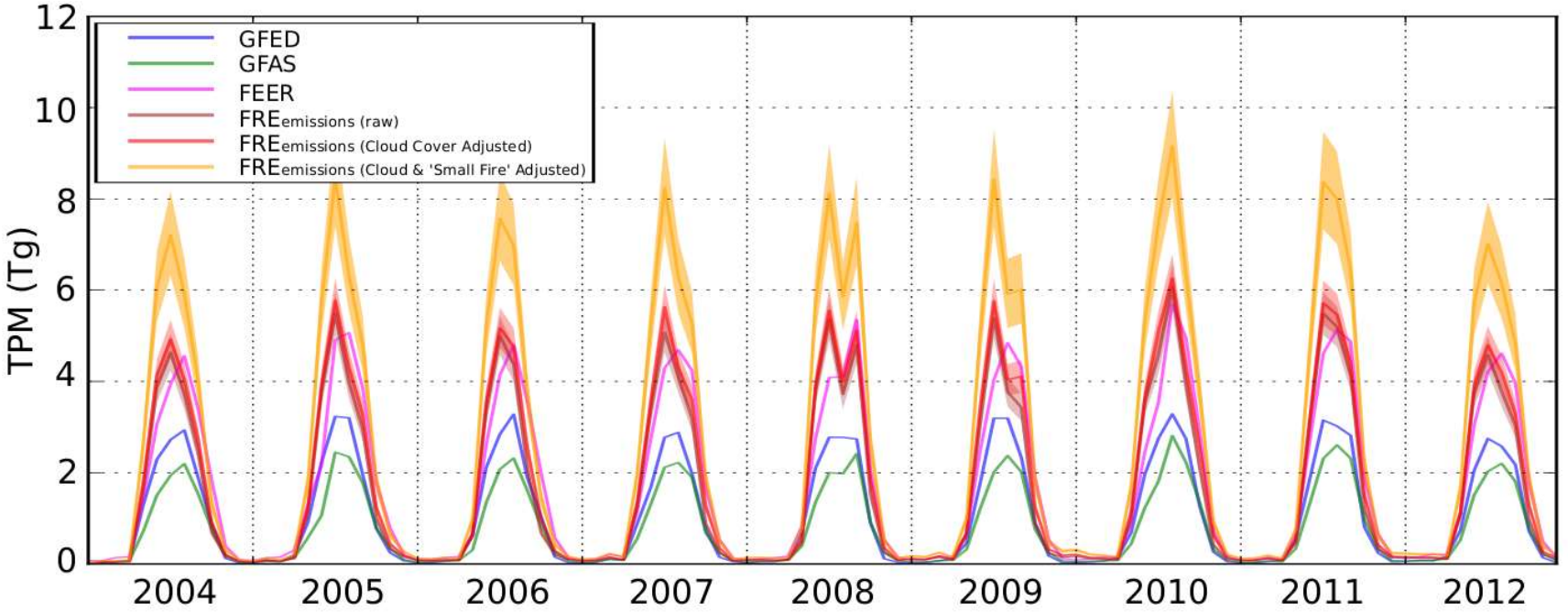
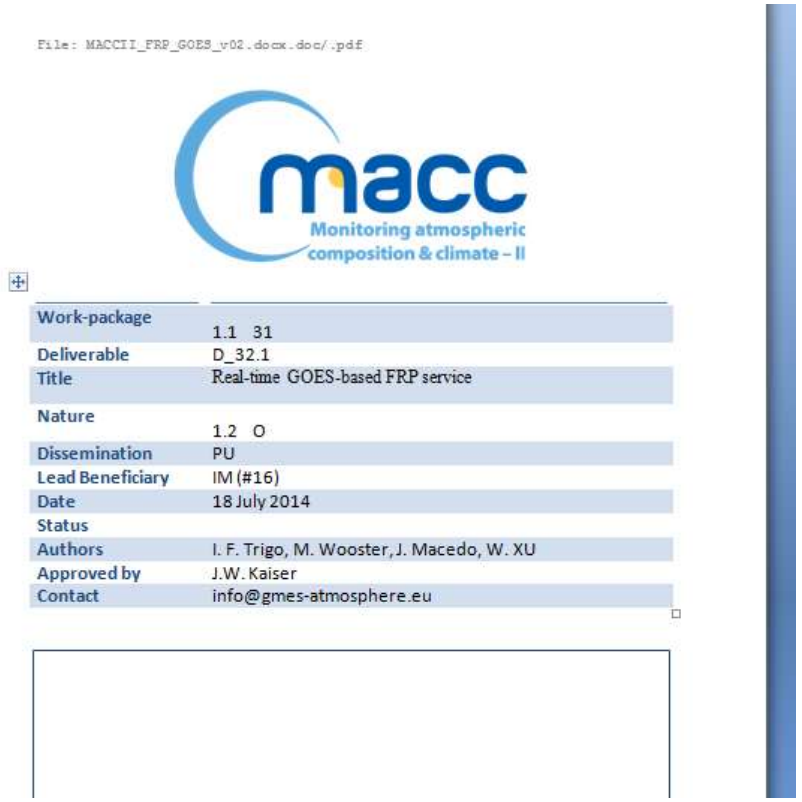
Reprocessed to 2012 – now being extended to present day….



Direct Emissions Estimation - Mota and Wooster (2016) *in review*

GOES FRP Product (America's)



Produced using the same Fire Thermal Anomaly (FTA) as the LSA SAF Meteosat FRP

ftp://frp_public:frp@geoland2.meteo.pt

Harmonisation of Data (GFAS)

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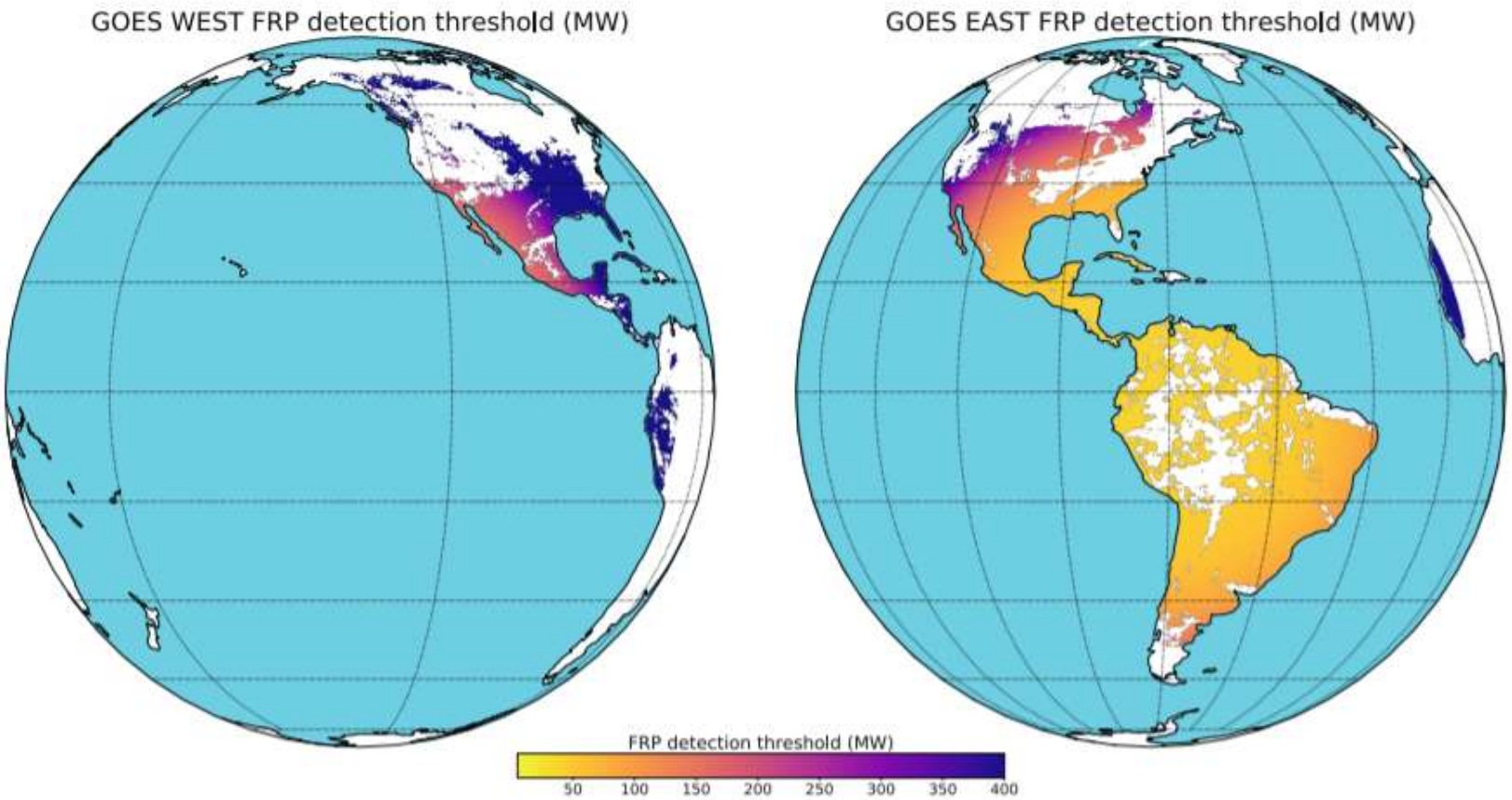
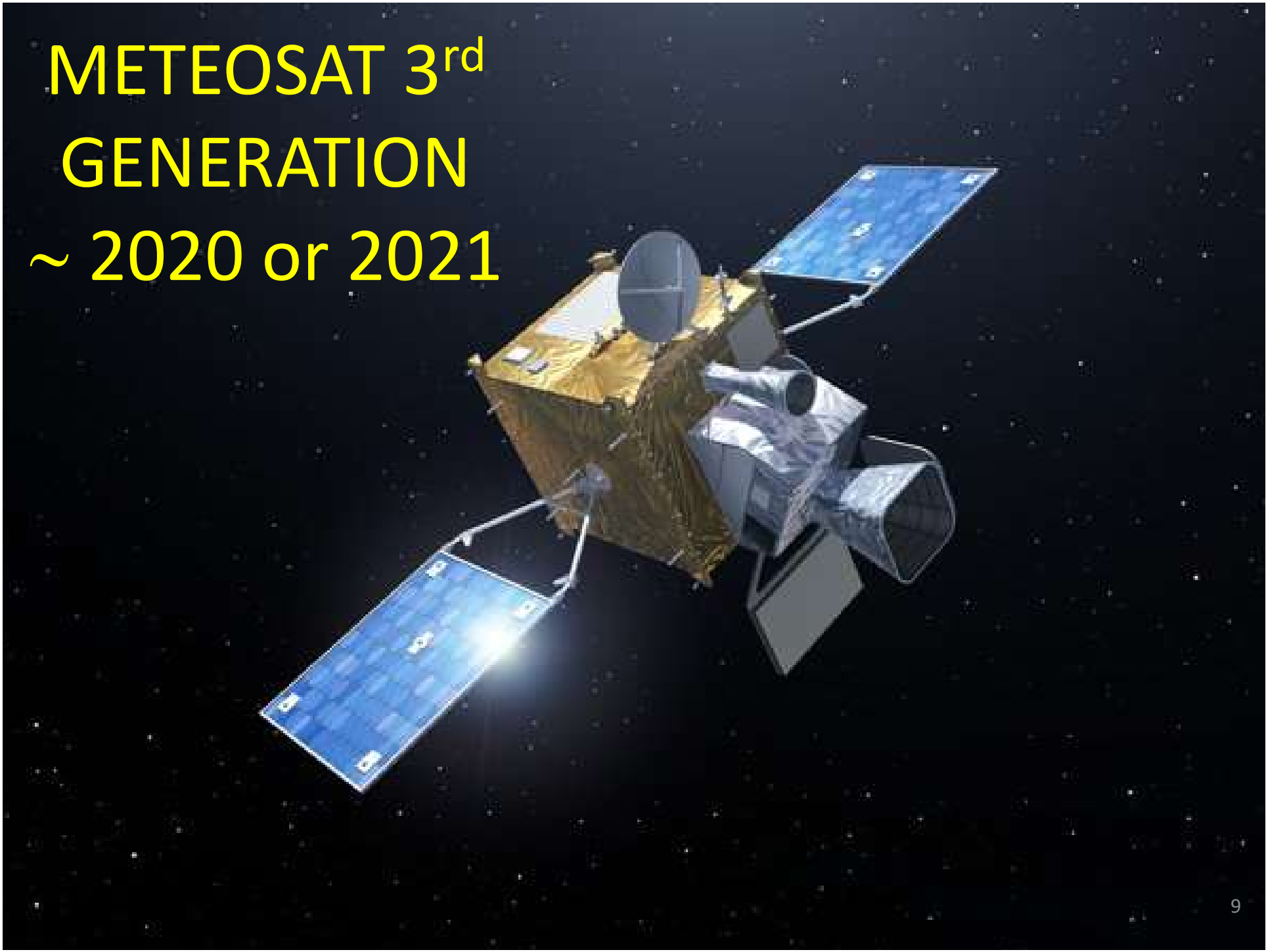
- Synergistic use of polar-orbiting & geostationary FRP products.
- Polar-orbiting sensors detect smaller and less intense fires.
- But geostationary sensors provide near-continuous record.



METEOSAT 3rd GENERATION ~ 2020 or 2021



MTG FLEXIBLE COMBINED IMAGER

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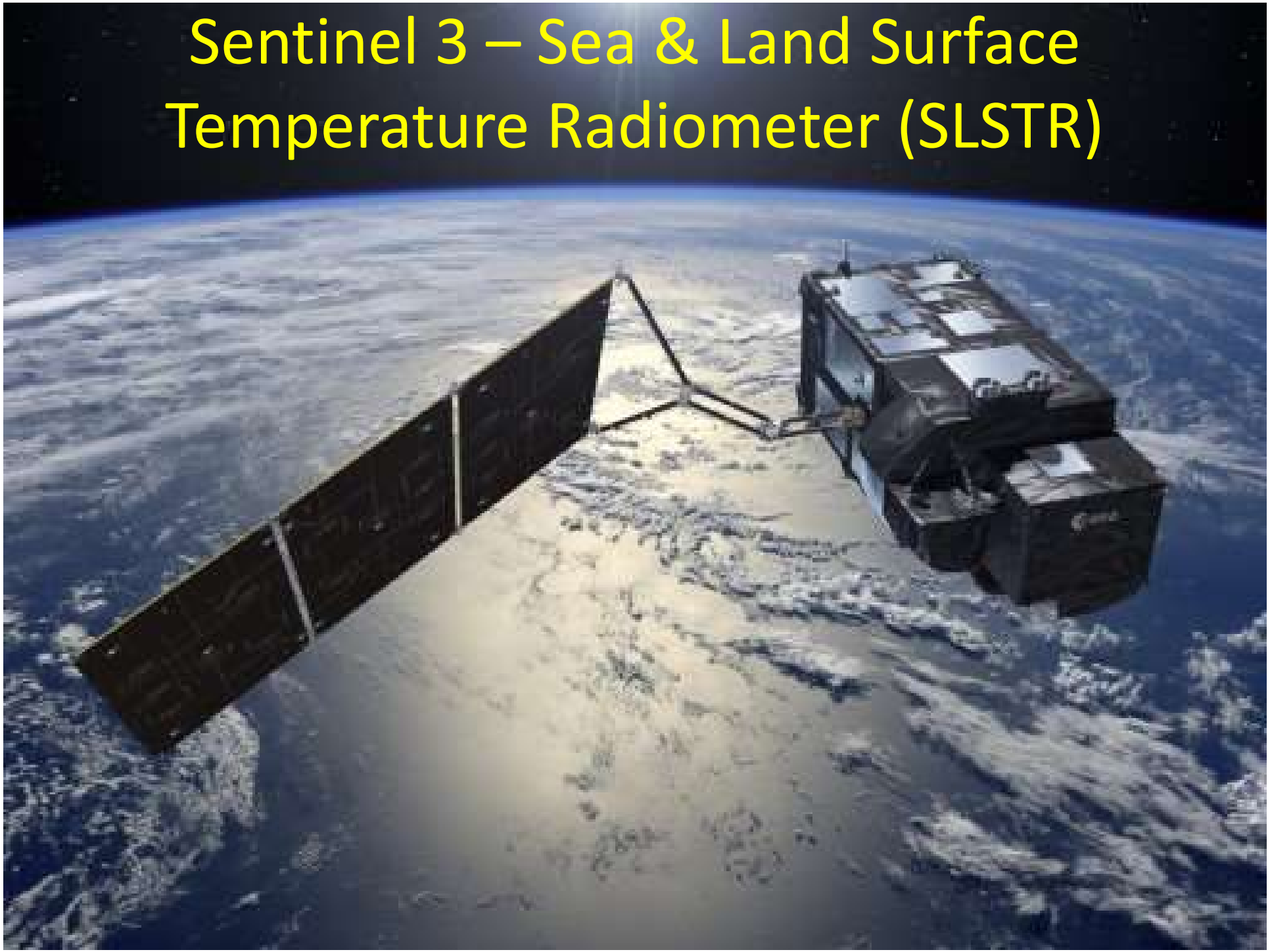
- Full Disk Scan (FDS), with a basic repeat cycle of 10 mins.
- European Regional-Rapid-Scan (RRS) with a repeat cycle of 2.5 mins.

▼ Details

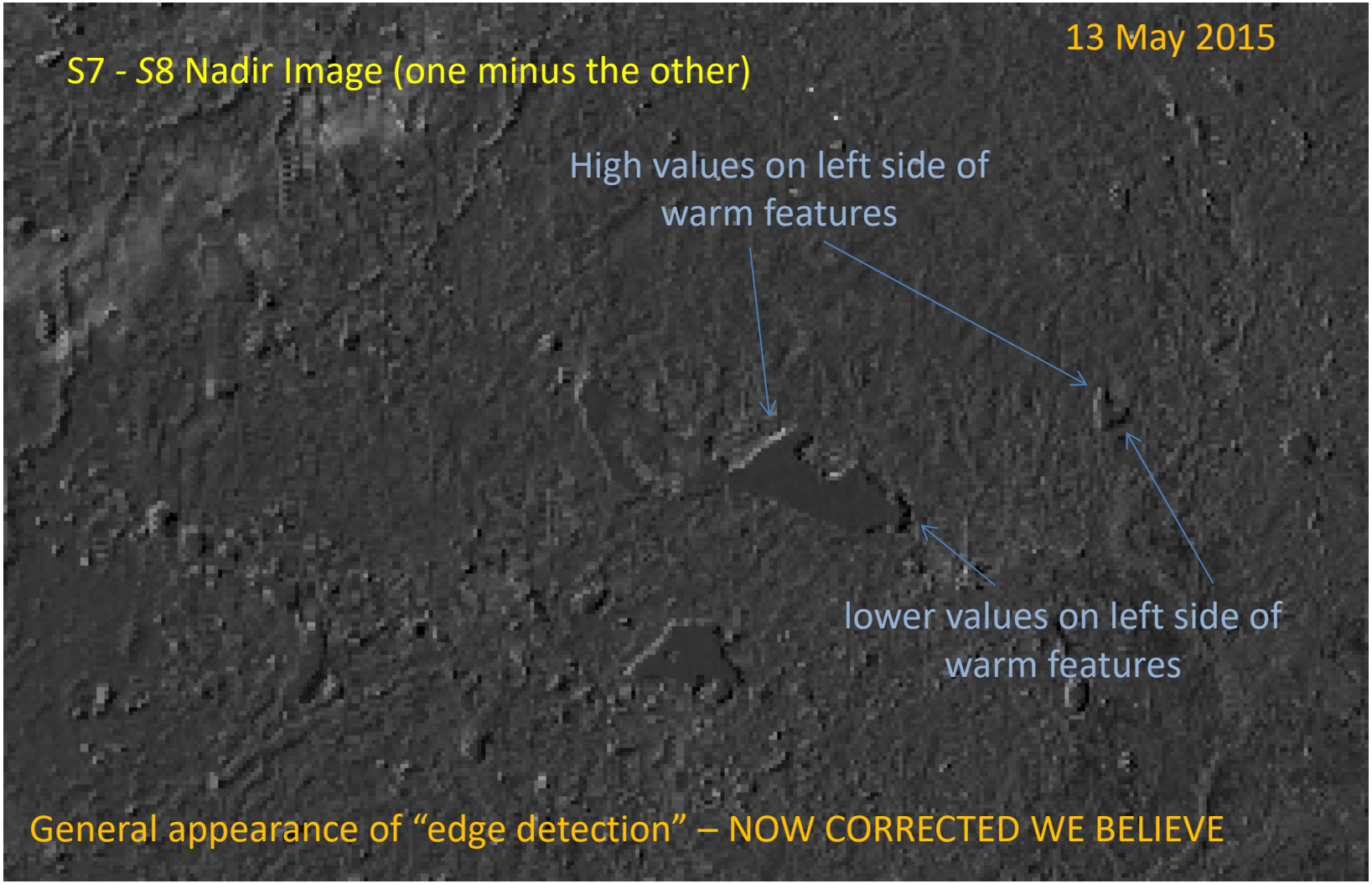
CHANNEL	CENTRE WAVELENGTH, Δ0	SPECTRAL WIDTH, ΔΛ0	SPATIAL SAMPLING DISTANCE (SSD)
VIS 0.4	0.444 µm	0.060 µm	1.0 km
VIS 0.5	0.510 µm	0.040 µm [TBC]	1.0 km
VIS 0.6	0.640 µm [TBC]	0.050 µm [TBC]	1.0 km; 0.5 km*
VIS 0.8	0.865 µm [TBC]	0.040 µm [TBC]	1.0 km
VIS 0.9	0.914 µm [TBC]	0.020 µm [TBC]	1.0 km
NIR 1.3	1.380 µm [TBC]	0.030 µm [TBC]	1.0 km
NIR 1.6	1.610 µm	0.050 µm	1.0 km
NIR 2.2	2.250 µm [TBC]	0.050 µm [TBC]	1.0 km; 0.5 km*
IR 3.8 (TIR)	3.800 µm	0.400 µm	2.0 km; 1.0 km*
WV 6.3	6.300 µm	1.000 µm	2.0 km
WV 7.3	7.350 µm	0.500 µm	2.0 km
IR 8.7 (TIR)	8.700 µm	0.400 µm	2.0 km
IR 9.7 (O_3)	9.660 µm	0.300 µm	2.0 km
IR 10.5 (TIR)	10.500 µm	0.700 µm	2.0 km; 1.0 km*
IR 12.3 (TIR)	12.300 µm	0.500 µm	2.0 km
IR 13.3 (CO_2)	13.300 µm	0.600 µm	2.0 km

450 K MWIR channel

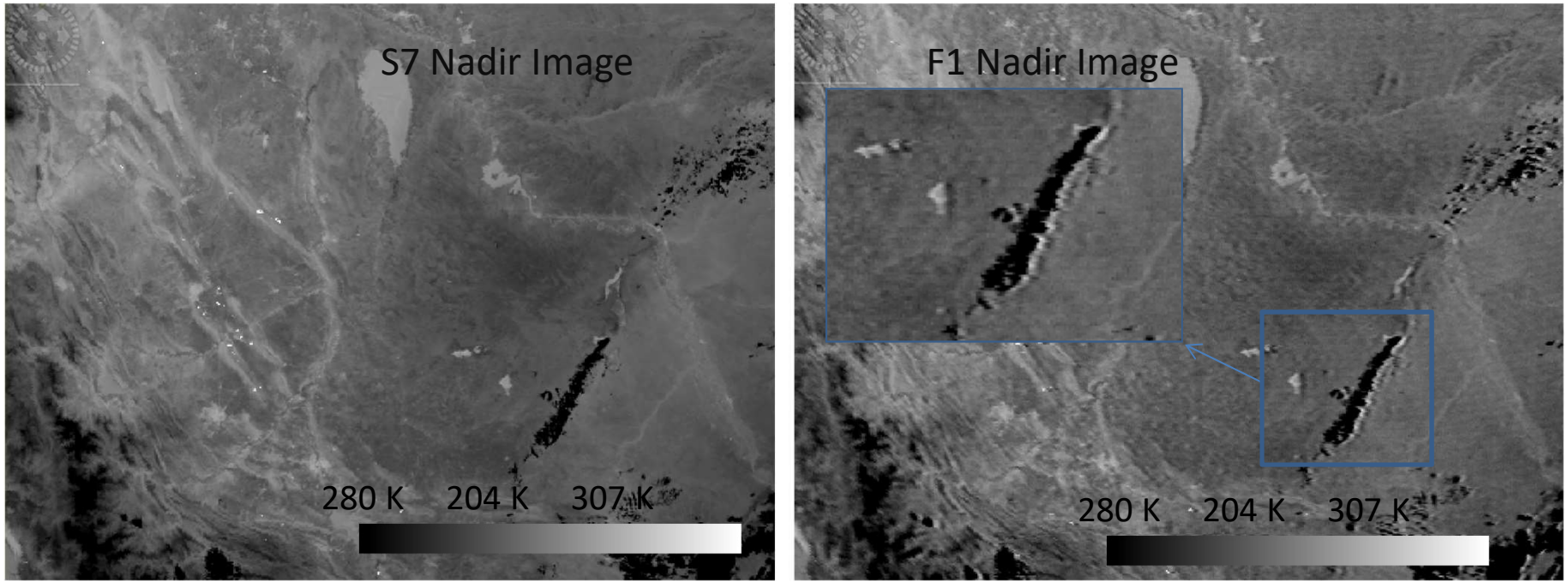
Sentinel 3 – Sea & Land Surface Temperature Radiometer (SLSTR)



PRELIMINAY RESULTS (Nadir View)



S7 vs. F1 Channel Noise
("Warm" ambient scene)



Warm BT scene

- F1 image still seems noisier than S7 – but less so than for prior colder scene. (expected due to NEdT being lower at higher temperatures)
- Odd "warm" BT shadow adjacent to some cold features e.g. clouds. (see zoom box above around cloud). Further examined next....

S3A_SL_1_RBT____20160528T184810_20160528T185110_20160530T151403_0180_004_327_6599_LN2_O_NT_001.SEN3

S7 vs. F1 Channel Noise
("Cold" ambient scene)

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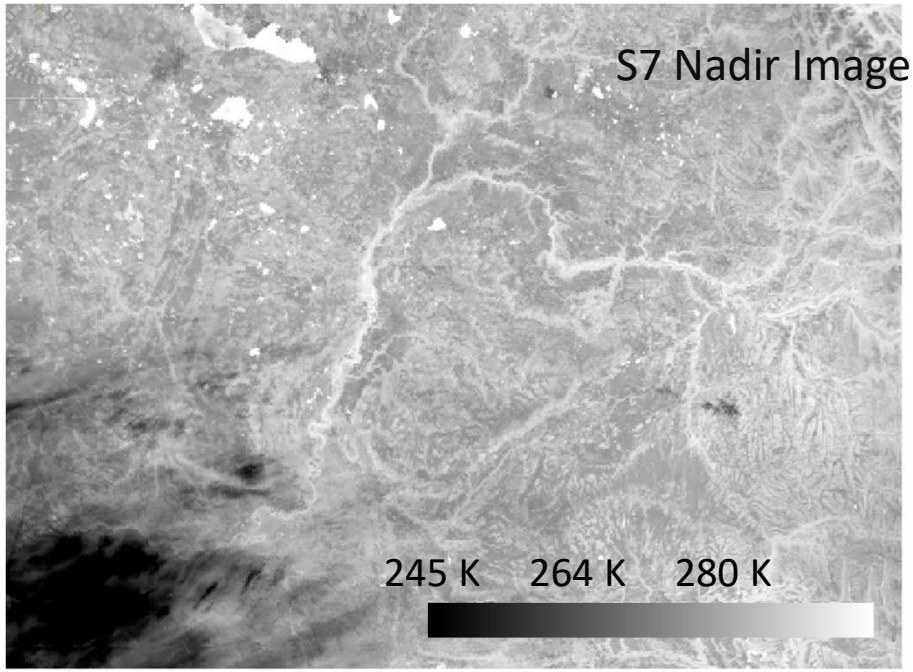

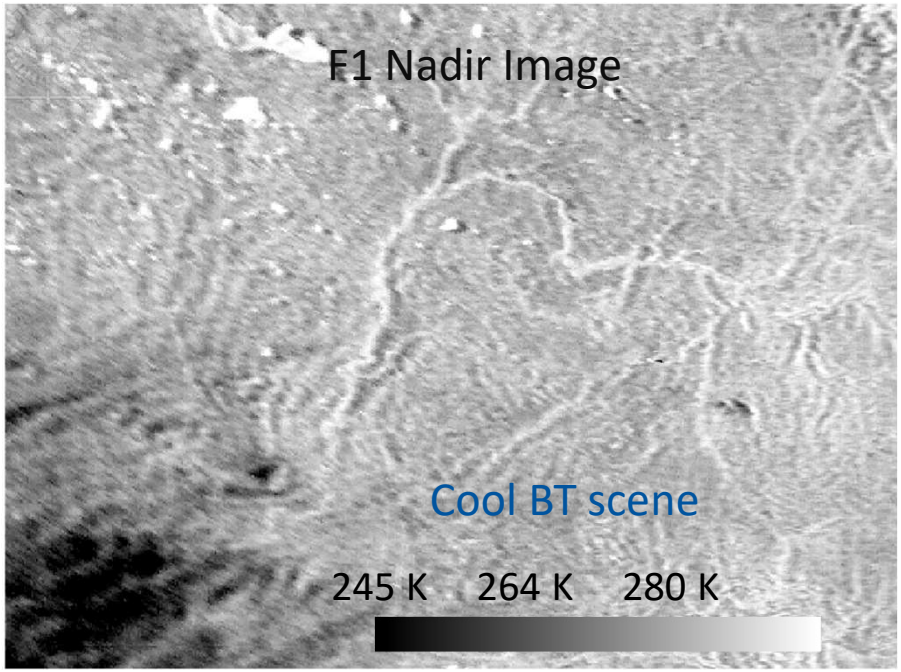

- F1 image has increased noise compared to S7 image.
  (expected due to much lower gain and wider dynamic range)
- Same type of difference not seen between F2 and S8.
- Applications should ideally use S7 for BT < 305 K and F1 > 305 K.
  (but not so easy to swap on pixel-by-pixel basis as area covered is different)

S3A_SL_1_RBT____20160513T051503_20160513T051803_20160513T063019_0179_004_105_0900_SVL_O_NR_001.SEN3

High Temperature Targets Gas Flares (Iraq)

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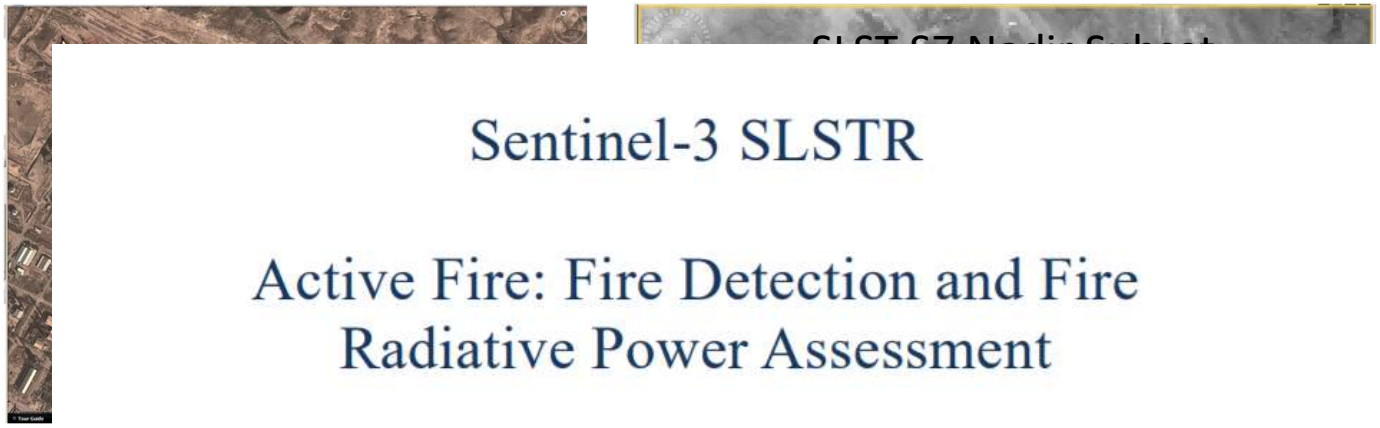
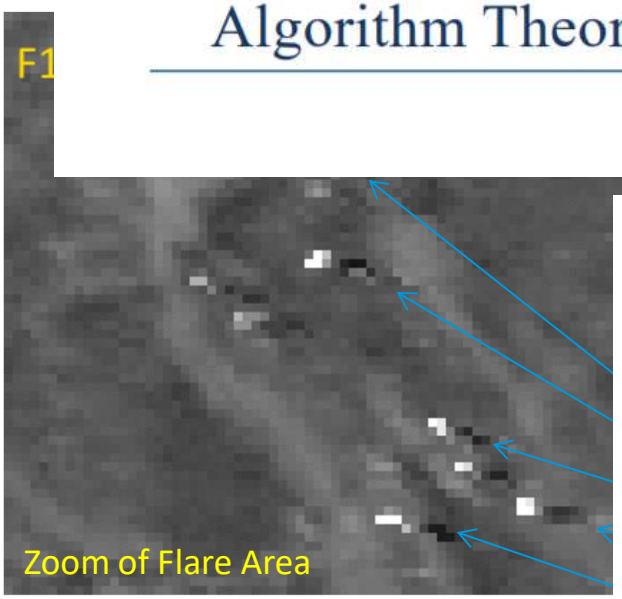


S3A_SL_1_RBT____20160528T184810_20160528T185110_20160530T151403_0180_004_327_6599_LN2_O_NT_001.SEN3

Here flares are apparent in S7 band (also seen in F1).



t position between S7

RSE-08230; No of Pages 19

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journal homepage: www.elsevier.com/locate/rse

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Sentinel-3 SLSTR active fire detection and FRP product: Pre-launch algorithm development and performance evaluation using MODIS and ASTER datasets

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[b] RAL Space, Rutherford Appleton Laboratory, Harwell Science and Innovation Campus, Didcot OX11 0QX, United Kingdom

Nighttime Active Fire Detection via SWIR

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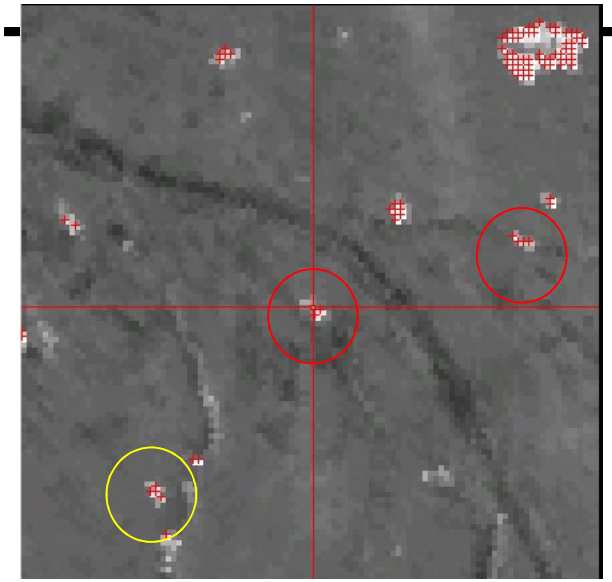
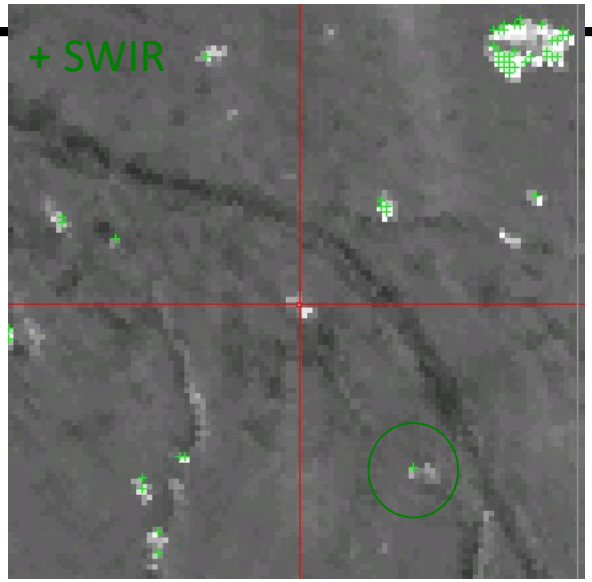
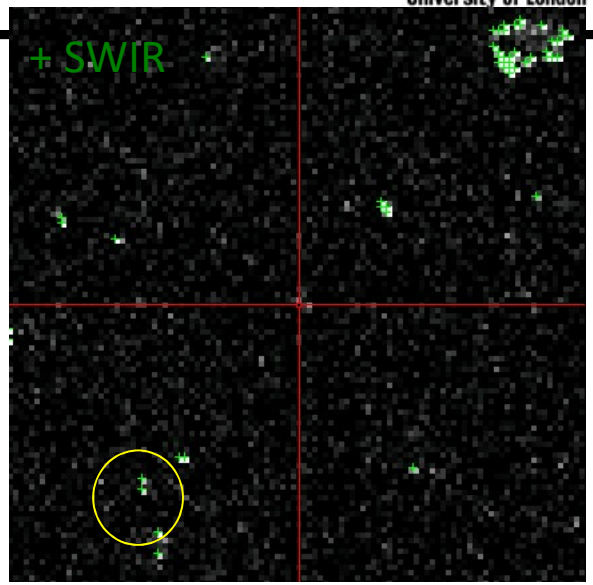
S7 - S8 Image



S7 – S8 Image



S6 Image



+ Represents an AF detection delivered using:

S7-S8 Signal

S6 Signal

AF detected by S7-S8 but not S6

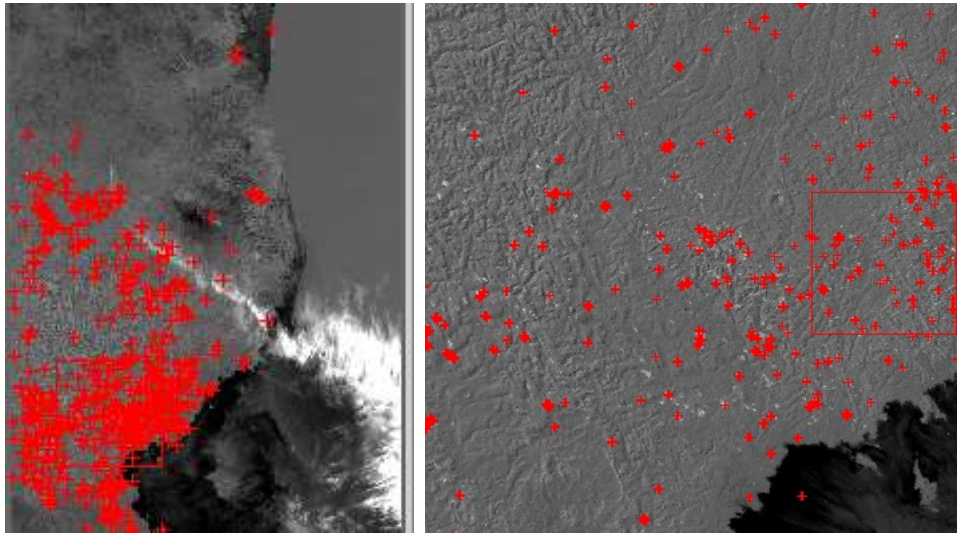
AF detected by S6 but not S7-S8

AF detected by both S7-S8 & S6 but non-identical AF pixels

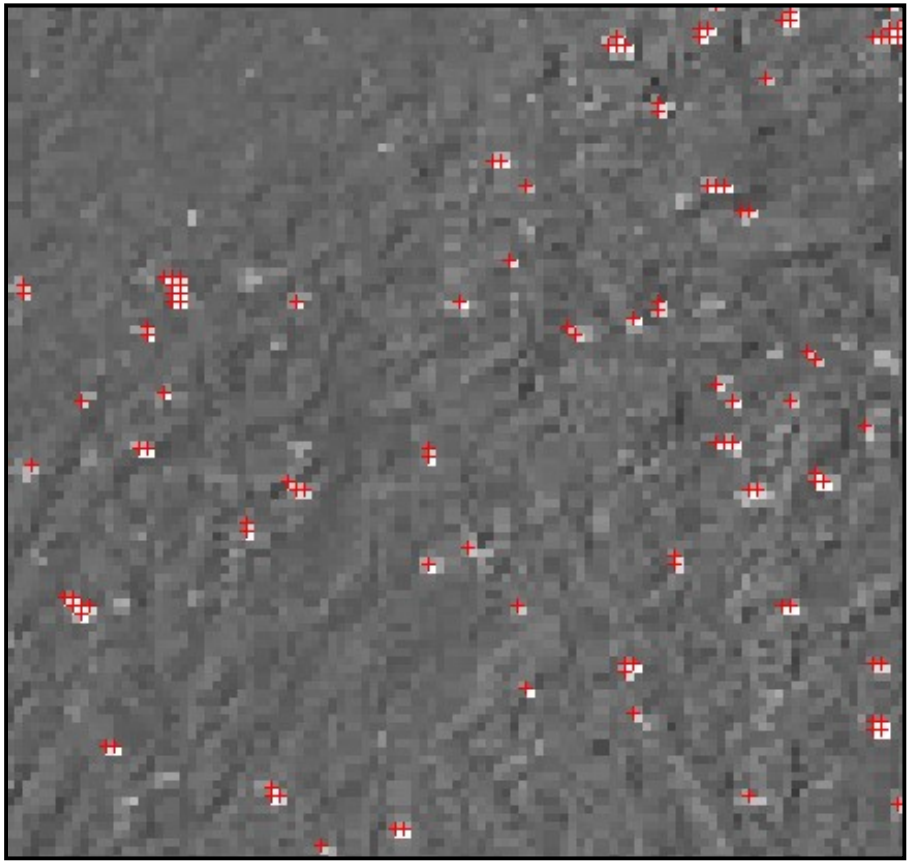
Conclusions:

- SWIR S6 provides additional capability for night-time AF detection (due to 4x smaller pixel area and near-zero background signal compared to S7-S8)
- SWIR S6 detection is not sufficient to use a sole detection metric, and current ATBD test requires adjustment to add base threshold not just rely on $L_{bck} + 3\ \sigma$
- Update ATBD to detect AF pixels with S6 at full resolution, then identify the S7 pixel that the detection lies within and operate the alg. with that as a confirmed AF pixel.

Active Fire Detection Testing (Night-time)



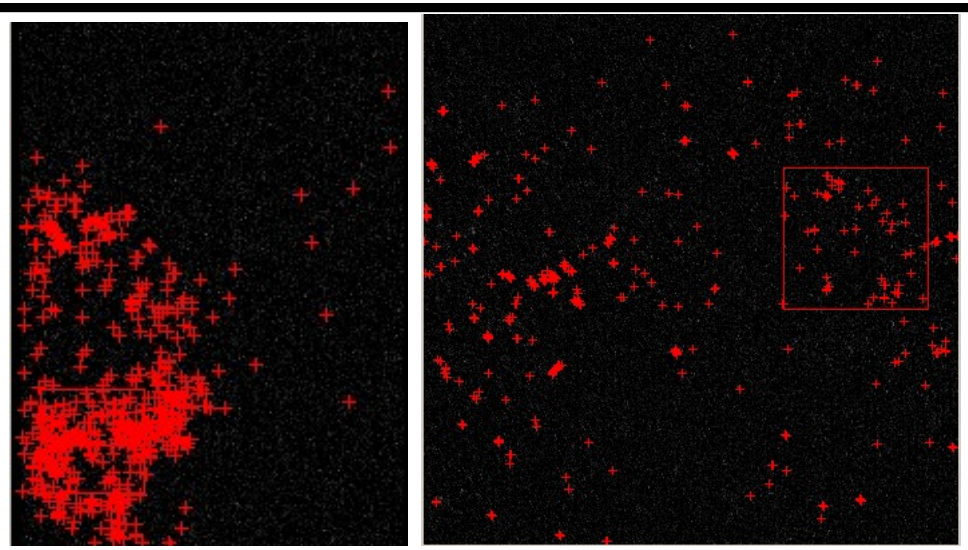
+ SLSTR AF Pixels (S7-S8 detection)



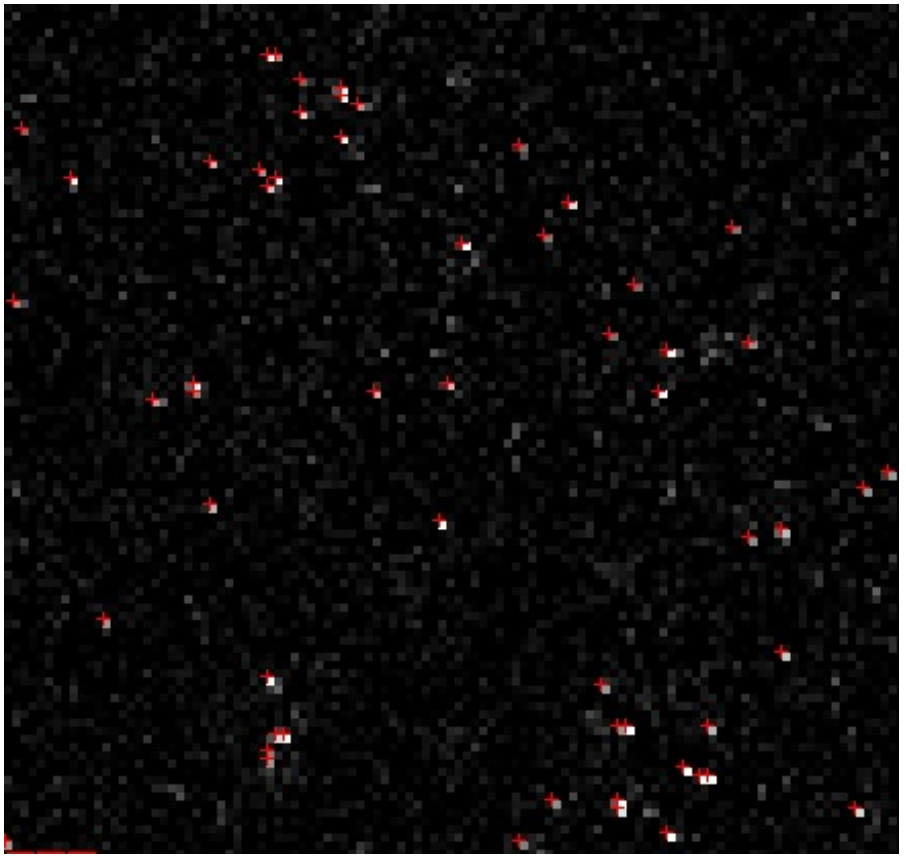
Angola, Southern Africa.

S7-S8 BT Difference from S3A-SLSTR @ 21:16 UTC on 03 Aug 2016

Active Fire Detection Testing (Night-time)



+ SLSTR AF Pixels (S6 detection)



Angola, Southern Africa.

S6 Data from S3A-SLSTR @ 21:16 UTC on 03 Aug 2016


SLSTR MODEL
jenaoptronik
Selex ES
A Finmeccanica Company
THIS WAY UP
CAUTION - NITROGEN RICH ATMOSPHERE VENTILATE VOLUME PRIOR TO PERSONNEL ENTRY
CAUTION - CONTAINER TO BE OPENED BY APPROVED PERSONNEL ONLY IN CONTROLLED ENVIRONMENT WITH QUALITY ASSURANCE REPRESENTATION
HANDLING MANUAL IN DOCUMENT STORAGE LOCATION
S3 SLSTR PFM
LENGTH 2.20M (3.20M)
WIDTH 1.80M
HEIGHT 1.90M (2.15M)
UNLOADED WEIGHT APPROX 360 KG
HANDLE WITH CARE
DO NOT DROP
G-56
CLEANROOM
USE ONLY