MTG view on the SNOW

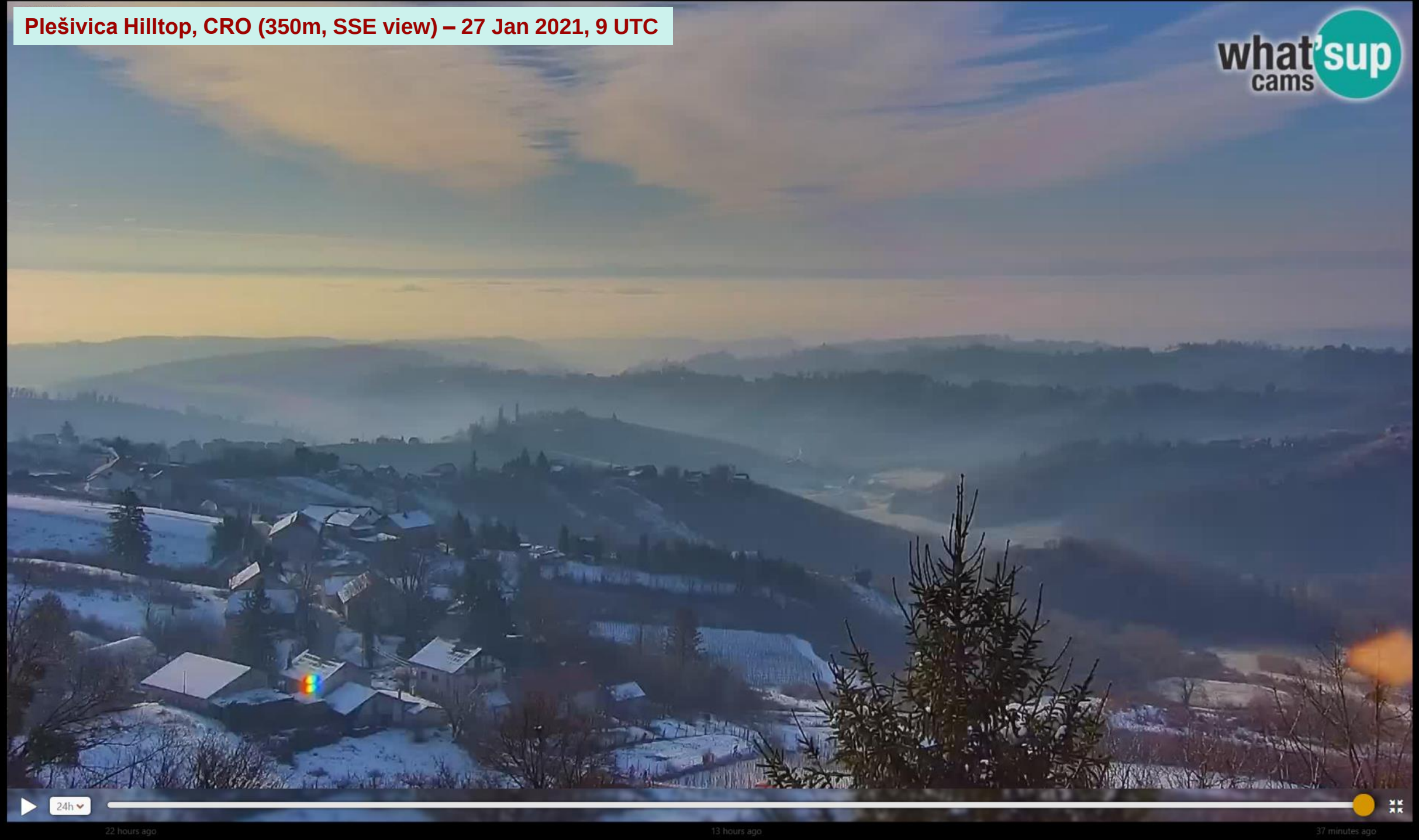
EUMeTrain **Snow** Event Week, Feb 2021

Ivan Smiljanic EUMETSAT

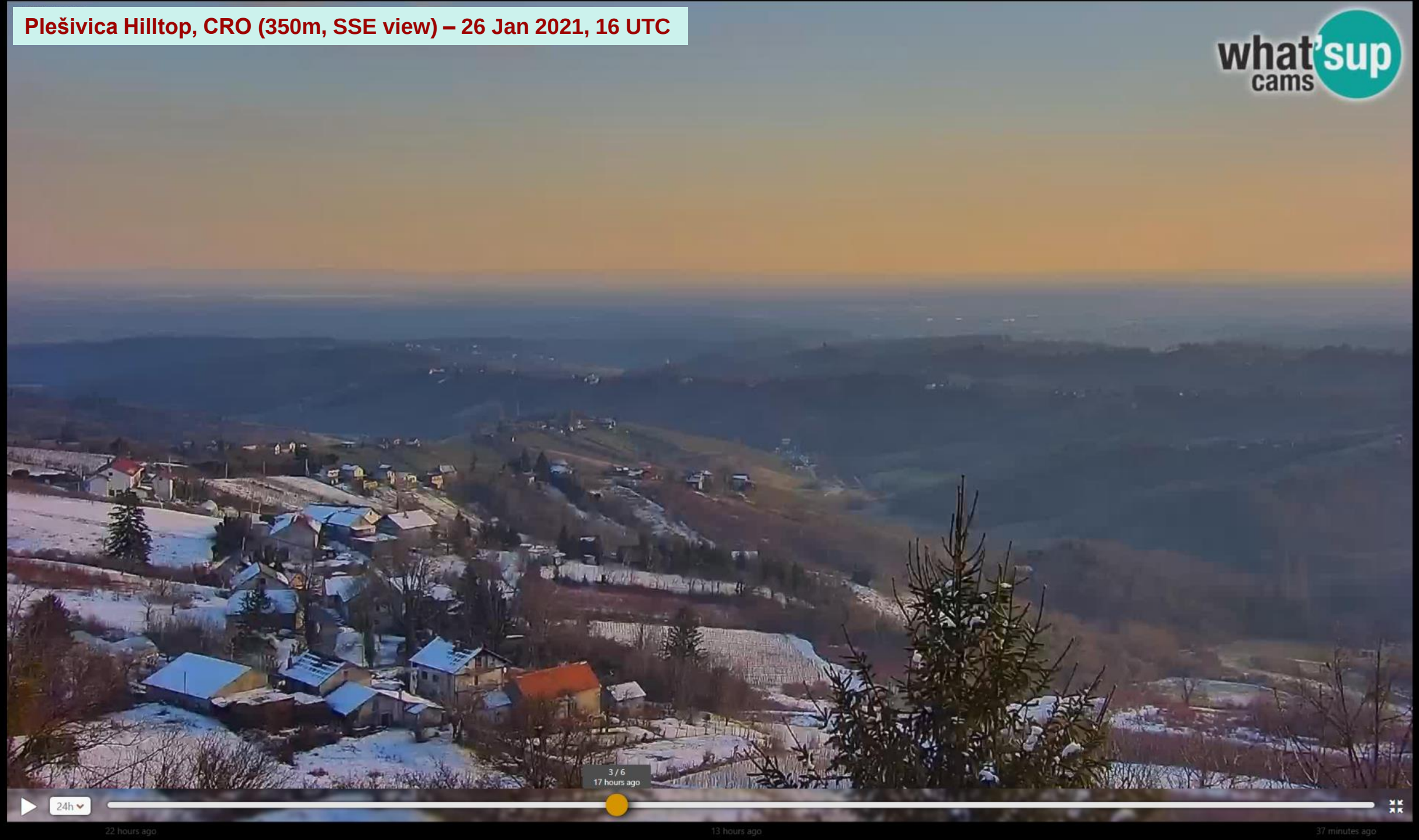
Detection challenges

- Do satellites see a snowman?!

Plešivica Hilltop, CRO (350m, SSE view) – 27 Jan 2021, 9 UTC



Plešivica Hilltop, CRO (350m, SSE view) – 26 Jan 2021, 16 UTC



1 day ago
26.01.2021 09:40:24 jelvica@pljusak.com
24h
1 day ago
12 hours ago
17 minutes ago

1 day ago

24h

1 day ago

12 hours ago

23 minutes ago

23 hours ago

24h

1 day ago

12 hours ago

24 minutes ago

22 hours ago

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12 hours ago

26 minutes ago

18 hours ago

24h

1 day ago

12 hours ago

27 minutes ago

17 hours ago

24h

1 day ago

12 hours ago

27 minutes ago

Detection challenges

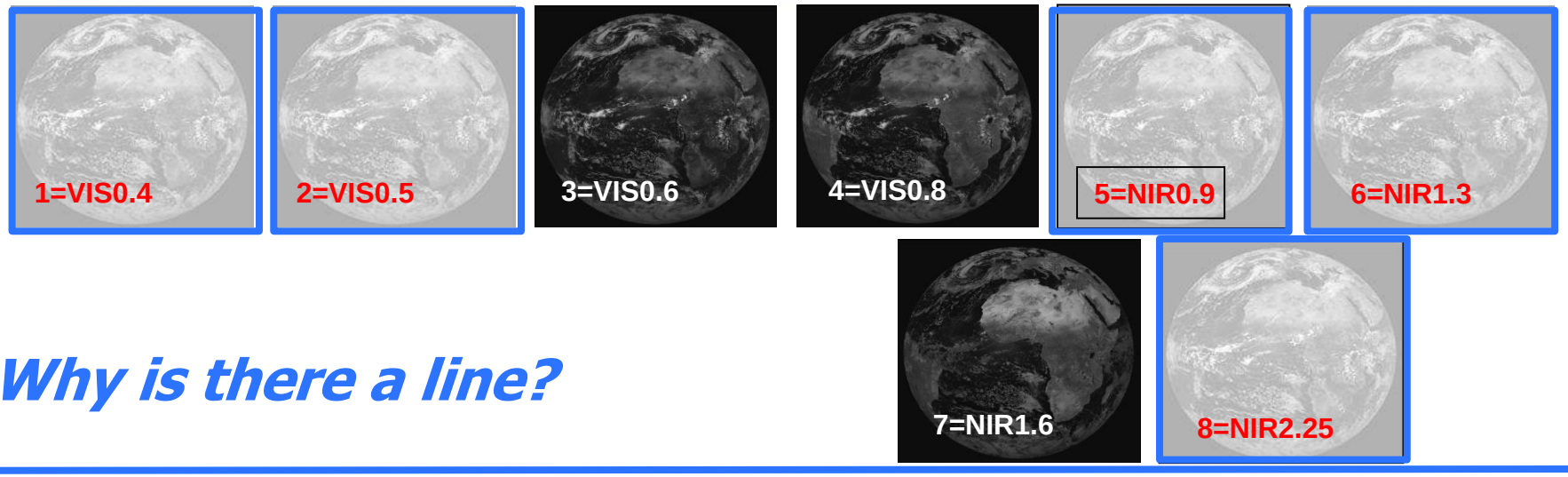
- Heterogeneous scene
- Diurnal cycles
- Sun angle
- Satellite angle
- Clouds
- Snow ‘flavour’ (genesis, pollution, life-cycle, i.e. microphysics)

Tackle with:
Advanced **SPATIAL** + **SPECTRAL** resolution

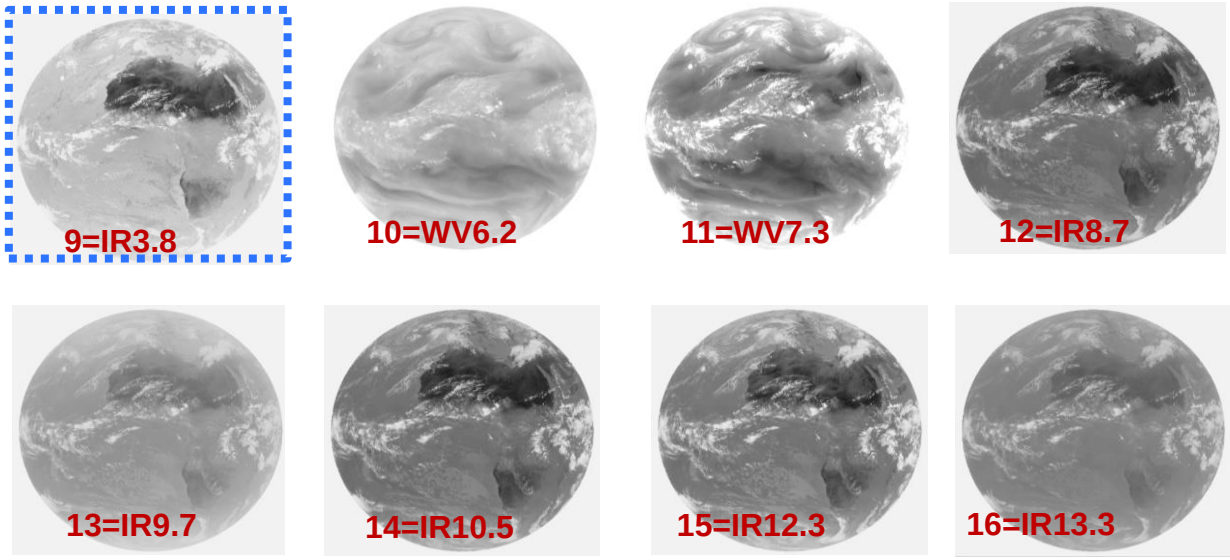
Meteosat Third Generation: Imaging mission (MTG-I)

- Imagery mission implemented by two MTG-I satellites
- Full disc imagery every 10 minutes in 16 bands **(FCI)**
- Fast imagery of Europe every 2.5 minutes **(FCI)**
- New Lightning Imager (LI)

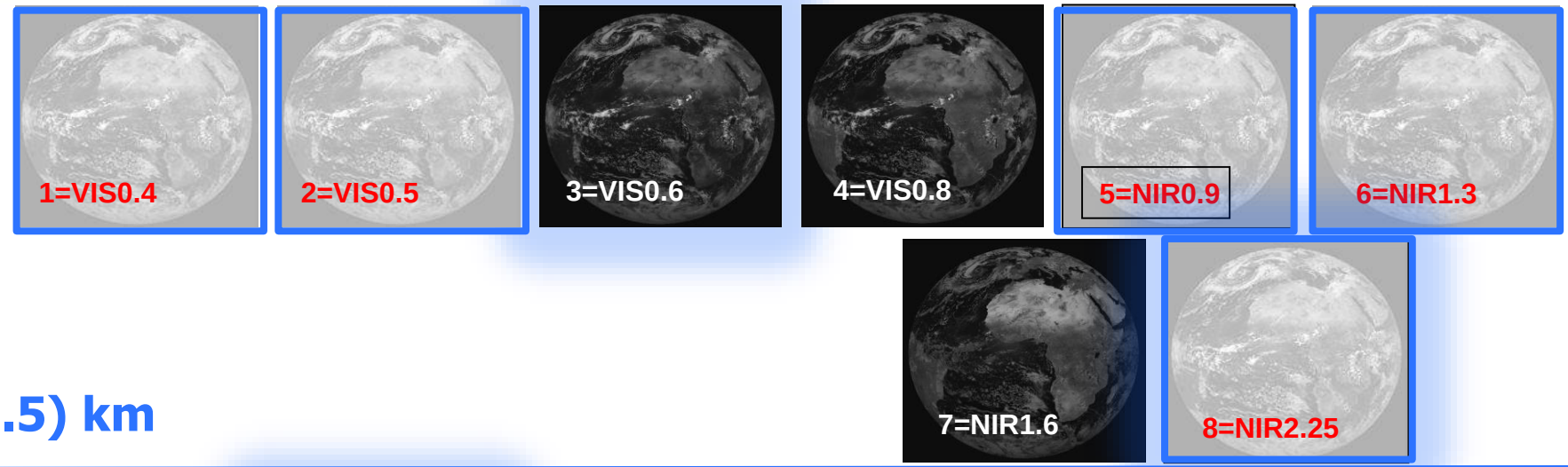
New FCI channels (vs SEVIRI)



****** Why is there a line?***

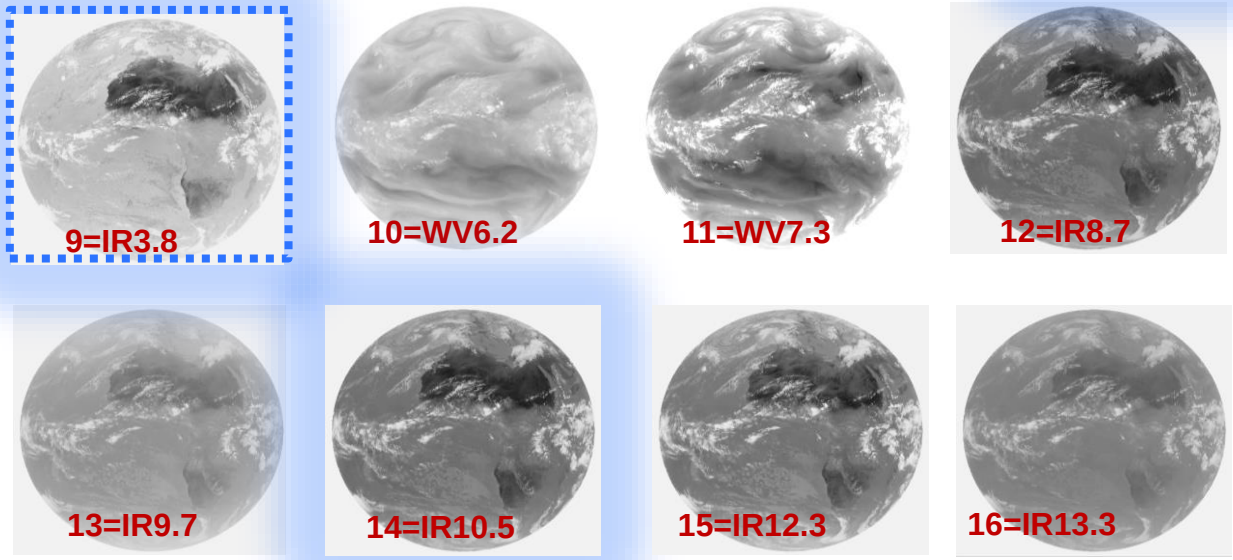


New FCI channels (vs SEVIRI)



Solar
1.0 (0.5) km

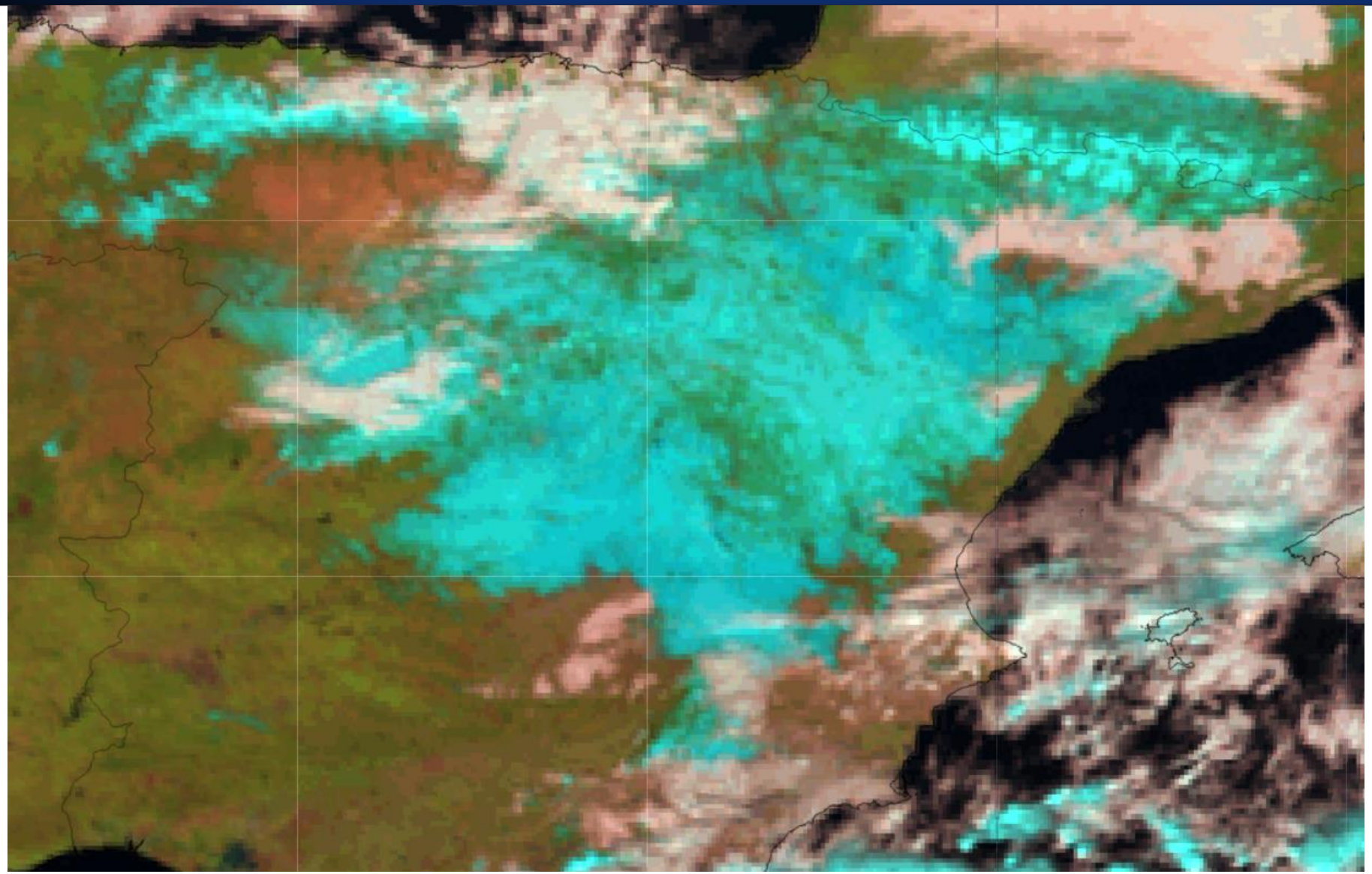
Thermal
2.0 (1.0) km



Advanced **SPATIAL +** resolution

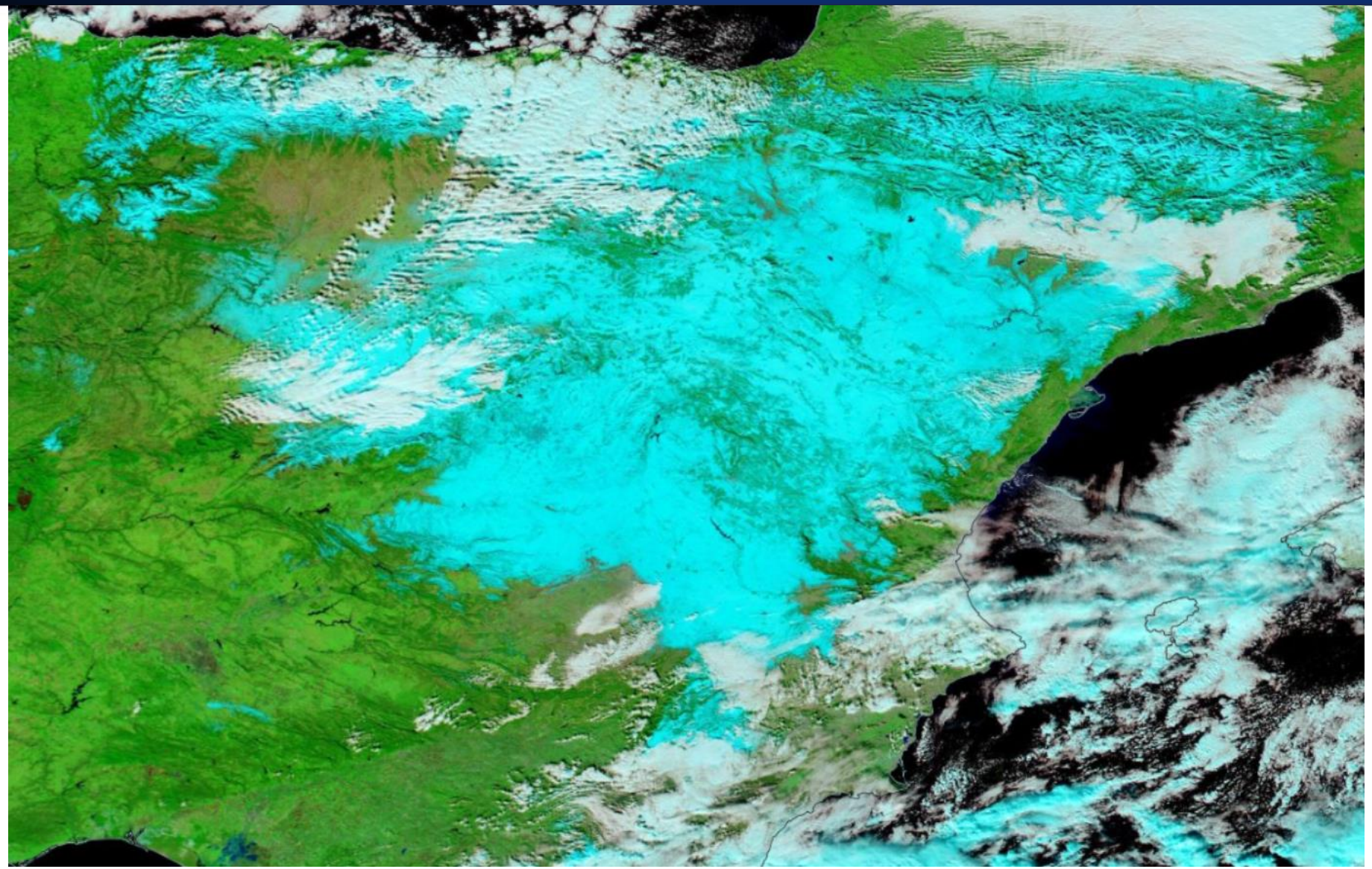
Advanced SPATIAL resolution

Resolution: 3.0 km / Meteosat-11 SEVIRI 2021 01 11 - 12:00 UTC



Advanced SPATIAL resolution

Resolution: 0.5 km / Aqua MODIS 2021 01 11 - 13:00 UTC

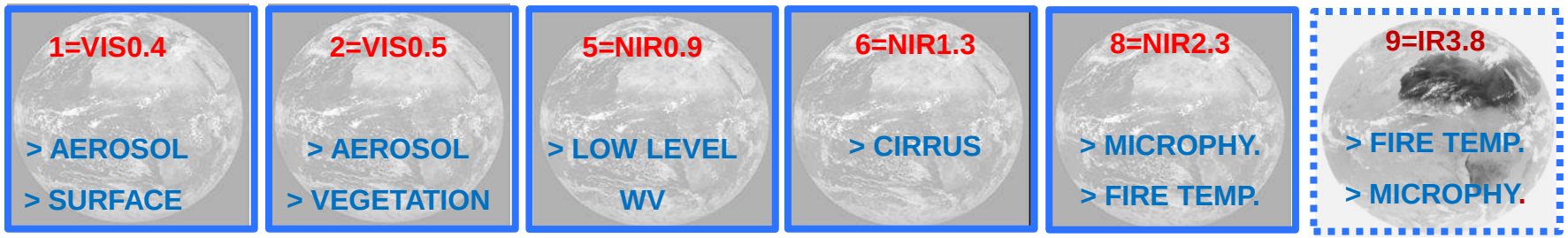


Advanced SPATIAL resolution

Resolution: 0.02 km / Sentinel-2a MSI 2021 01 11 - 11:14 UTC

Advanced **SPECTRAL +** resolution

New RGBs

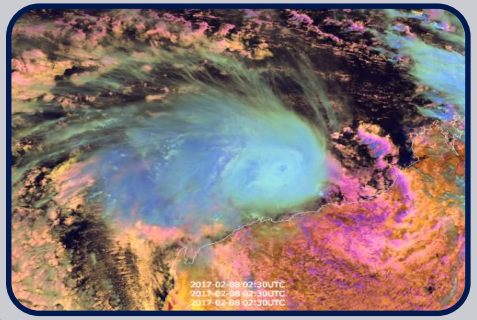


True Colour RGB

R VIS0.6
G VIS0.5
B VIS0.4

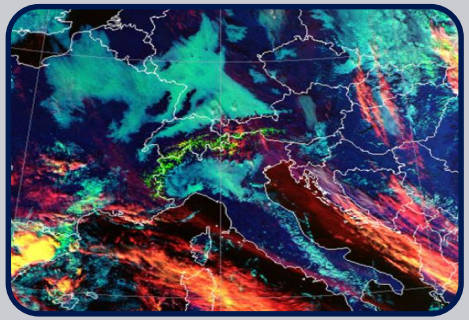
Cloud Phase RGB

R NIR1.6
G NIR2.3
B VIS0.5/VIS0.6



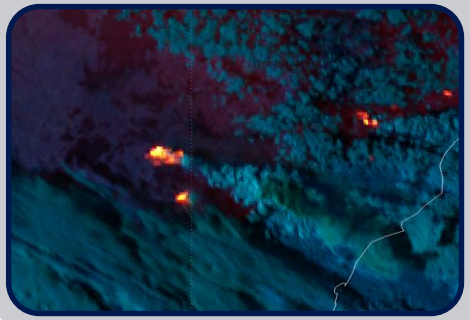
Cloud Type RGB

R NIR1.3
G VIS0.8
B VIS1.6

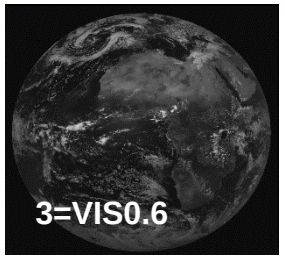


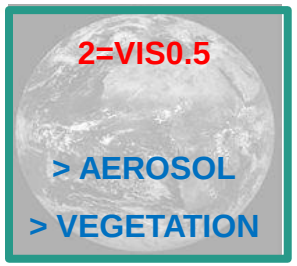
Fire Temp. RGB

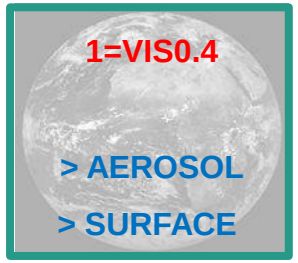
R IR3.9
G NIR2.3
B NIR1.6



True Colour RGB



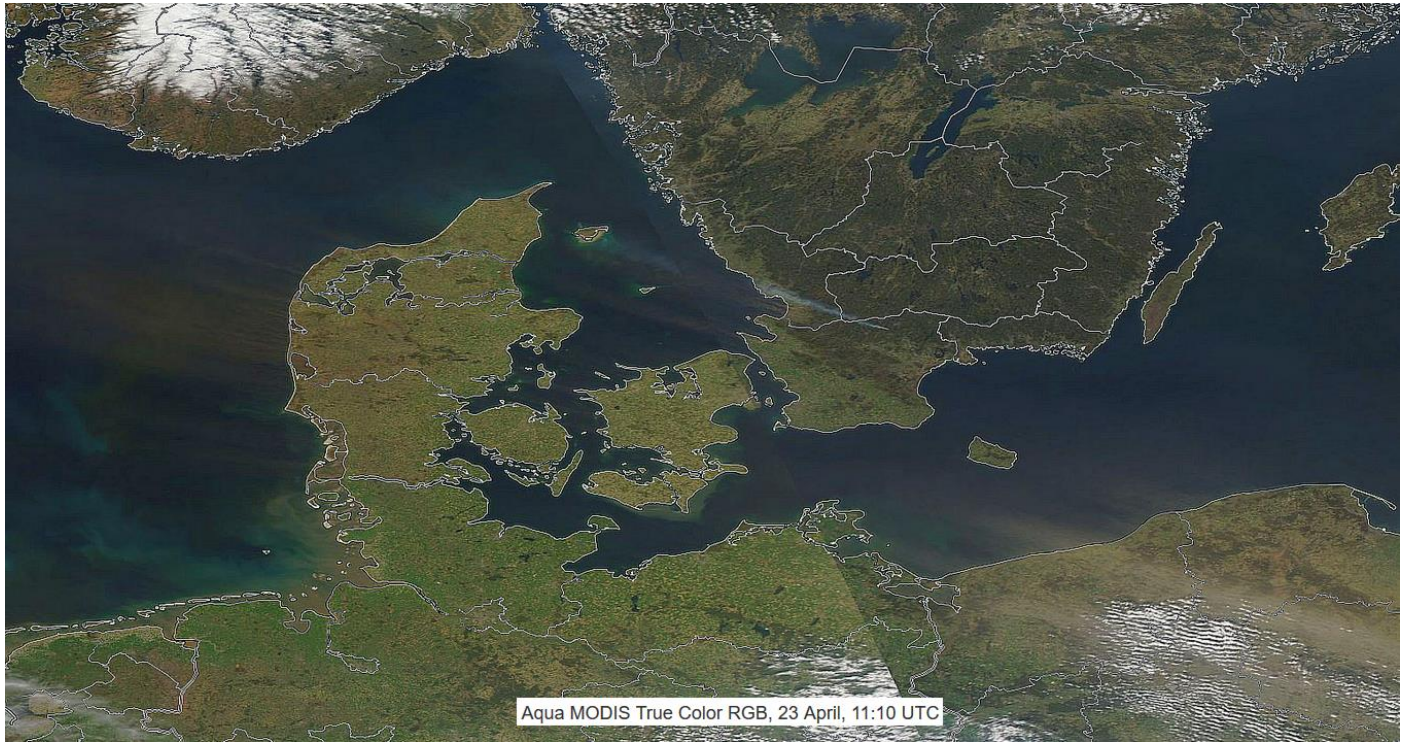




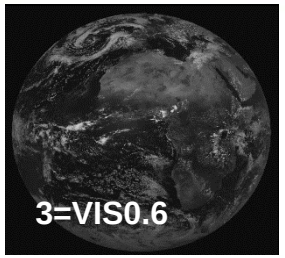
- Clouds
- Aerosols (dust, ash, smoke, smog)
- Ocean Colour
- Vegetation

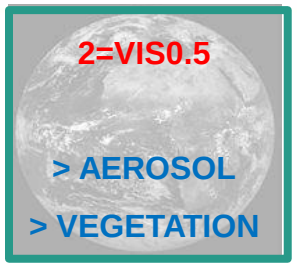
Range

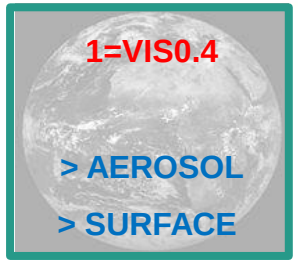
R VIS0.6	0 to 100 %
G VIS0.5	0 to 100 %
B VIS0.4	0 to 100 %



True Colour RGB







- Clouds
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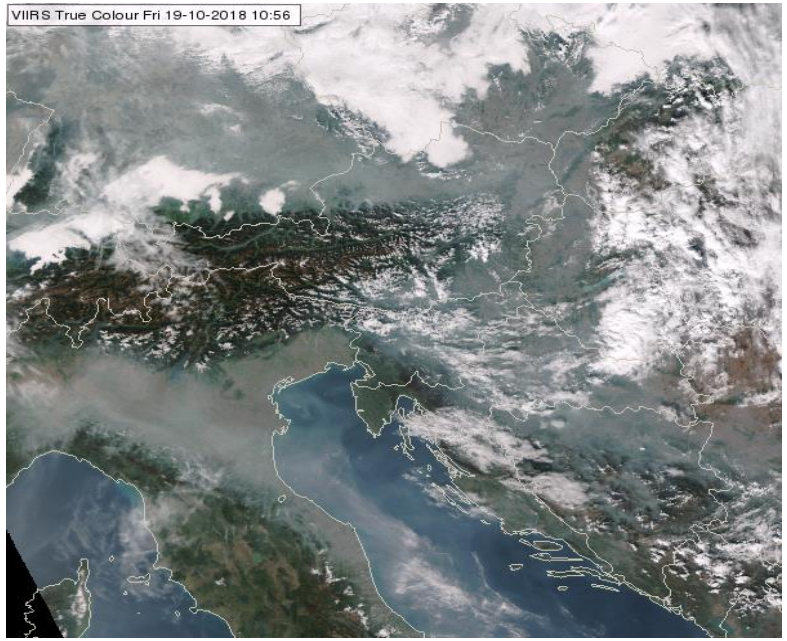
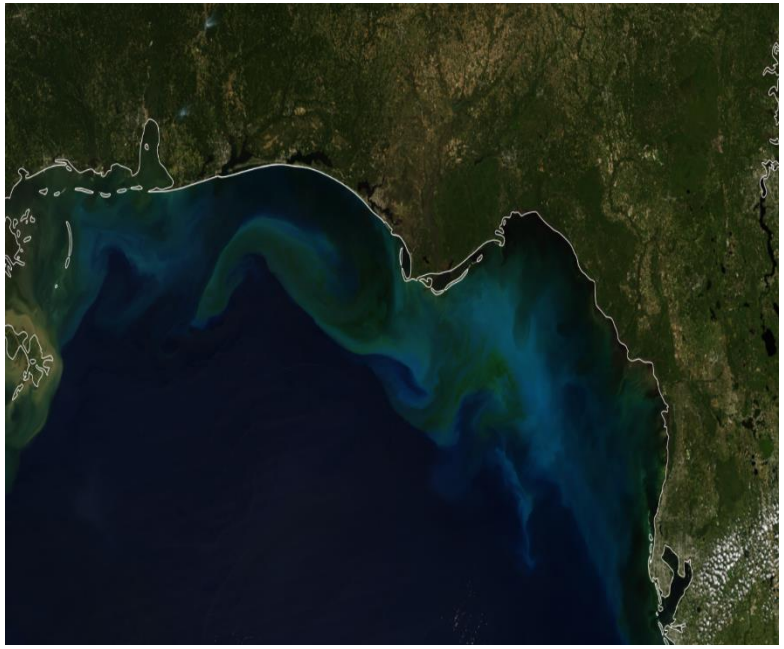
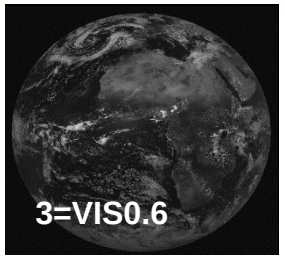
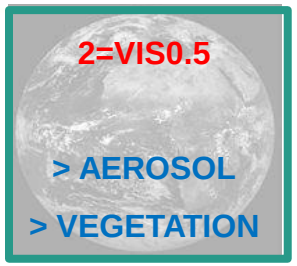


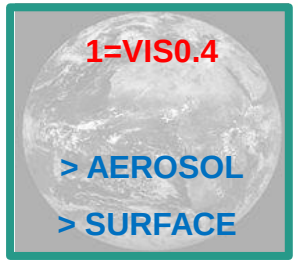


****** Where do you see snow?***

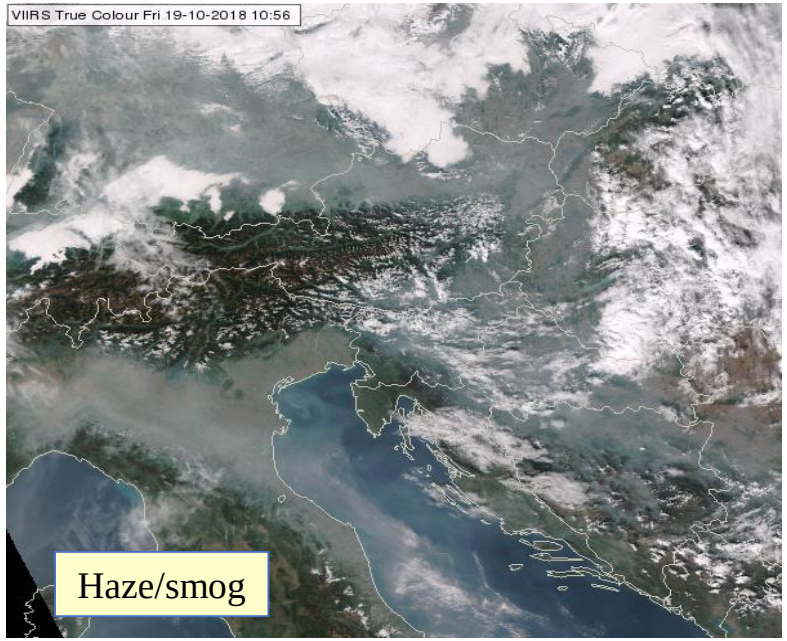
True Colour RGB

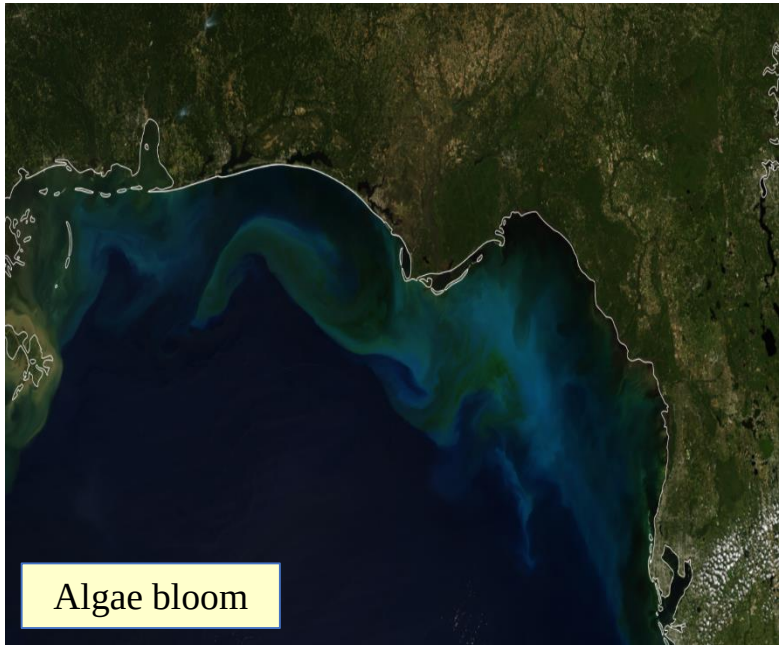






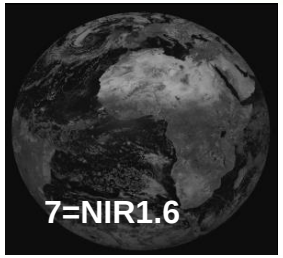
- Clouds
- Aerosols (dust, ash, smoke, smog)
- Ocean Colour
- Vegetation

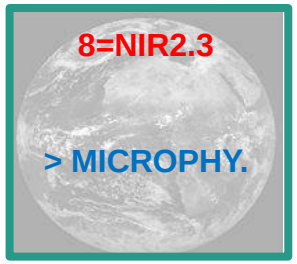


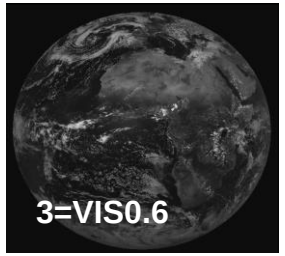


****** No snow!***

Cloud Phase RGB



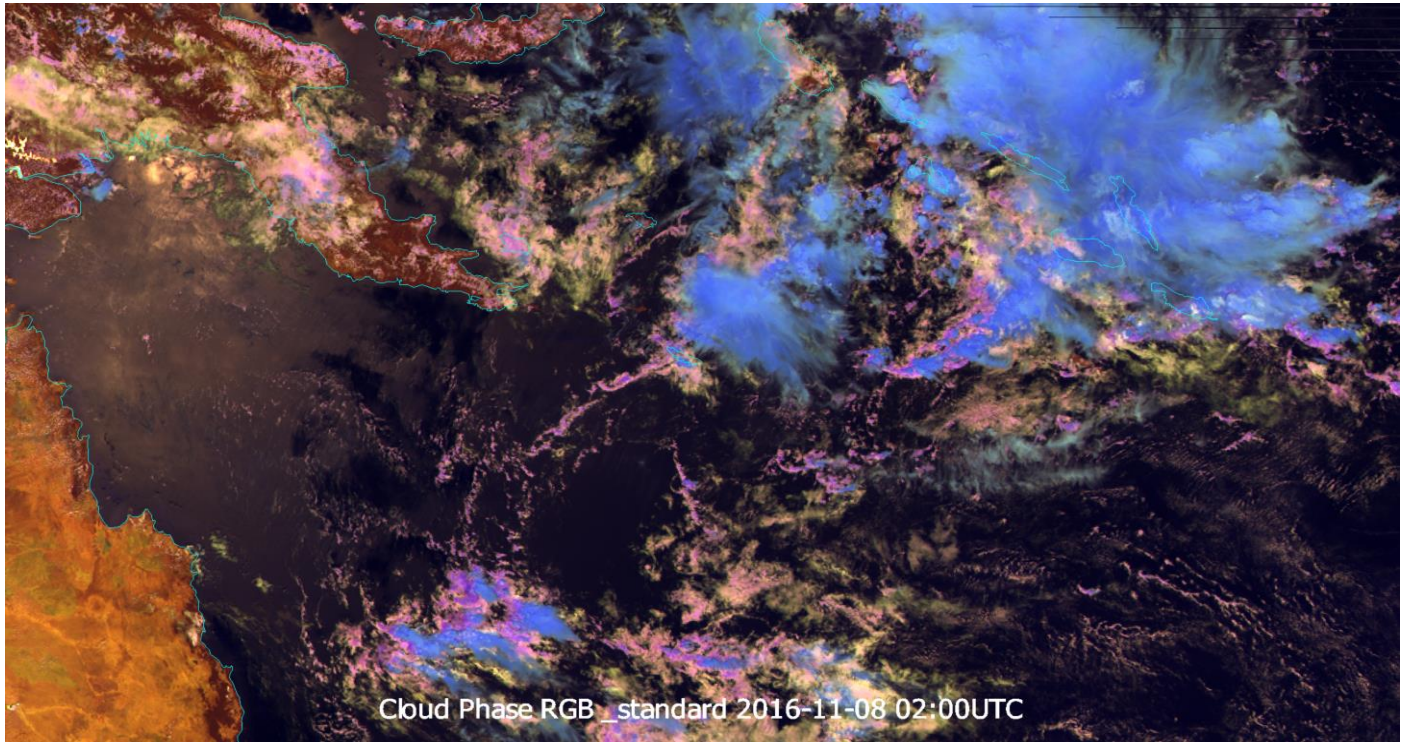




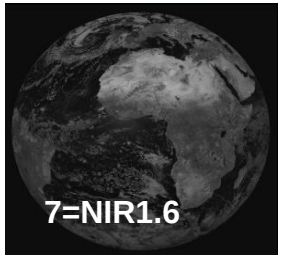
- Cloud phase
- Particle size
- Snow/ice
- Vegetation

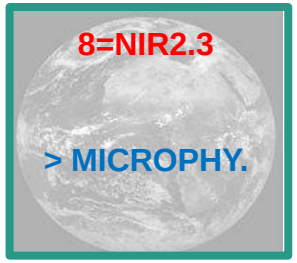
Range

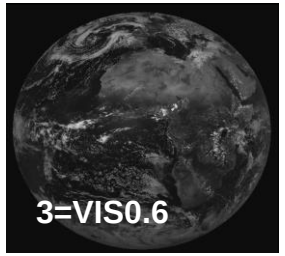
R NIR1.6	0 to 50 %
G NIR2.3	0 to 50 %
B VIS0.6	0 to 100 %



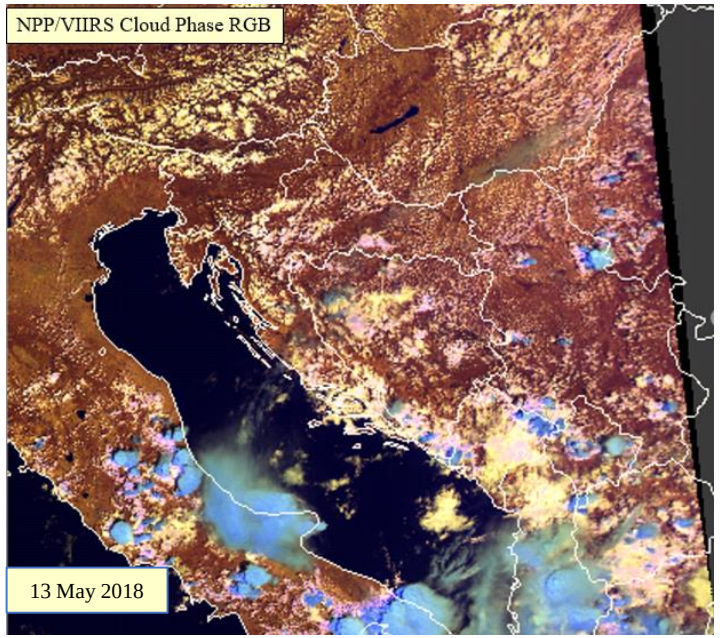
Cloud Phase RGB

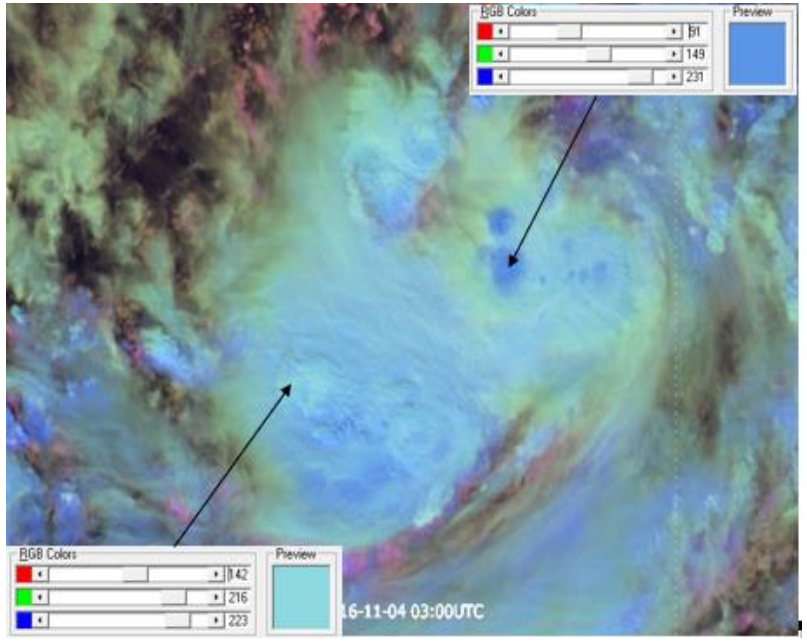


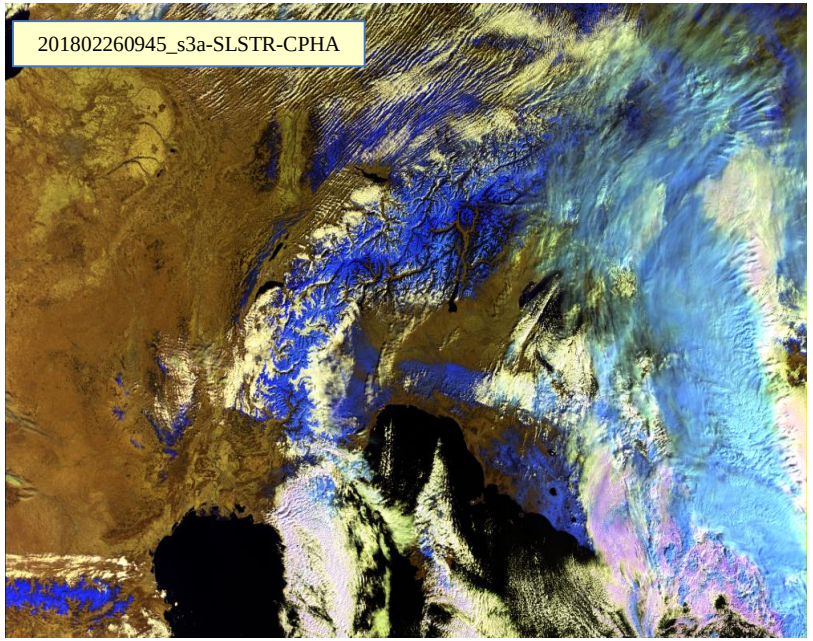




- Cloud phase
- Particle size
- Snow/ice
- Vegetation

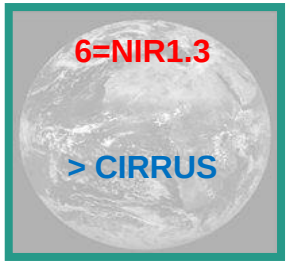


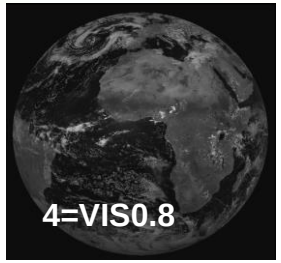


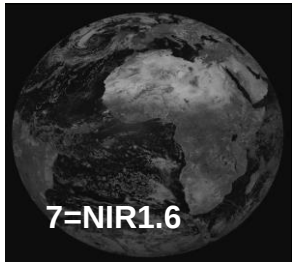


****** Where do you see snow?***

Cloud Type RGB



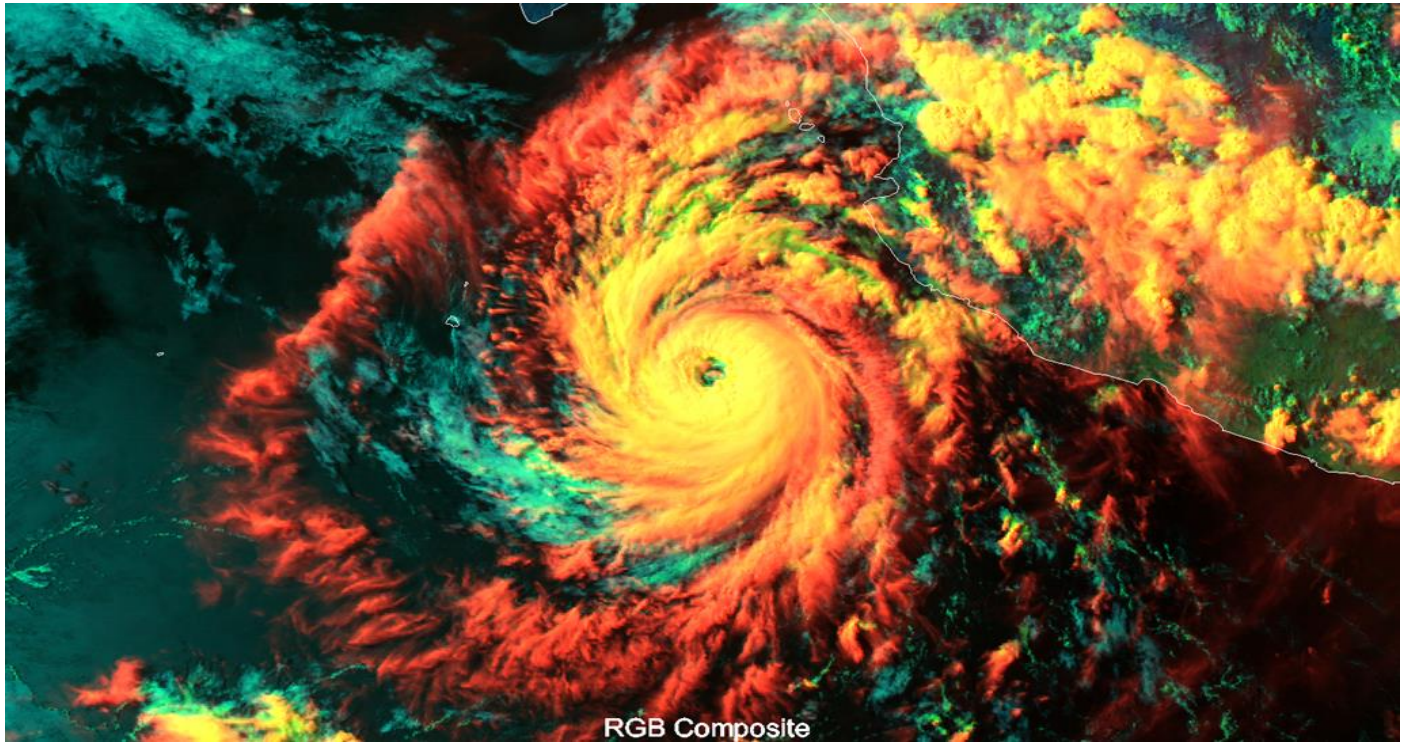




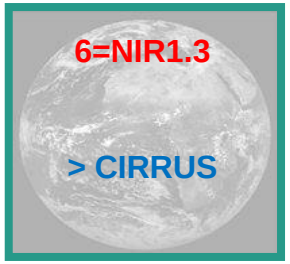
- Cloud optical depth
- Cloud phase
- Snow/ice
- Vegetation

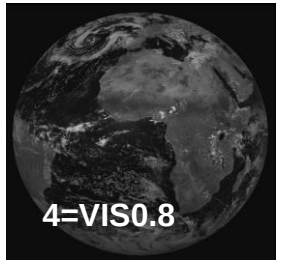
Range

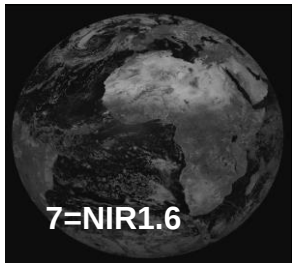
R NIR1.3	0 to 10 % G1.5
G VIS0.8	0 to 80 % G0.75
B NIR1.6	0 to 80 % G1.0



Cloud Type RGB







- Cloud optical depth
- Cloud phase
- Snow/ice
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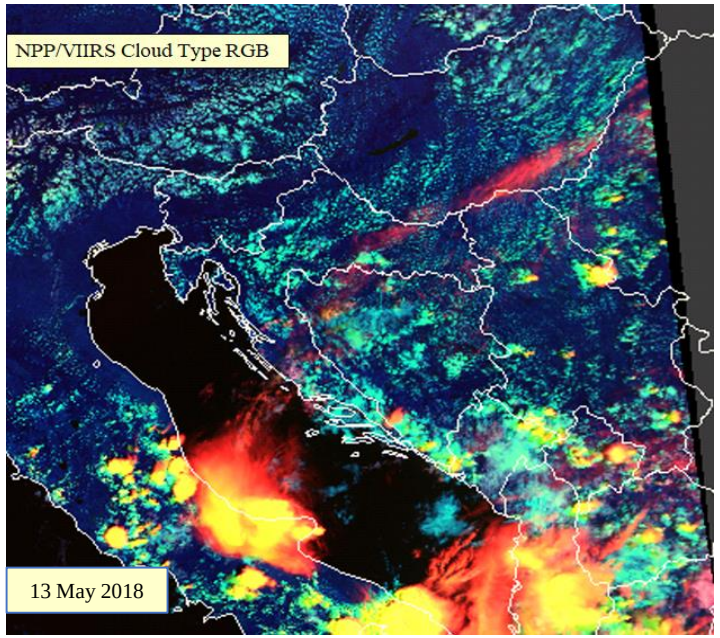
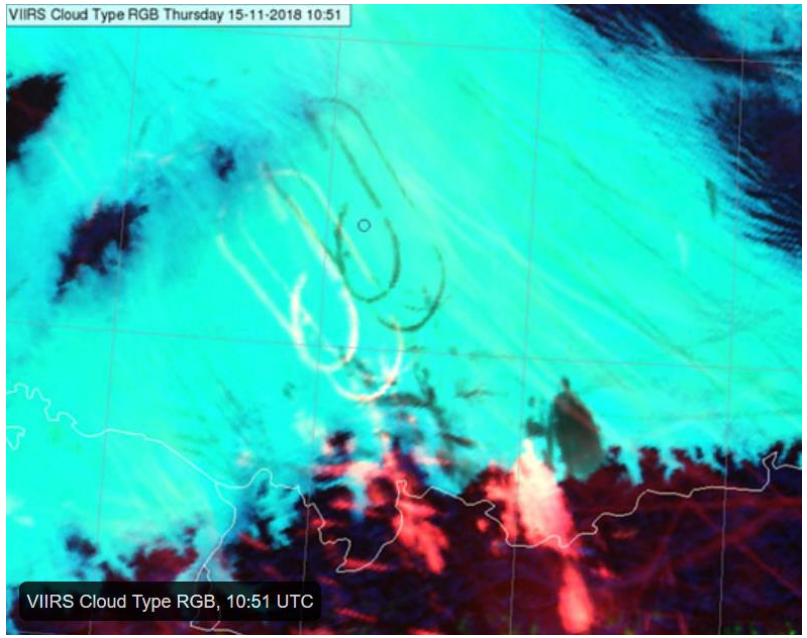
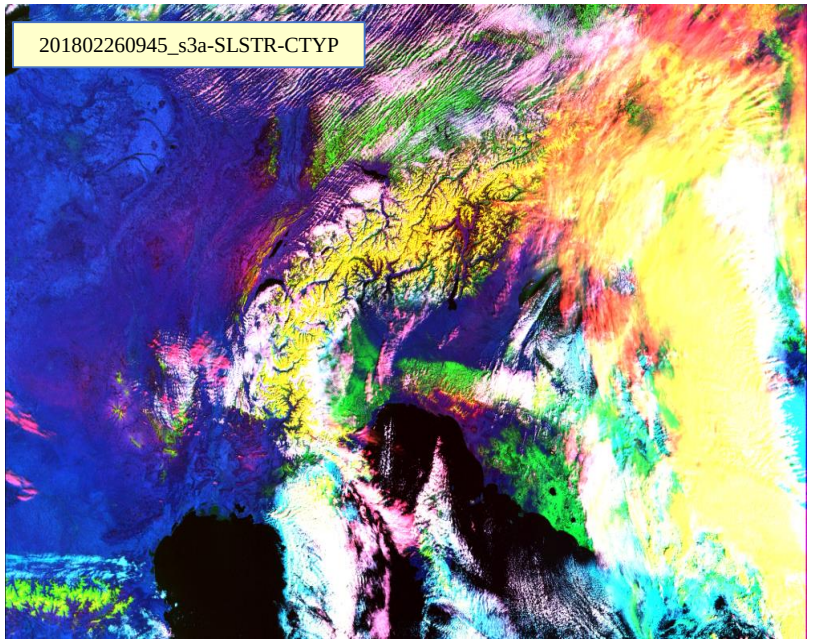




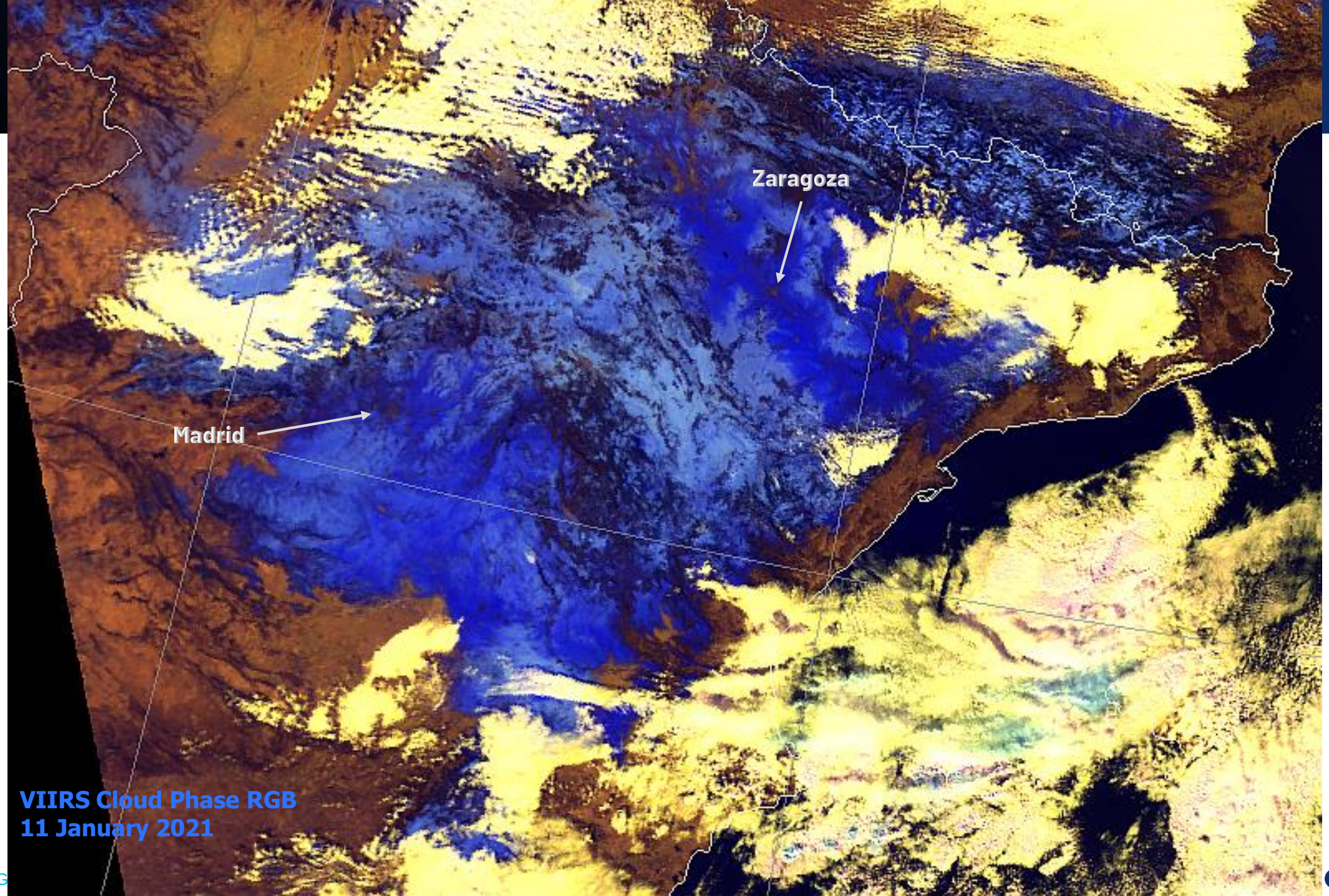


****** Where do you see snow?***

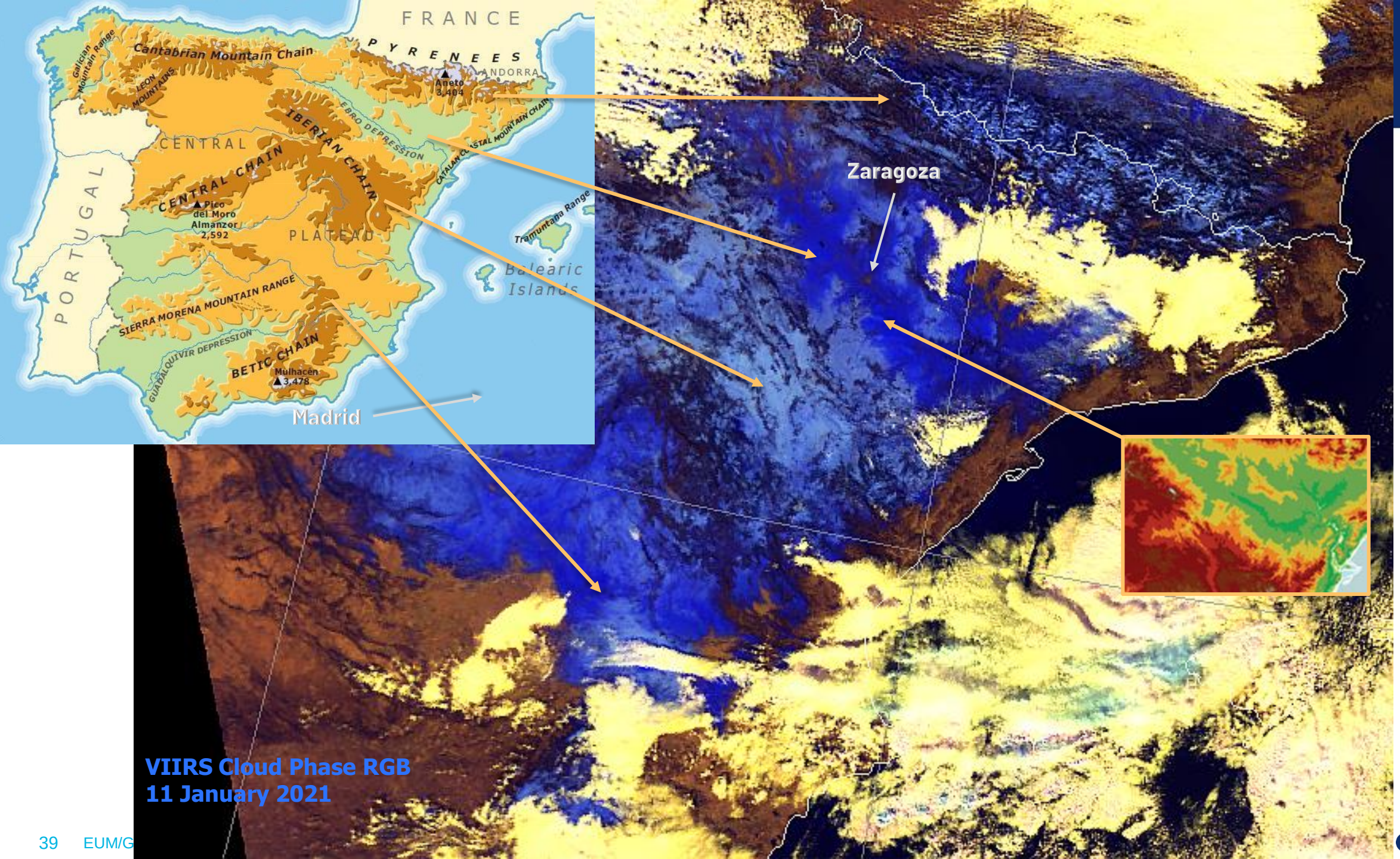
Case study – ‘Skiing in Madrid’, 8 – 11 January 2021

- https://www.eumetsat.int/heavy-snow-in-spain

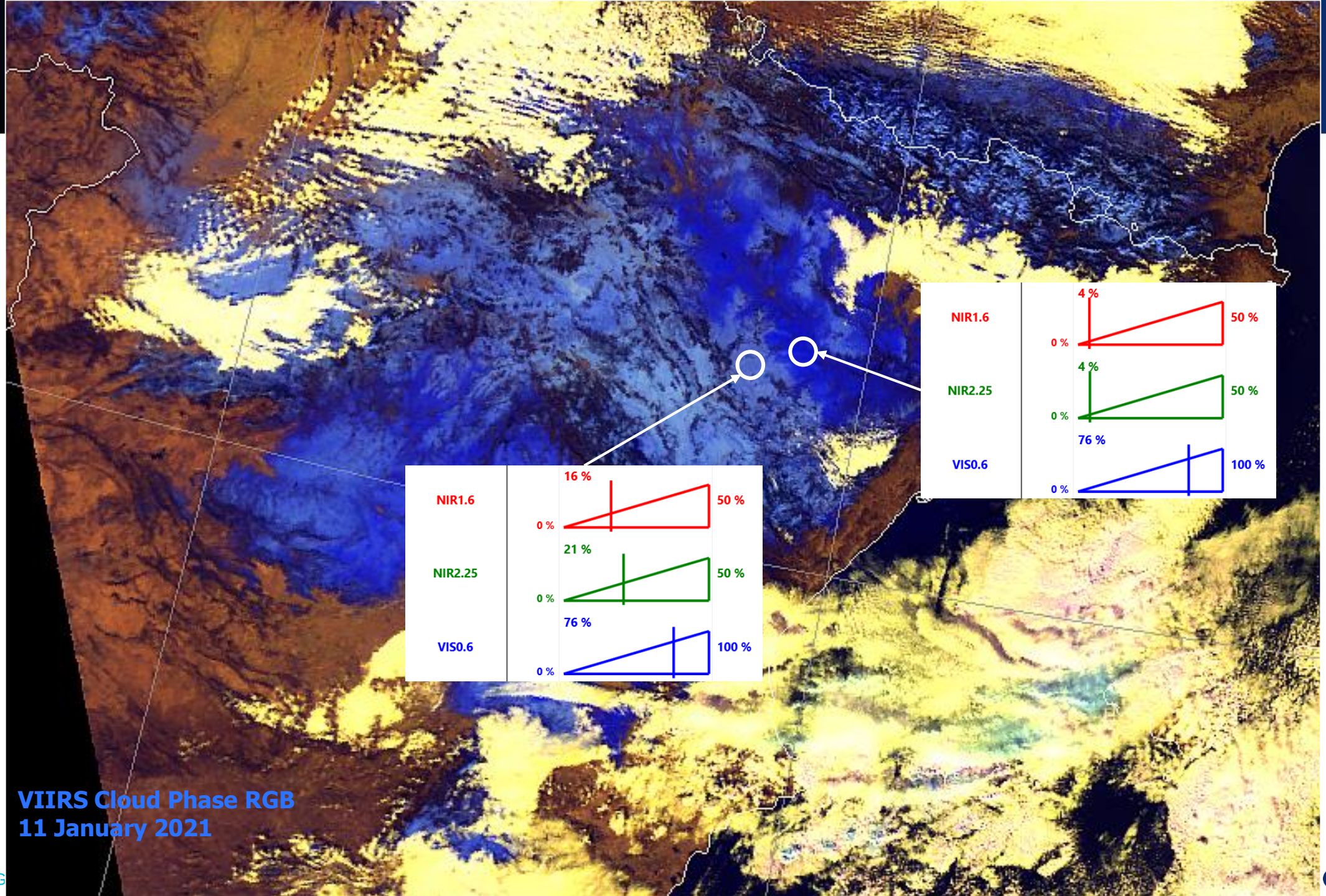
Photo: Gabriel Bouys/AFP



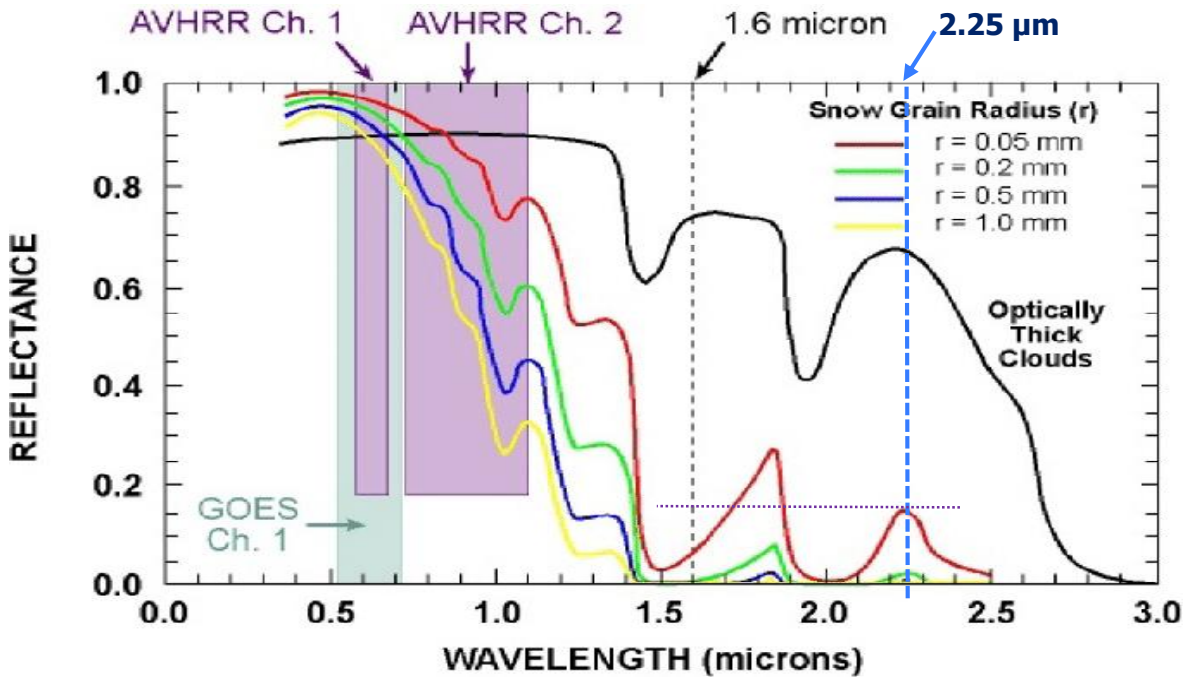
VIIRS Cloud Phase RGB
11 January 2021


FRANCE
PYRENEES
ANDORRA
Aneto
3,404
Cantabrian Mountain Chain
Galician Mountain Range
LEON MOUNTAINS
IBERIAN CHAIN
EBRO DEPRESSION
CATALAN COASTAL MOUNTAIN CHAIN
CENTRAL
CENTRAL CHAIN
Pico del Moro Almanzor
2,592
PLATEAU
PORTUGAL
Tramuntana Range
Balearic Islands
SIERRA MORENA MOUNTAIN RANGE
GUADALQUIVIR DEPRESSION
BETIC CHAIN
Mulhacen
3,478
Madrid
Zaragoza
VIIRS Cloud Phase RGB
11 January 2021

EUMETSAT

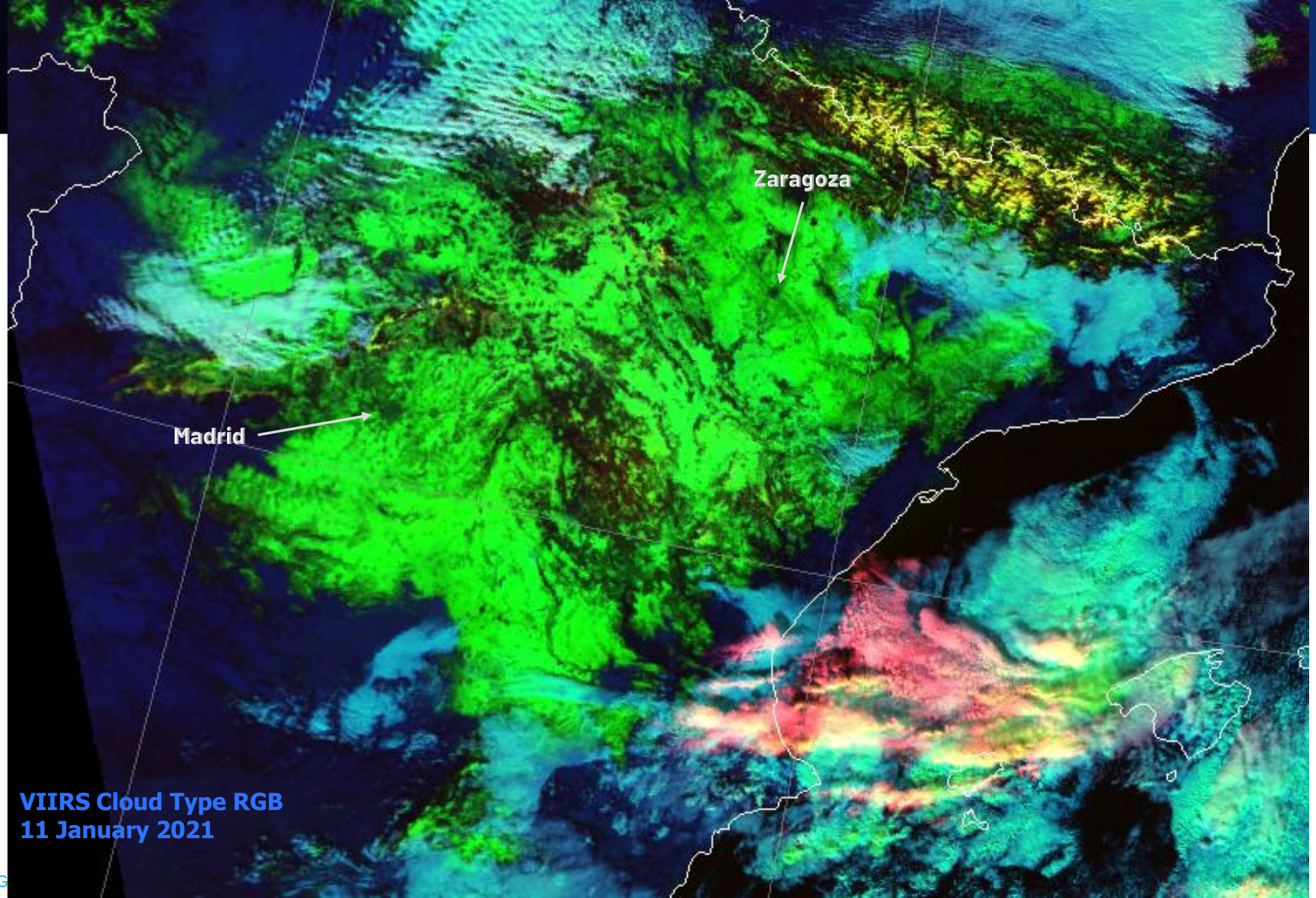


VIIRS Cloud Phase RGB
11 January 2021

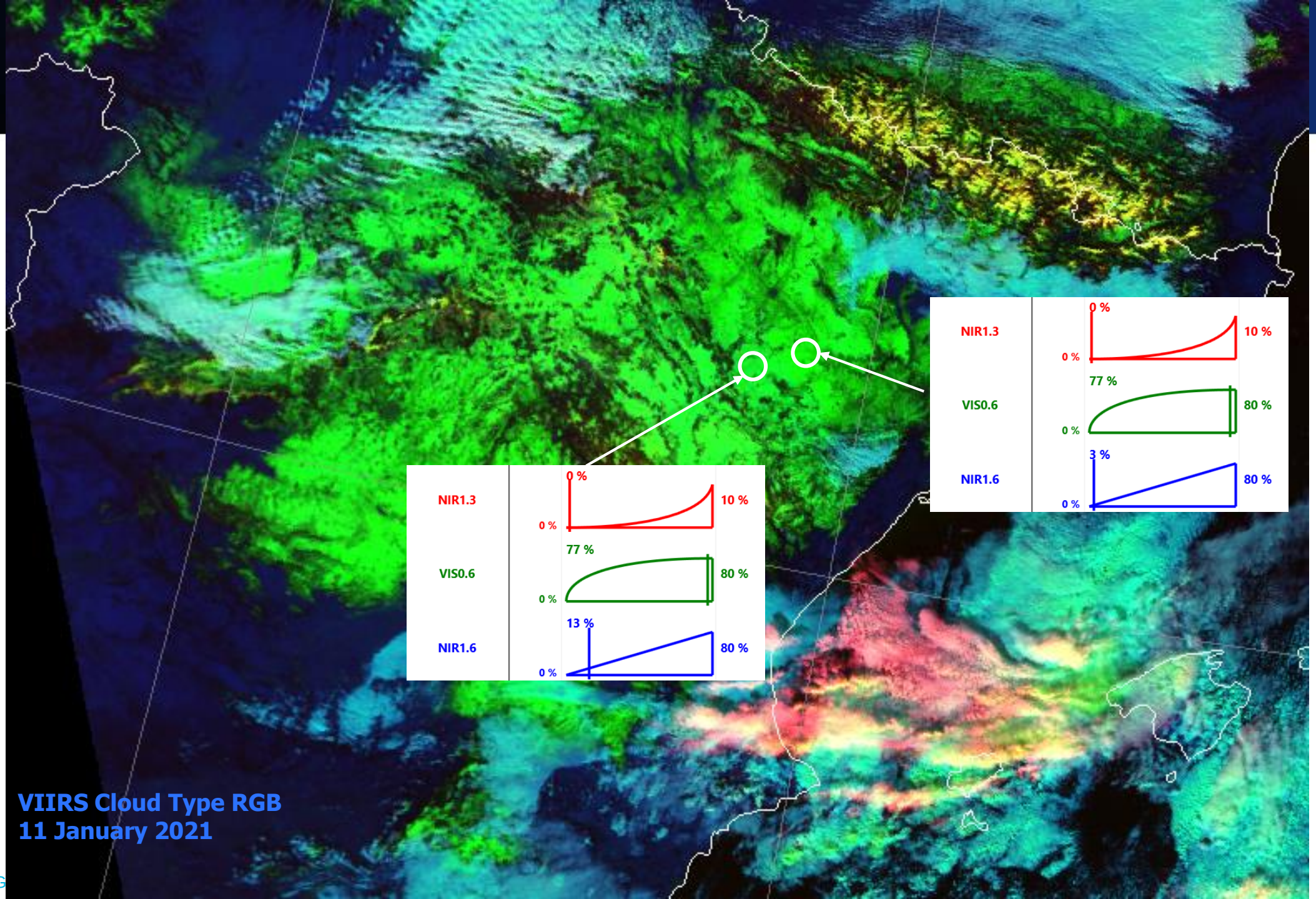


For snow covered land

- The smaller the snow grain size the higher the reflectance both at NIR1.6 and NIR2.25
- NIR2.25 reflectance is higher than NIR1.61 reflectance
- NIR2.25 seems to be more sensitive to the snow grain size than NIR1.61



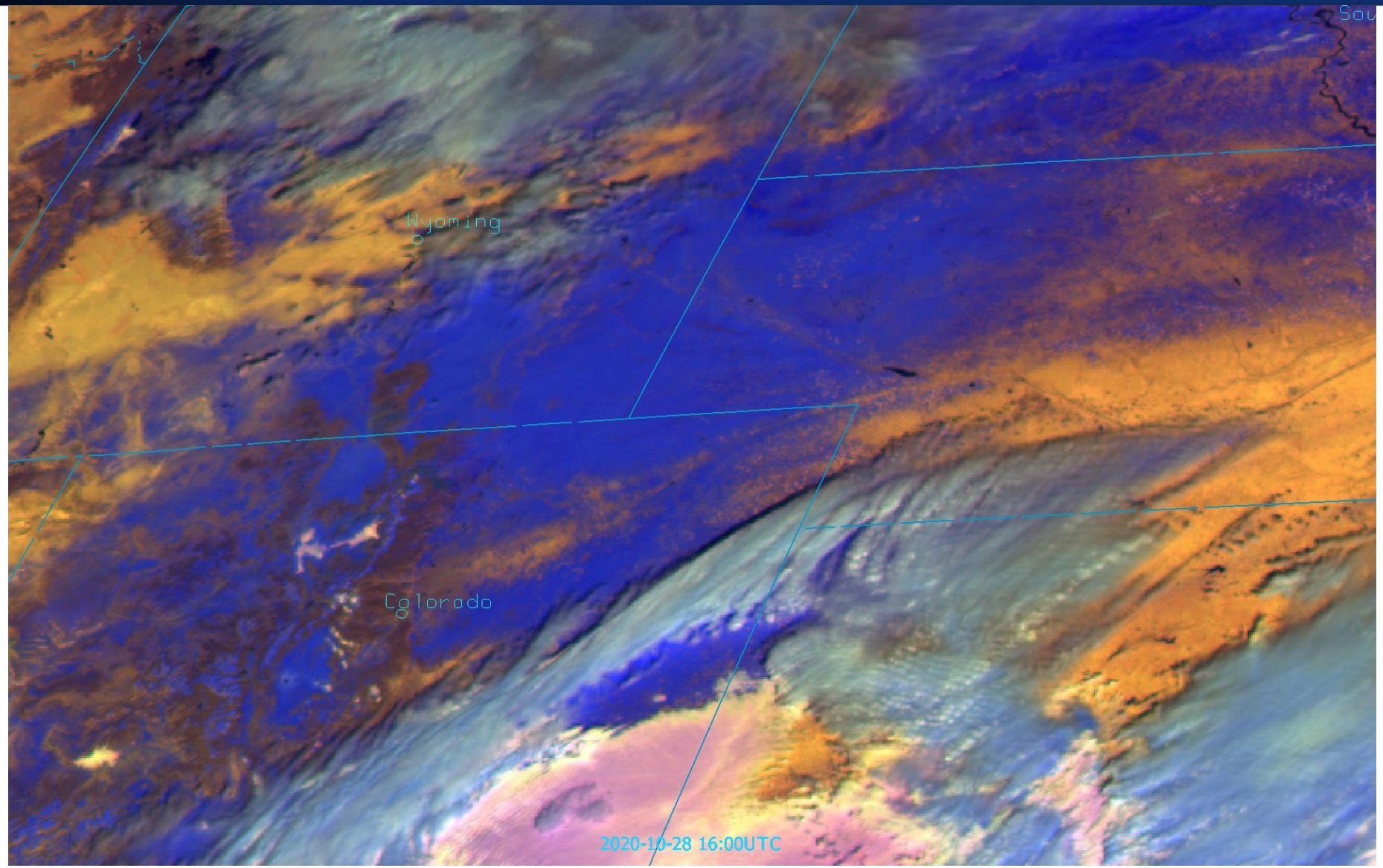
VIIRS Cloud Type RGB
11 January 2021



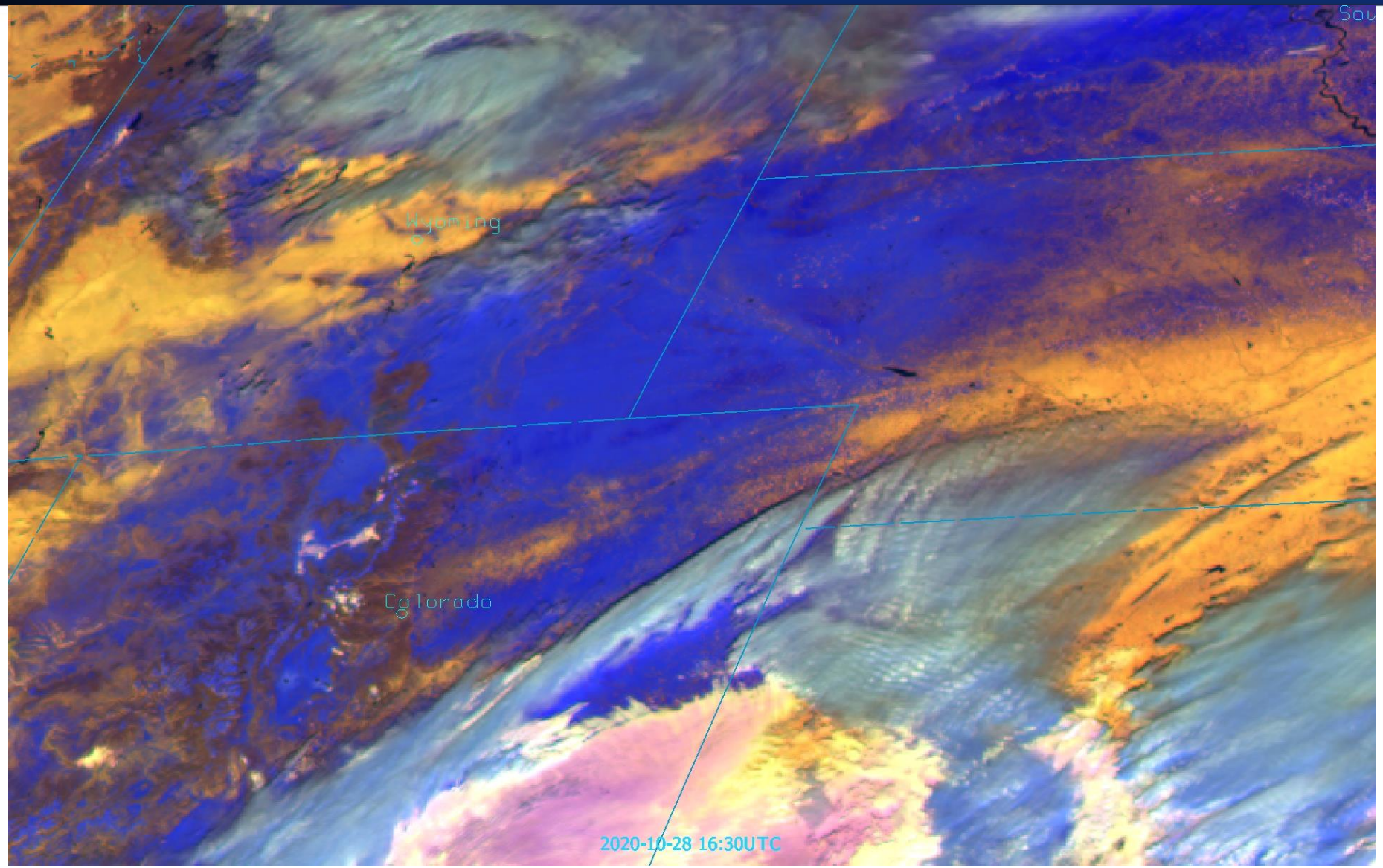
VIIRS Cloud Type RGB
11 January 2021

Case study – ‘Snow over fires’, USA, 28 October 2020

Snow melt loop (8-13h local time)



Snow melt loop (8-13h local time)



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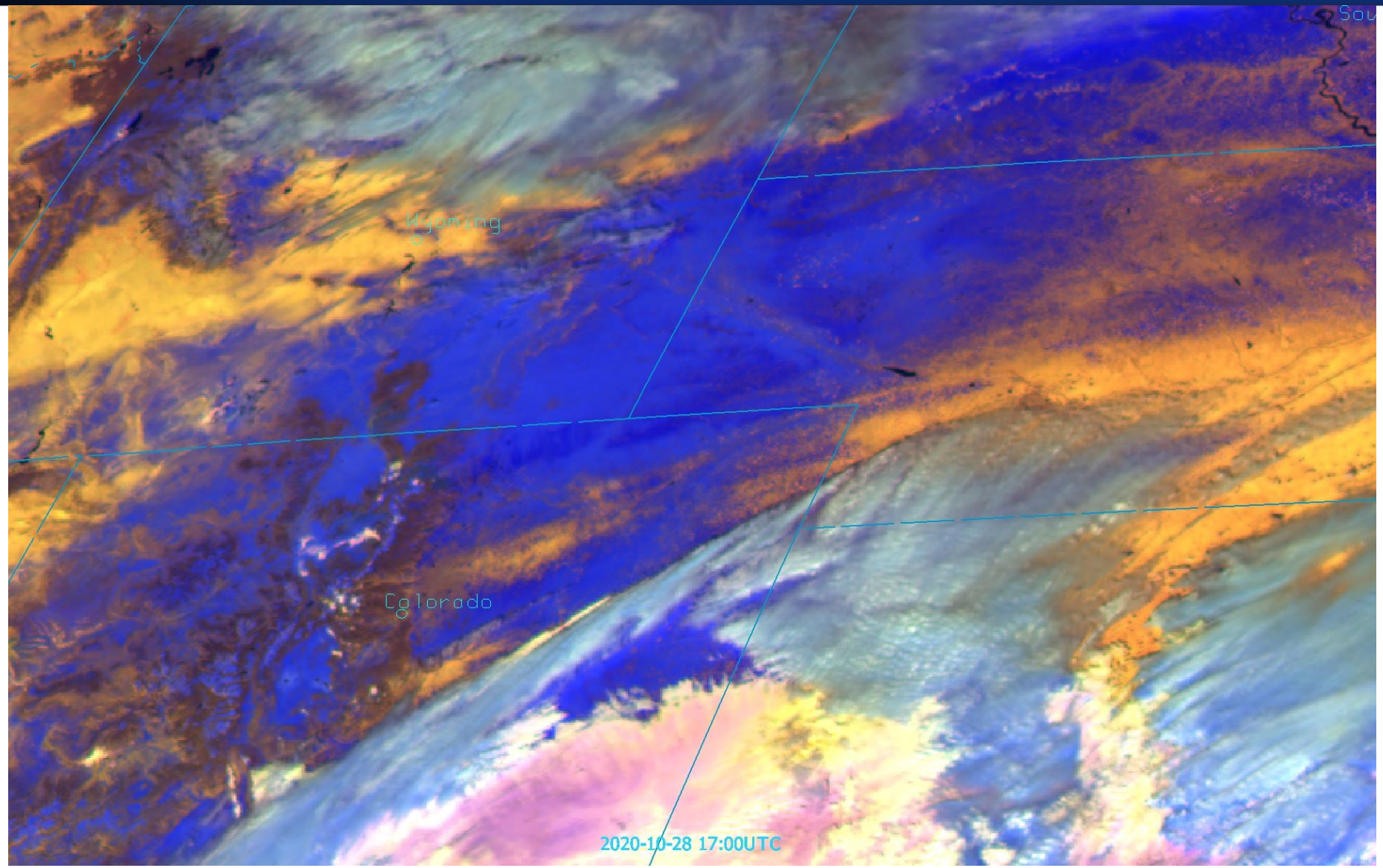
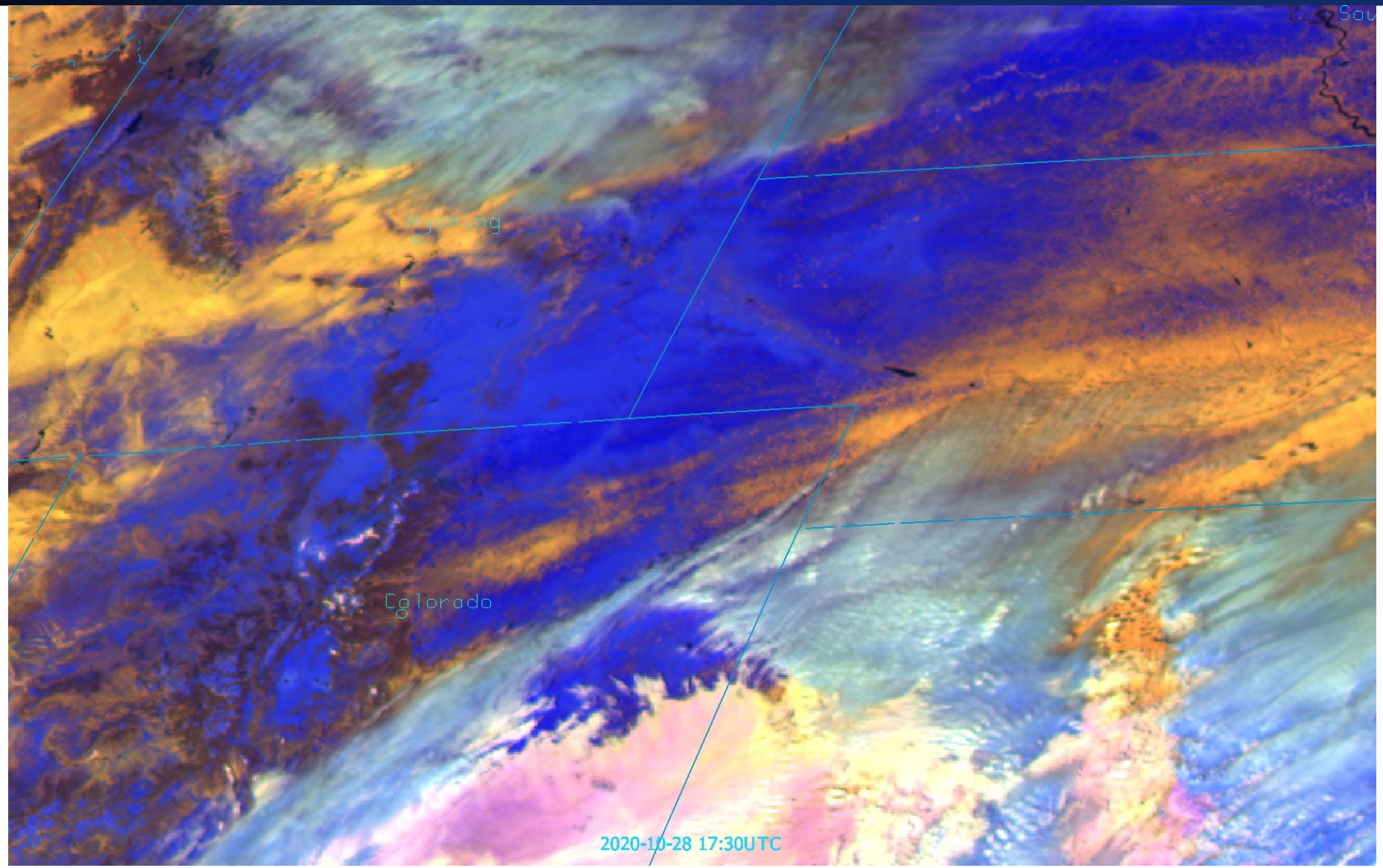
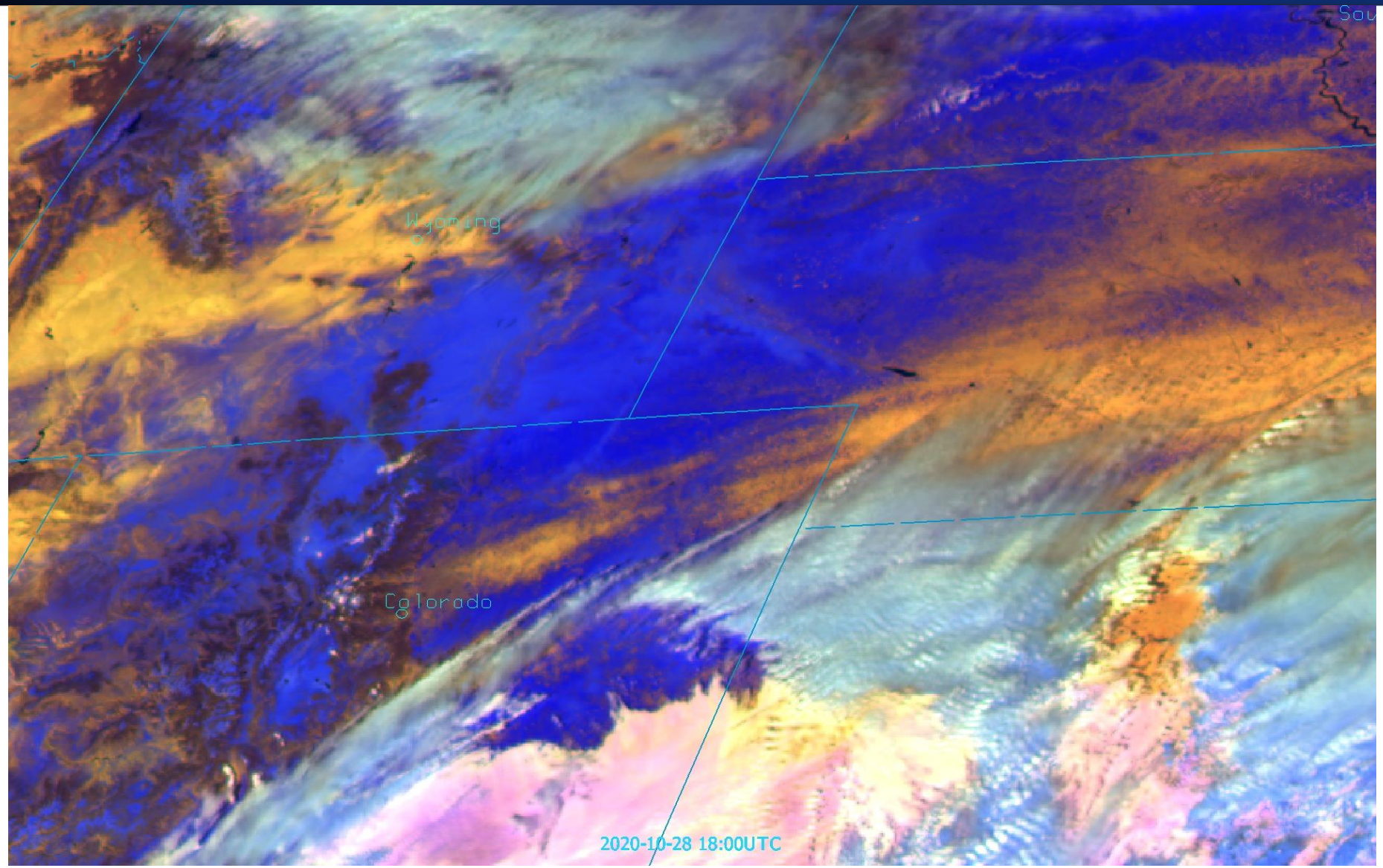


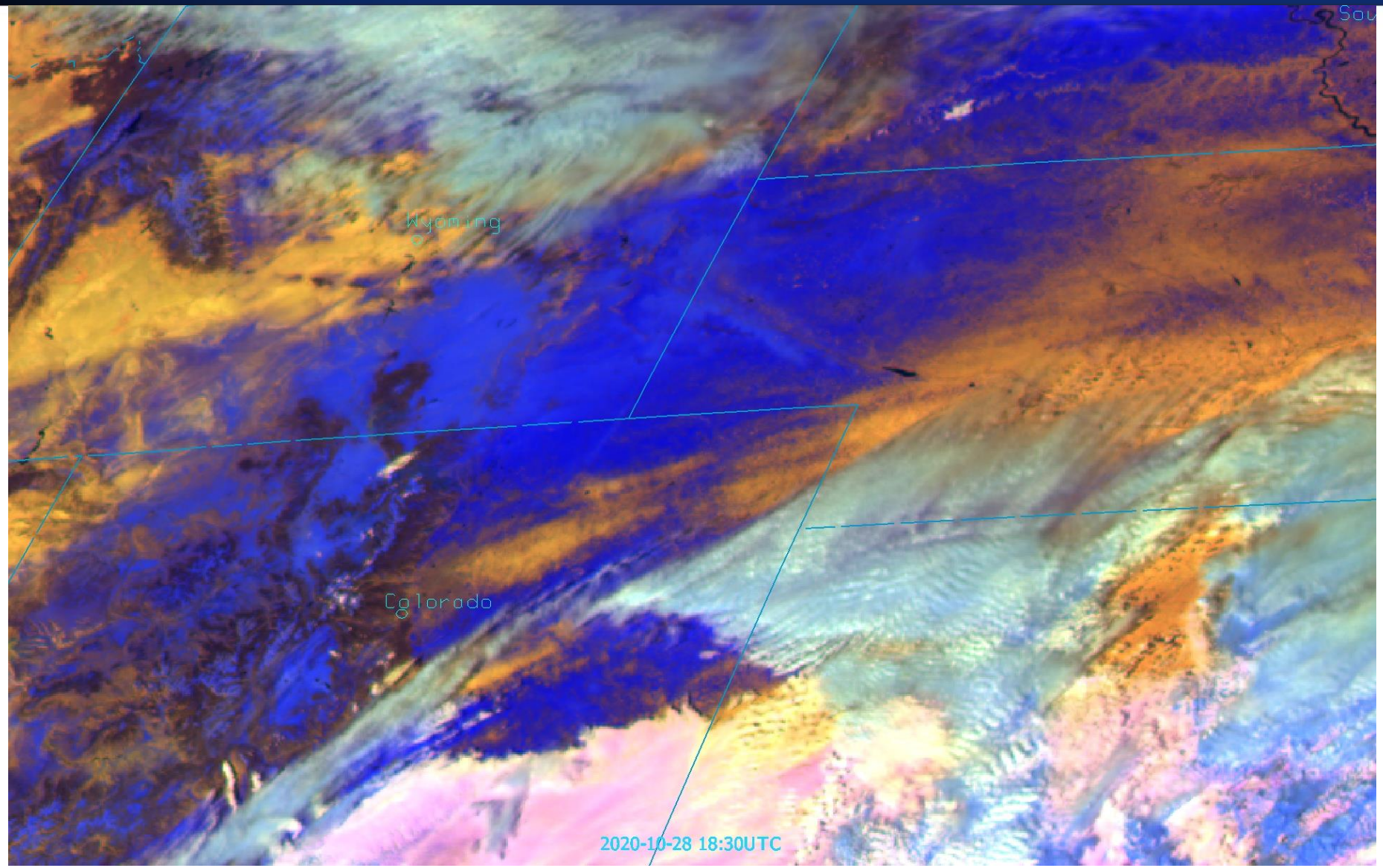
Snow melt loop (8-13h local time)



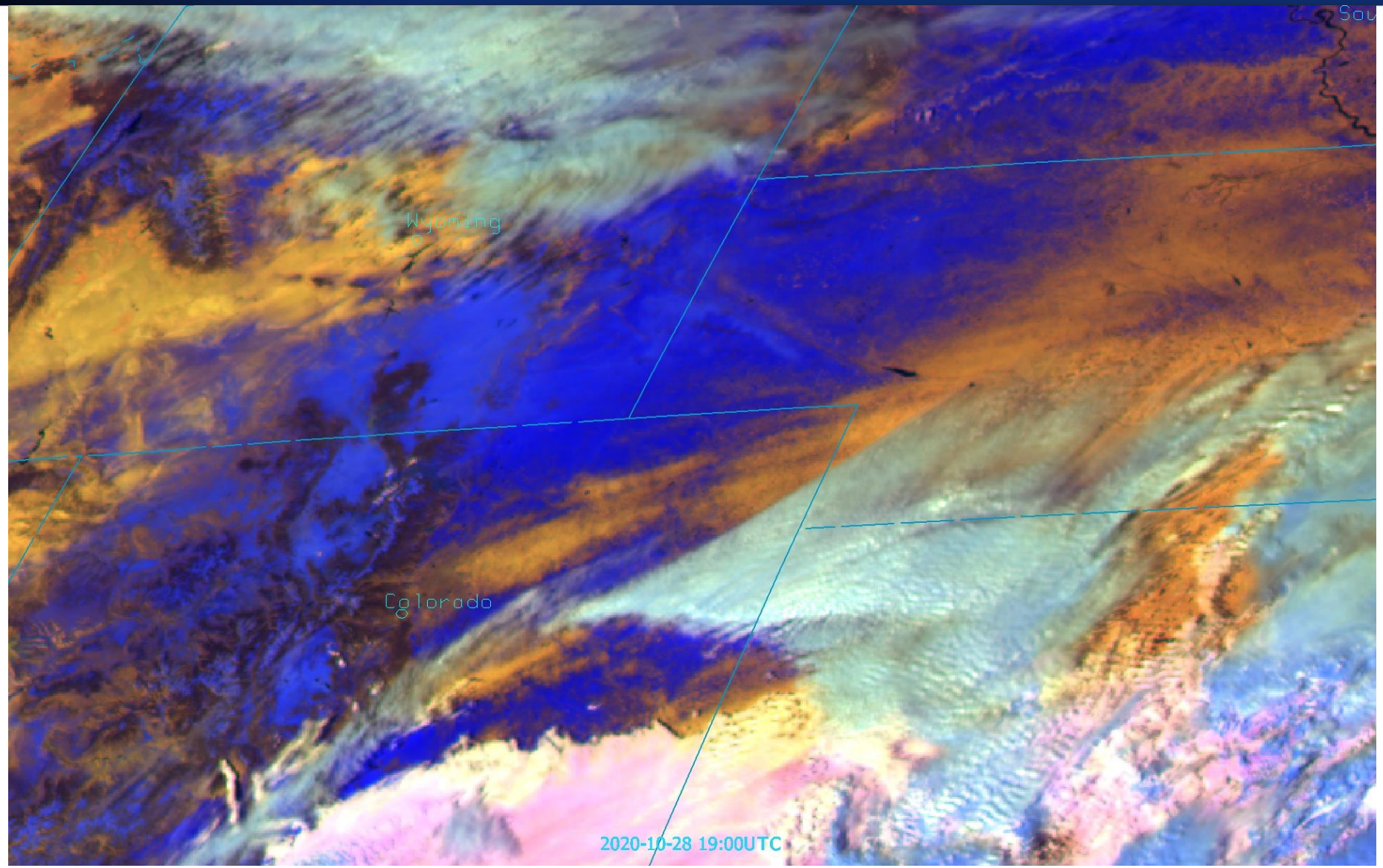
Snow melt loop (8-13h local time)



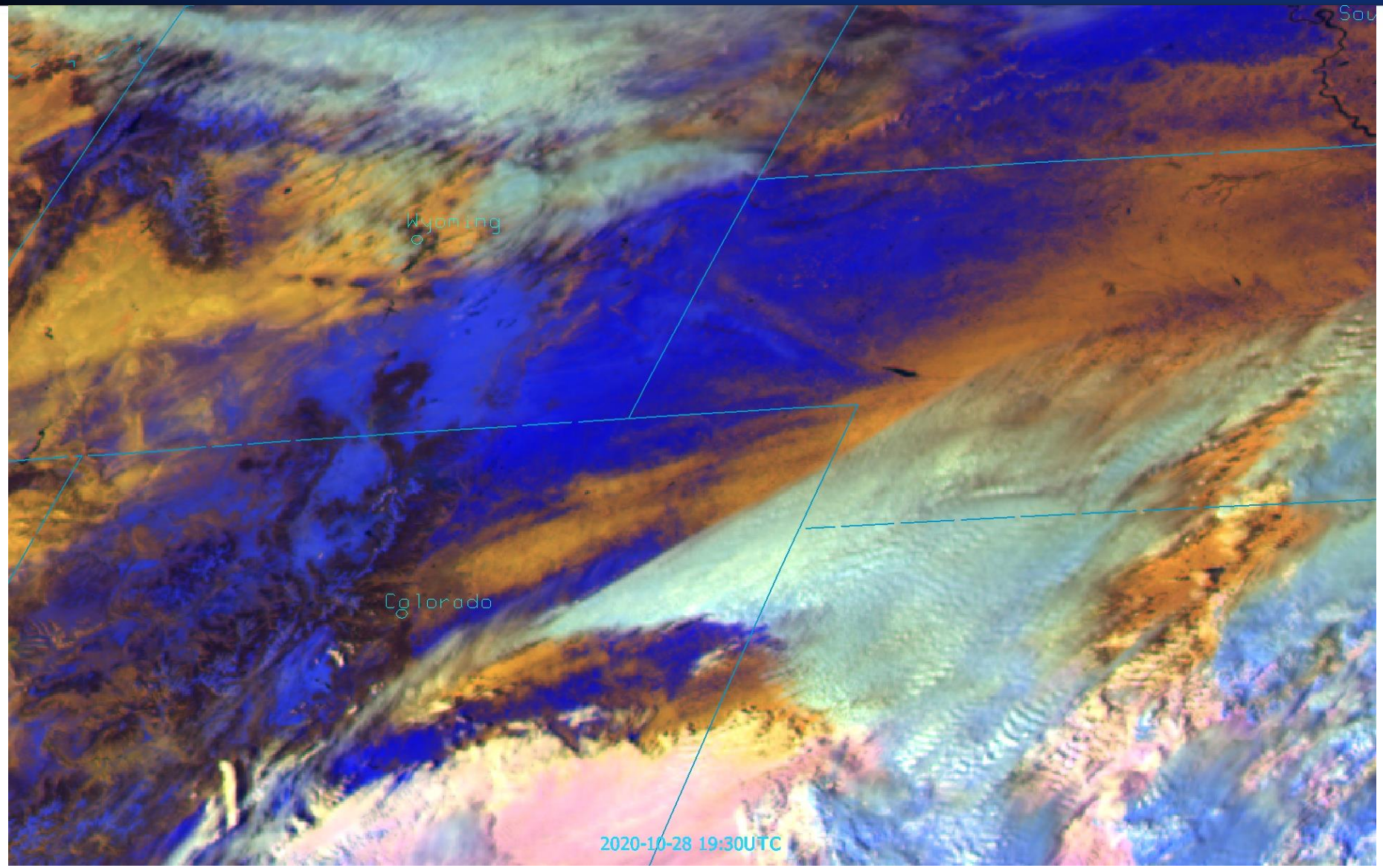
Snow melt loop (8-13h local time)



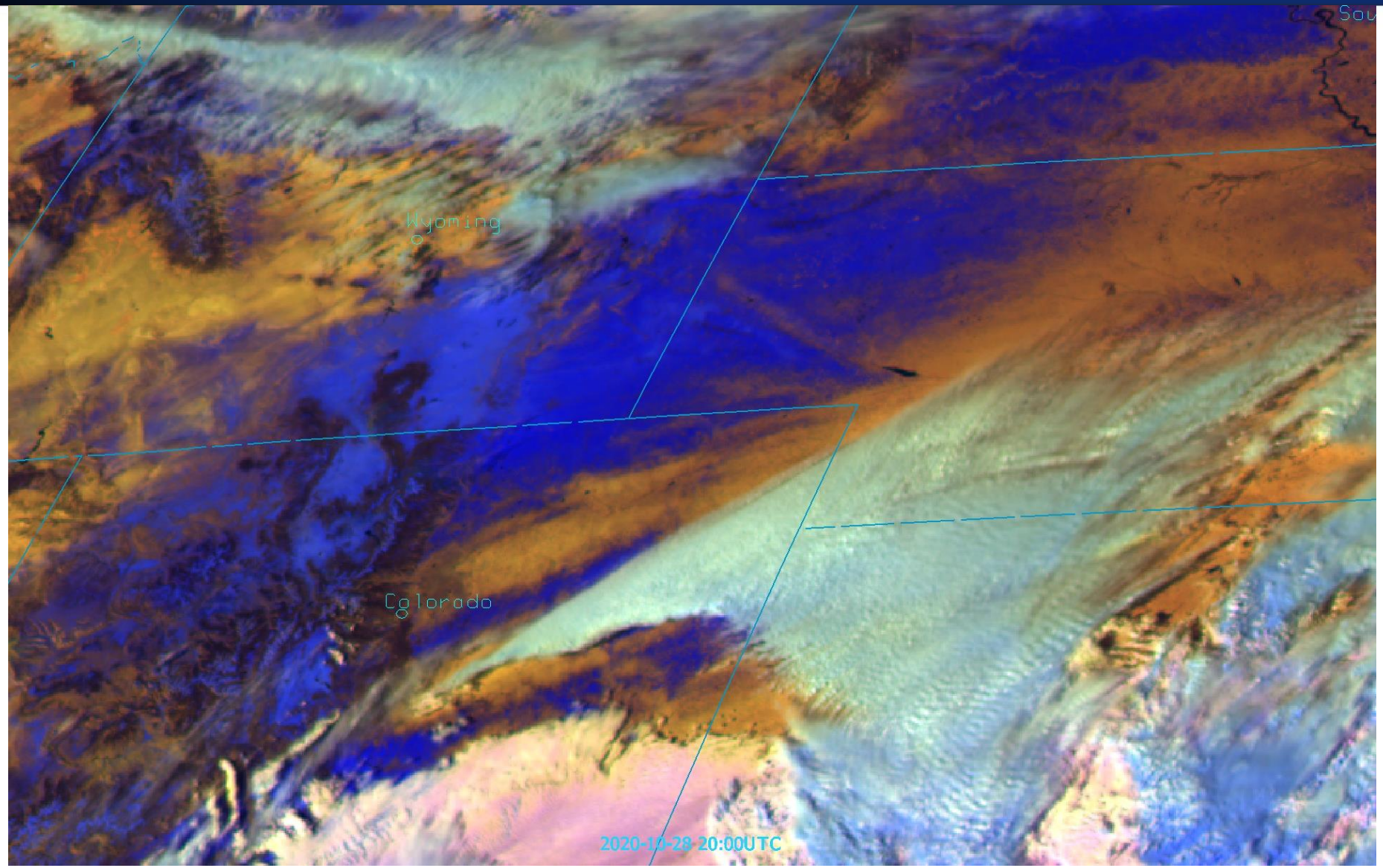
Snow melt loop (8-13h local time)



Snow melt loop (8-13h local time)



Snow melt loop (8-13h local time)



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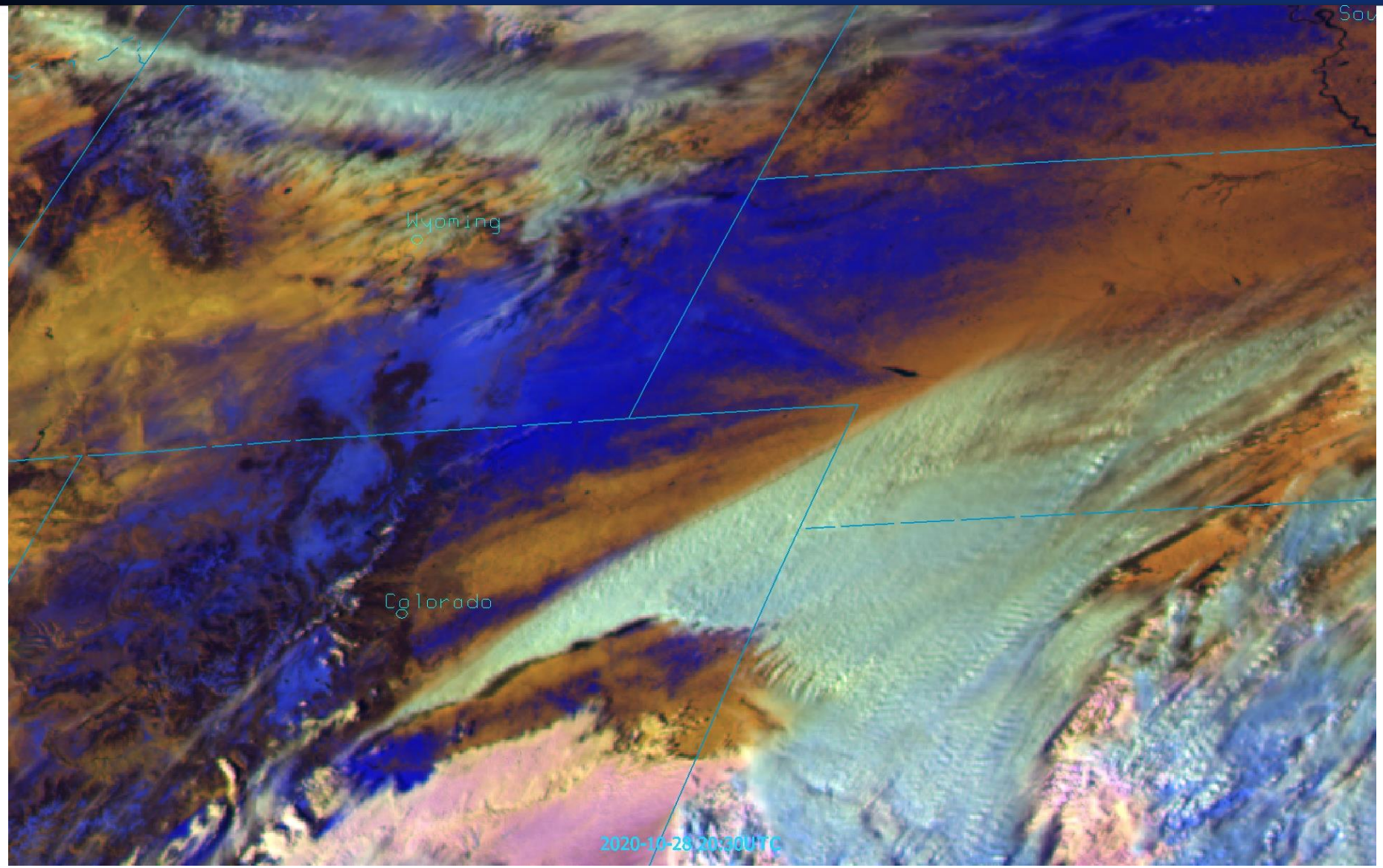

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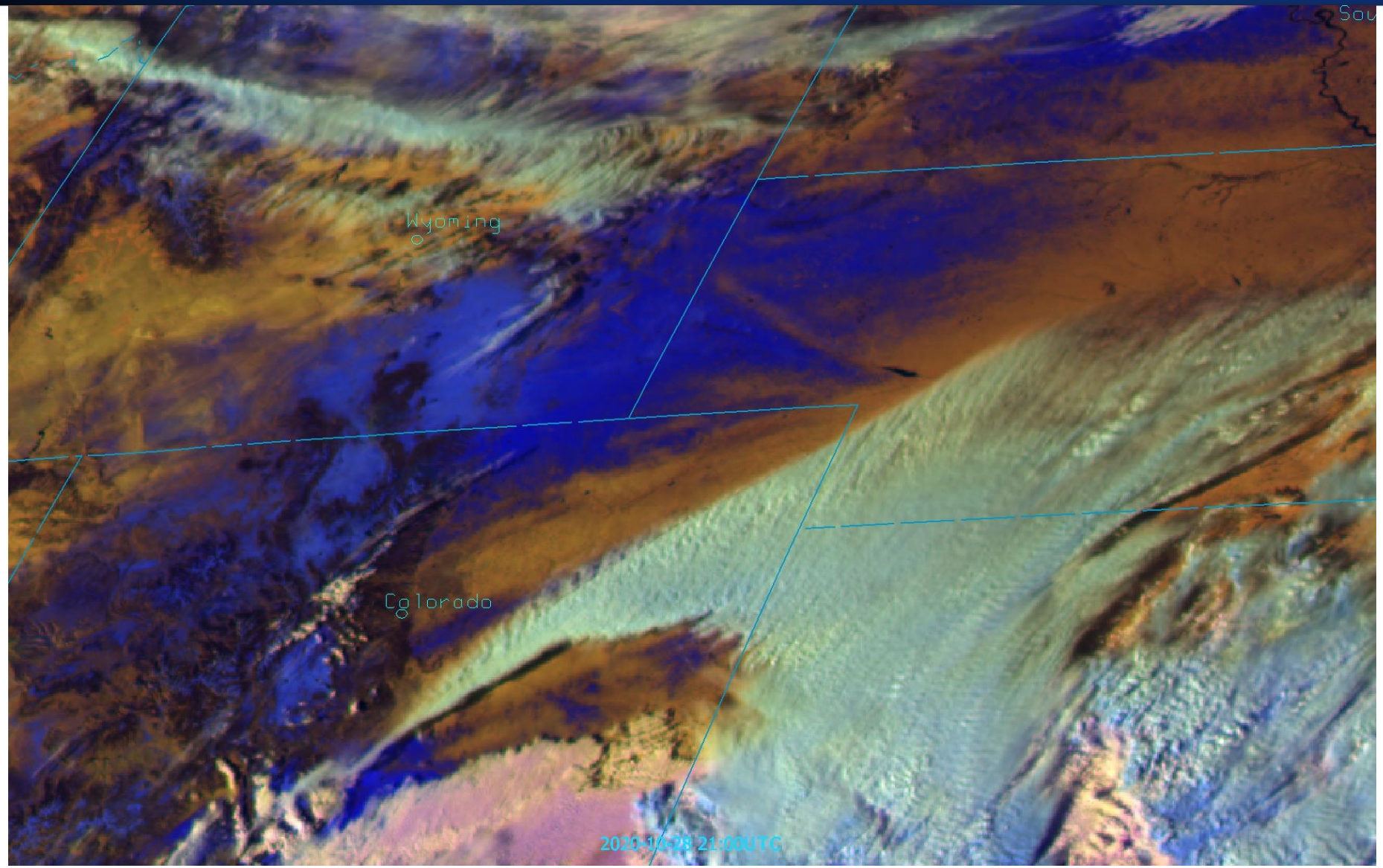

Detection challenges

- Heterogeneous scene
- Diurnal cycles
- Sun angle
- Satellite angle
- Clouds
- Snow ‘flavour’ (genesis, pollution cycle, i.e. microphysics)

Tackle with:
Advanced **SPATIAL** + **SPECTRAL** resolution

Enjoy the snow!