Activity 1 : **Comparing RGB products between Geostationary Satellite and Polar orbiting Satellite**

Dust over North East Sudan 7th Jun 2024

This activity is to explore and compare **different VIS RGB Products** from three different satellites and instruments:

1. SEVIRI on the Meteosat-9 (IODC) satellite – https://view.eumetsat.int/productviewer?v=default

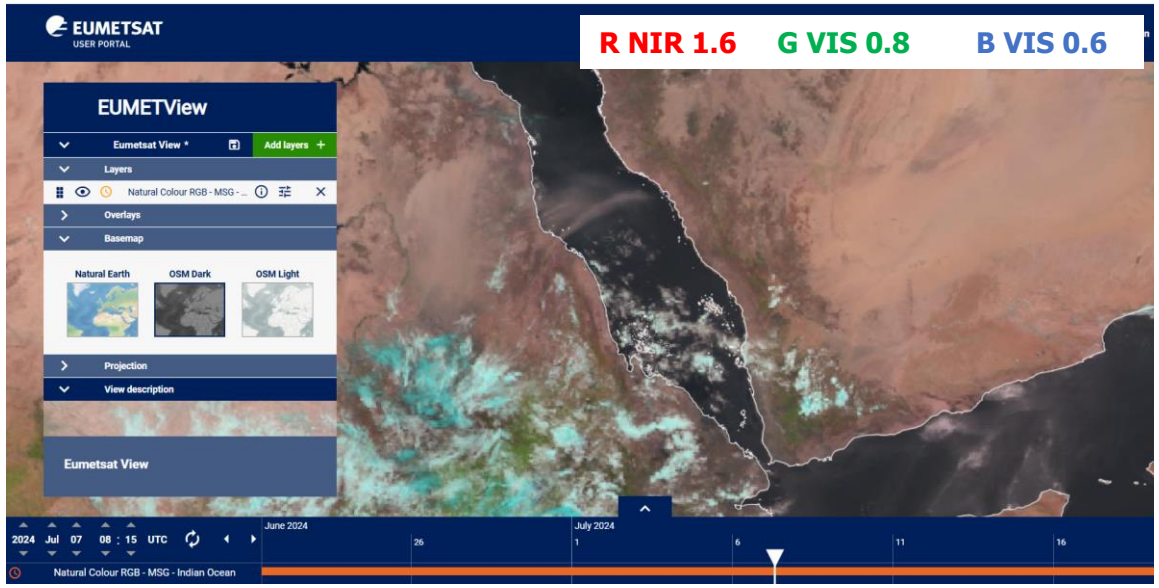
a. Open EUMETView using the link above and go to "Add Layers" >>select MSG- IODC >>select Natural Color RGB then select date and time as **2024 Jul 07 0815 UTC**

b. Zoom to North East Sudan close to Red Sea , you should see the dust emotion as in the image below :

- Can you Identify the thicker line of dust crossing the Red Sea?

- What is the wind Direction along this line?
- What is the source of the dust ?

Figure : 1



c. Go to "Add Layers" >> select MSG- 0 >>select Natural Color RGB (compare the two natural color RGB from the two satellites)

2. MODIS on Terra and Aqua satellites- https://go.nasa.gov/42oA3Bf

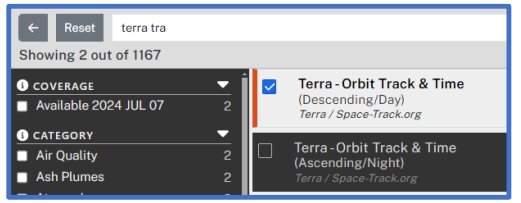
a. Open Worldview using the link above , **Terra / MODIS** True color RGB image will be shown as default image . Go to the same date **2024 Jul 7** and zoom to the same area .

Can you see the case of dust ?

b. Go to red box 

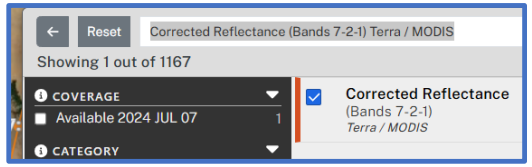
at the left of the screen and click add layers . In the search box at the top, type : **Terra - Orbit Track & Time**, then select the first option with (Descending \ Day) , as in figure 2.

Figure : 2



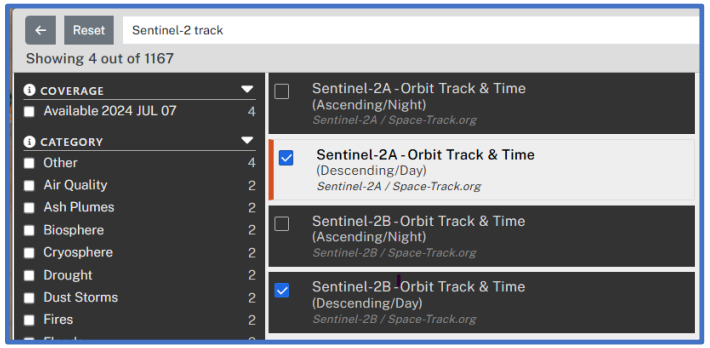
c. Clear the search and type : **Corrected Reflectance (Bands 7-2-1) Terra / MODIS** and select the only option you get as in figure 3 .

Figure : 3



d. Clear the search again and type : **Sentinel-2 track** and select the options as you see below, figure 4 .

Figure : 4



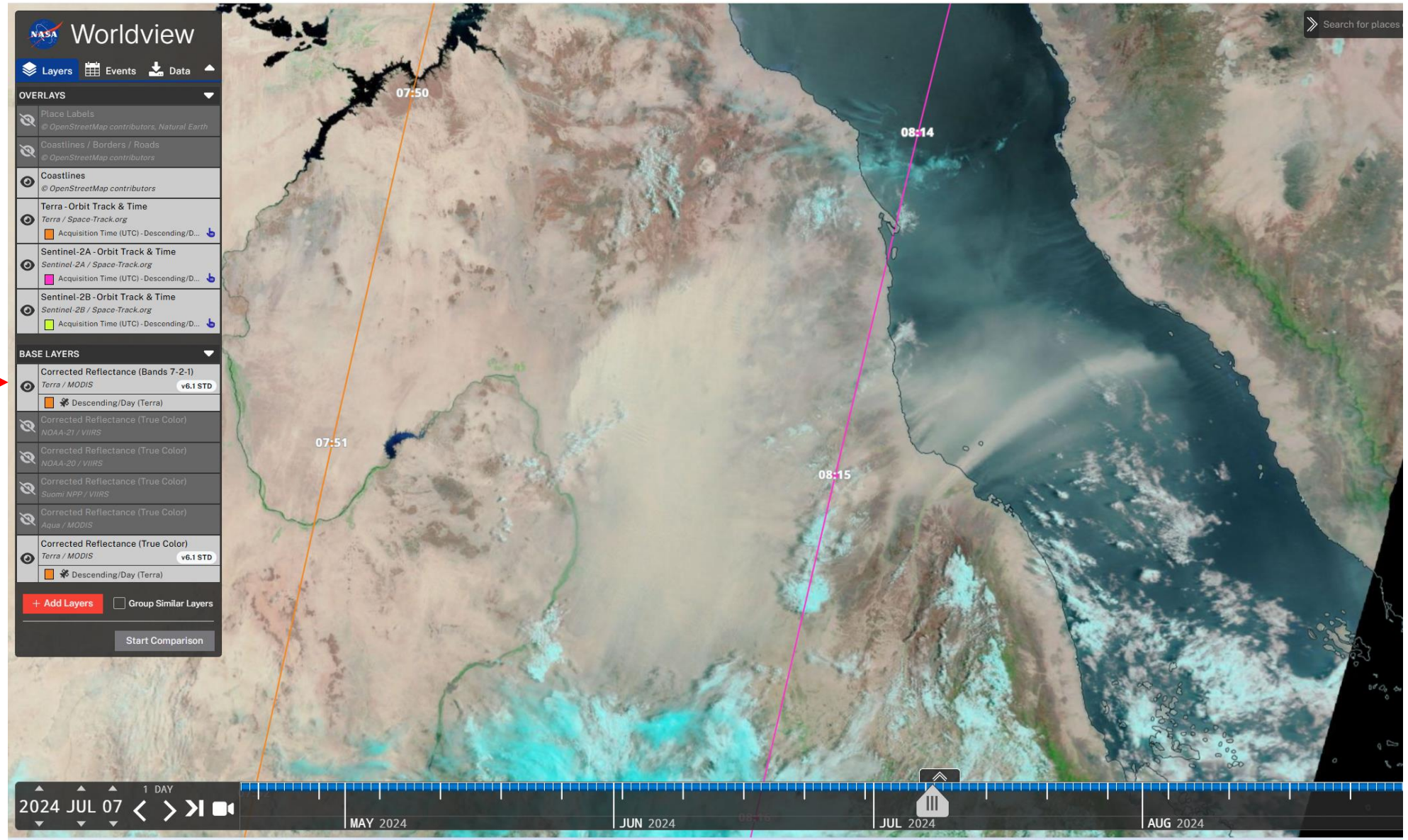
e. Close the window to see the added image and the tracks of the satellites as in the next slide

Figure : 5

f. Identify **Terra** and **Sentinel-2** tracks and passing time

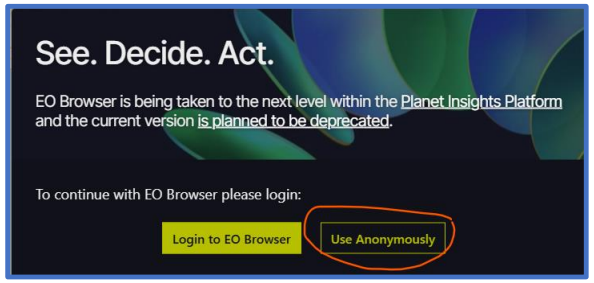
g. Identify the directions of their tracks

h. Try to close this eye by clicking it, to compare it with the true color RGB opened in the background .

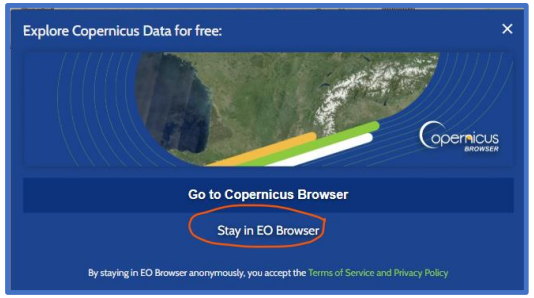


3. Now, since you know that there is a good pass of Sentinel 2 A, Open the EO browser https://apps.sentinel-hub.com/eo-browser/ , no need to Login if you have no account , just select "Use Anonymously" as below

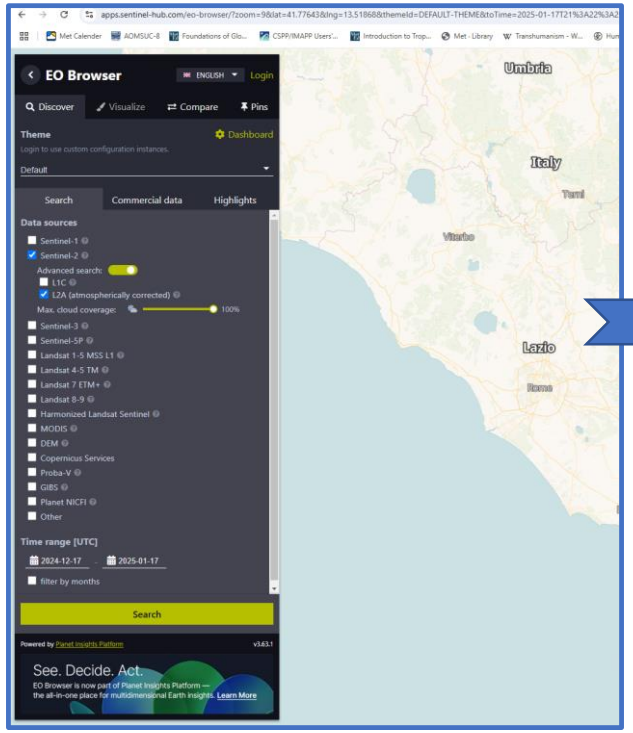
a. no need to Login if you have no account , just select "Use Anonymously" as below



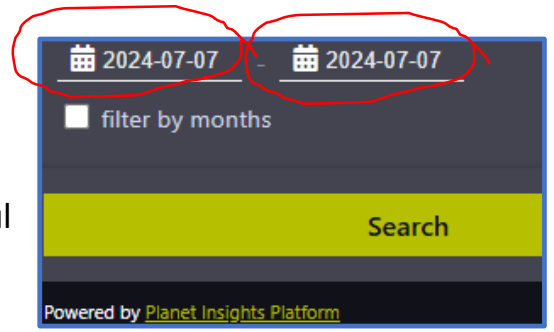
b. Then select **Stay in EO browser**



c. A map with list of satellite and instrument is shown , and sentinel 2 L2A is already selected



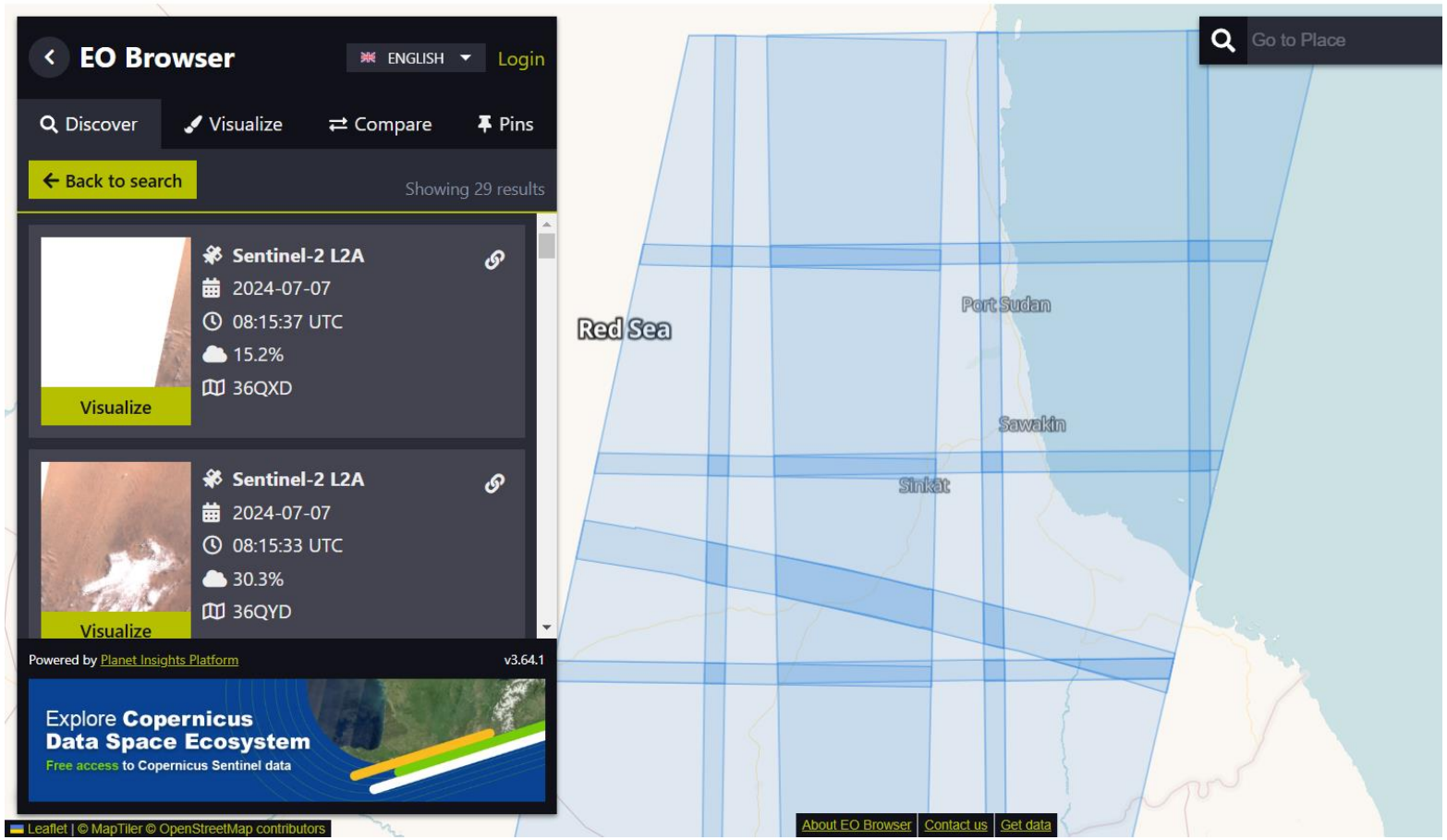
d. Without changing any of the selected options , go to the calendar and put 2024 Jul 7 for both sides as shown



e. Finally , zoom to the same area of the dust emission as in previous tasks . Then click on **Search.**

Then **click "Visualize " for the first image tile as in the figure .**

What did you get?



SEVIRI Bands

Channel	Centre wavelength (µm)	Range (µm)	Sampling distance at subsatellite point (km)
VIS0.6	0.635	0.56 – 0.71	3
VIS0.8	0.81	0.74 – 0.88	3
NIR1.6	1.60	1.50 – 1.78	3
IR3.9	3.92	3.48 – 4.36	3
WV6.2	6.25	5.35 – 7.15	3
WV7.3	7.35	6.85 – 7.85	3
IR8.7	8.70	8.30 – 9.10	3
IR9.7	9.66	9.38 – 9.94	3
IR10.8	10.80	9.80 – 11.80	3
IR12.0	12.00	11.00 – 13.00	3
IR13.4	13.40	12.40 – 14.40	3
HRV	(broadband)	0.5 – 0.9	1

Sentinel 2 Bands

Sentinel-2 Bands	Central Wavelength (µm)	Resolution (m)
Band 1 - Coastal aerosol	0.443	60
Band 2 - Blue	0.490	10
Band 3 - Green	0.560	10
Band 4 - Red	0.665	10
Band 5 - Vegetation Red Edge	0.705	20
Band 6 - Vegetation Red Edge	0.740	20
Band 7 - Vegetation Red Edge	0.783	20
Band 8 - NIR	0.842	10
Band 8A - Vegetation Red Edge	0.865	20
Band 9 - Water vapour	0.945	60
Band 10 - SWIR - Cirrus	1.375	60
Band 11 - SWIR	1.610	20
Band 12 - SWIR	2.190	20

MODIS Bands

Primary Use	Band	Band Range[1]	Bandwidth[2]	Spectral Radiance[3]	Central Wavelength[4]
Land/Cloud/Aerosols Boundaries	1	0.620 – 0.670	41.8	21.8	0.659
	2	0.841 -0. 876	39.4	24.7	0.865
Land/Cloud/Aerosols Properties	3	0.459 – 0.479	17.6	35.3	0.470
	4	0.545 – 0.565	19.7	29.0	0.555
	5	1.230 – 1.250	24.5	5.4	1.240
	6	1.628 – 1.652	29.7	7.3	1.640
	7	2.105 – 2.155	52.9	1.0	2.130
Ocean Colour/ Phytoplankton/ Biogeochemistry	8	0.405 – 0.420	11.8	44.9	0.415
	9	0.438 – 0.448	9.7	41.9	0.443
	10	0.483 – 0.493	10.6	32.1	0.490
	11	0.526 – 0.536	11.8	27.9	0.531
	12	0.546 – 0.556	10.4	21.0	0.565
	13	0.662 – 0.672	10.1	9.5	0.653
	14	0.673 – 0.683	11.4	8.7	0.681
	15	0.743 – 0.753	10.0	10.2	0.750
	16	0.862 – 0.877	15.5	6.2	0.865
Atmospheric Water Vapour	17	0.890 – 0.920	35.7	10.0	0.905
	18	0.931 – 0.941	13.7	3.6	0.936
	19	0.915 – 0.965	46.3	15.0	0.940
Surface/Cloud Temperature	20	3.660 - 3.840	36.4	0.45(300K)	3.750
	21	3.929 - 3.989	182.6	2.38(335K)	3.959
	22	3.929 - 3.989	85.7	0.67(300K)	3.959
	23	4.020 - 4.080	88.2	0.79(300K)	4.050
Atmospheric Temperature	24	4.433 - 4.498	87.8	0.17(250K)	4.465
	25	4.482 - 4.549	93.7	0.59(275K)	4.515
Cirrus Clouds Water Vapour	26	1.360 - 1.390	94.3	6.00	1.375
	27	6.535 - 6.895	254.6	1.16(240K)	6.715
	28	7.175 - 7.475	325.3	2.18(250K)	7.325
Cloud Properties	29	8.400 - 8.700	369.2	9.58(300K)	8.550
Ozone	30	9.580 - 9.880	300.6	3.69(250K)	9.730
Surface/Cloud Temperature	31	10.780 - 11.280	510.3	9.55(300K)	11.030
	32	11.770 - 12.270	493.5	8.94(300K)	12.020
Cloud Top Altitude	33	13.185 - 13.485	13.335	4.52(260K)	13.335
	34	13.485 - 13.785	13.635	3.76(250K)	13.635
	35	13.785 - 14.085	13.935	3.11(240K)	13.935
	36	14.085 - 14.385	14.235	2.08(220K)	14.235

[1] Bands 1 to 36 are in µm
[2] Bandwidth values are in nm
[3] Spectral radiance values are in Wm^{-2} μm^{-1} sr^{-1}
[4] Central wavelength values are in µm

Do we have more time!