

# Major contributors to the air pollution by nitrogen dioxide on the African continent

Sentinel-3 OLCI FR acquired on 28 August 2021 from 08:07:07 to 08:10:07 UTC  
Sentinel-3 SLSTR RBT acquired on 21 January 2022 at 08:30:57 UTC  
Sentinel-2 MSI acquired on 20 March 2022 at 11:21:21 UTC  
Sentinel-1 CSAR IW acquired on 21 December 2022 at 06:28:00 UTC  
Sentinel-5P TROPOMI NO2 acquired on 08 April 2023 at 13:47:46 UTC

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Fig. 1 - S5P TROPOMI (21.03.2023->08.04.2023) - Nitrogen Dioxide total tropospheric column in log scale - Mean of 19 days over Africa. [2D view](#)

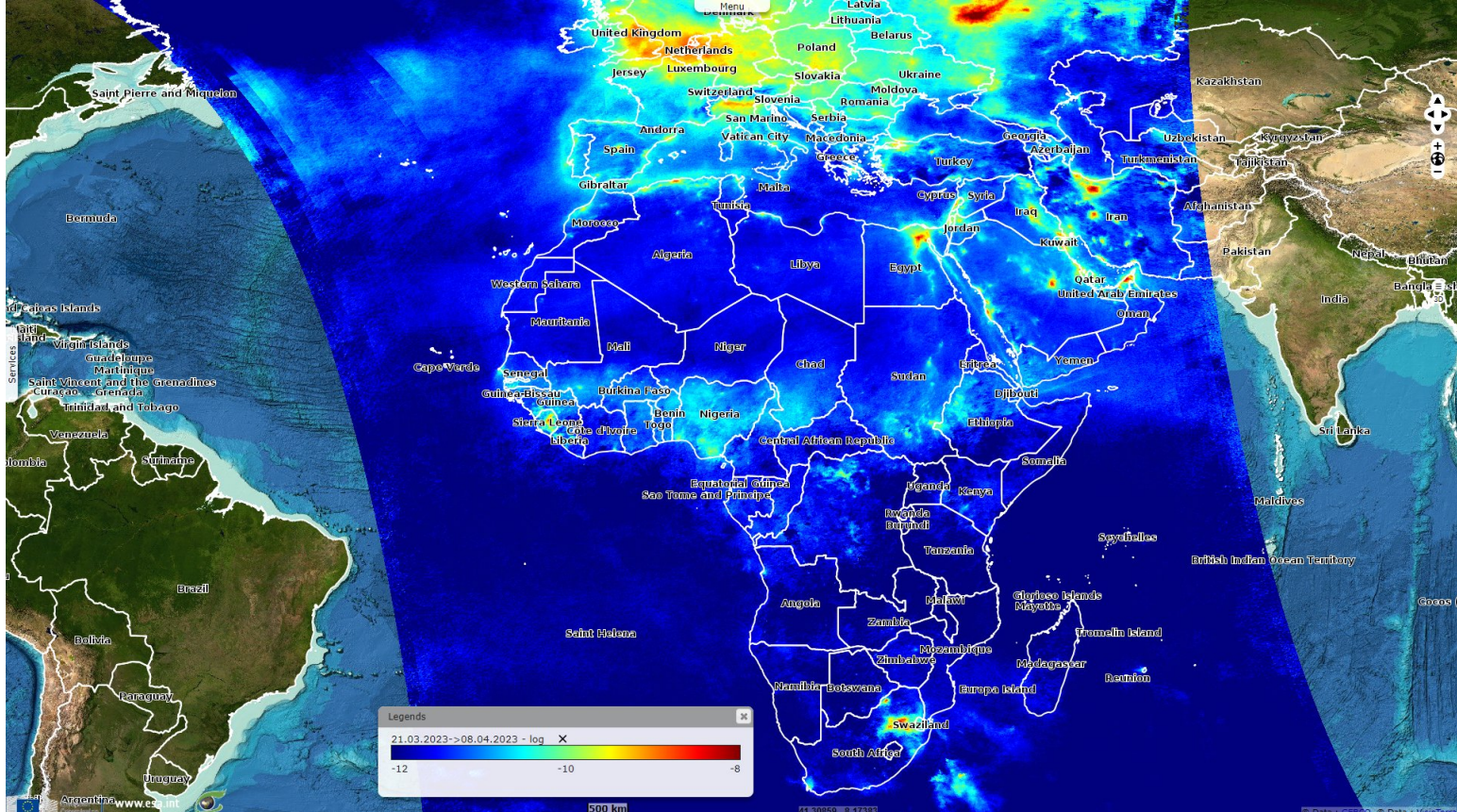




Fig. 2 - S5P TROPOMI (21.03.2023->08.04.2023) - The worst pollution hotspot lies in South Africa in the region of Johannesburg and Pretoria.

[2D view](#)

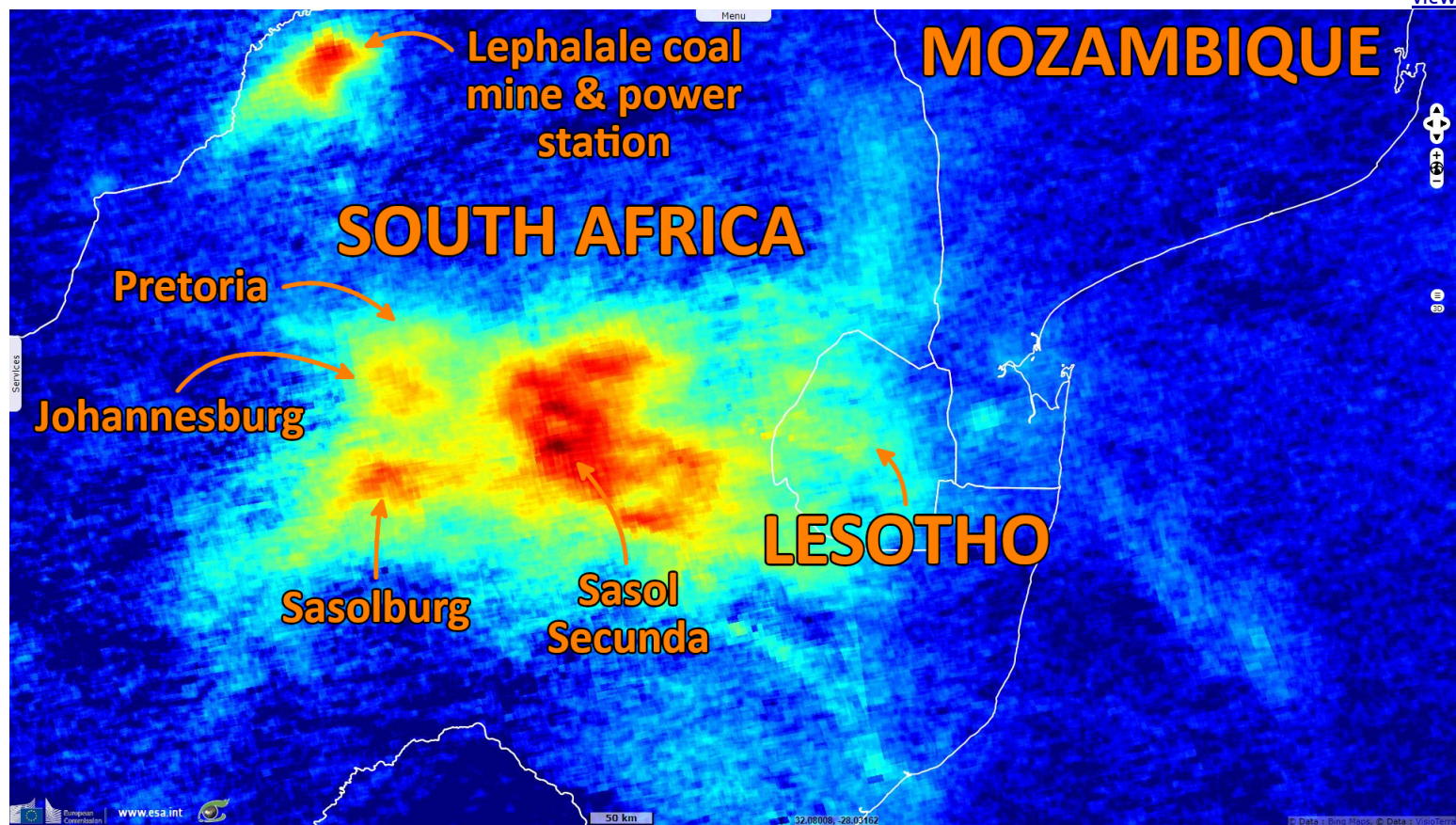
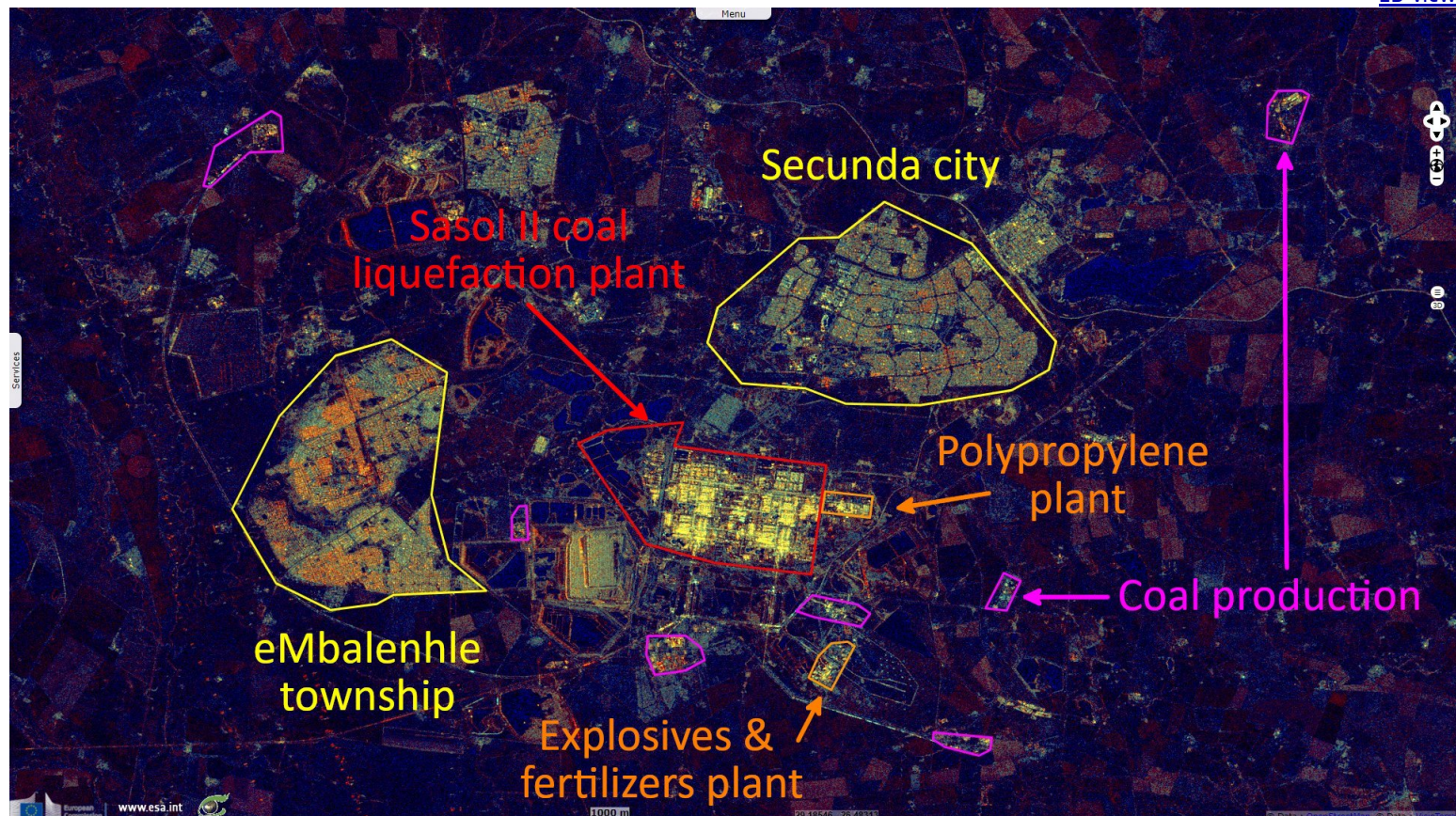


Fig. 3 - S1 (21.06.2021, 03 & 15.07.2021) - Sasol Secunda complex and other coal-based productions are the main source of this pollution rather than nearby cities.

[2D view](#)

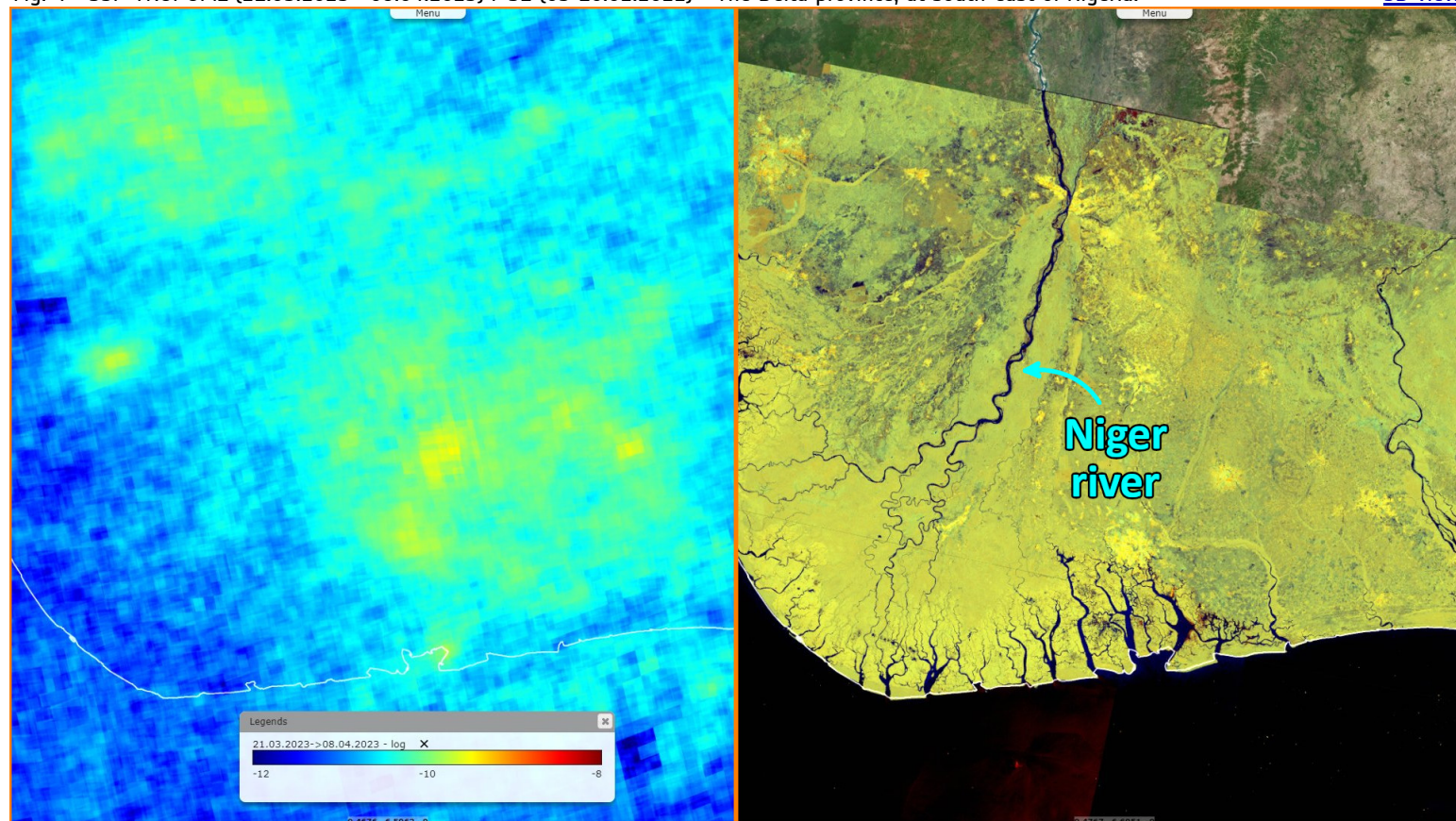


Sasol industrial complex of Secunda is the largest emitter of NO<sub>2</sub> on the whole continent. It is also the World's biggest single-site greenhouse gases emitter. It produces coal-based liquid fuels, its energy comes from nearby coal power plants.



Fig. 4 - S5P TROPOMI (21.03.2023->08.04.2023) / S1 (03-10.02.2022) - The Delta province, at south-east of Nigeria.

[3D view](#)



The Delta Province does not have the single largest emitters of Nigeria (Abuja and Lagos) but it is the largest contributing province of the country. It may be related to its important oil and gas infrastructures.

Fig. 5 - S5P TROPOMI (21.03.2023->08.04.2023) / S2 (20.04.2018) - The pollution around the city of Algiers encompasses a part of the coastal plain.

[2D view](#) [2D view](#)

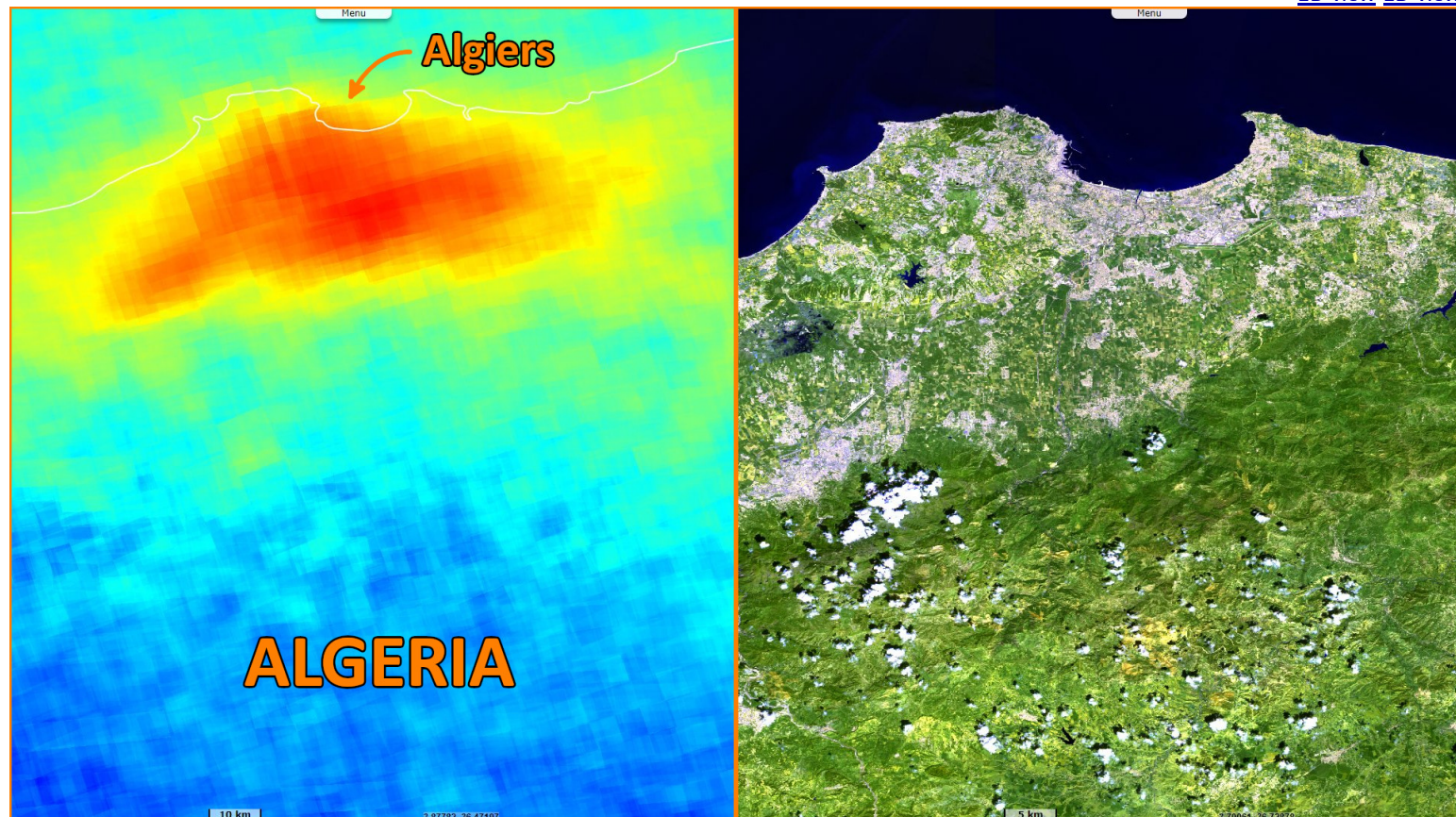
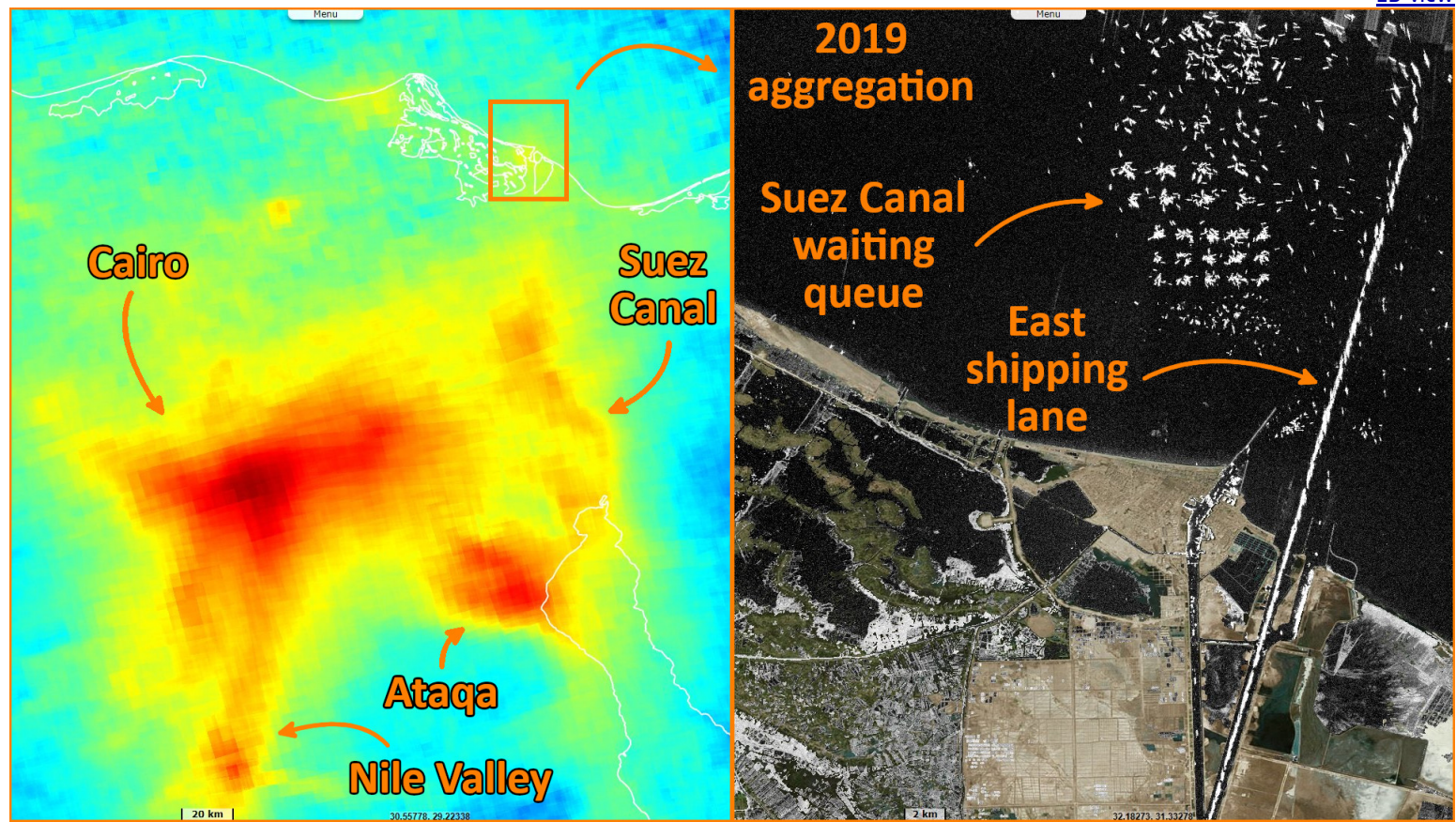


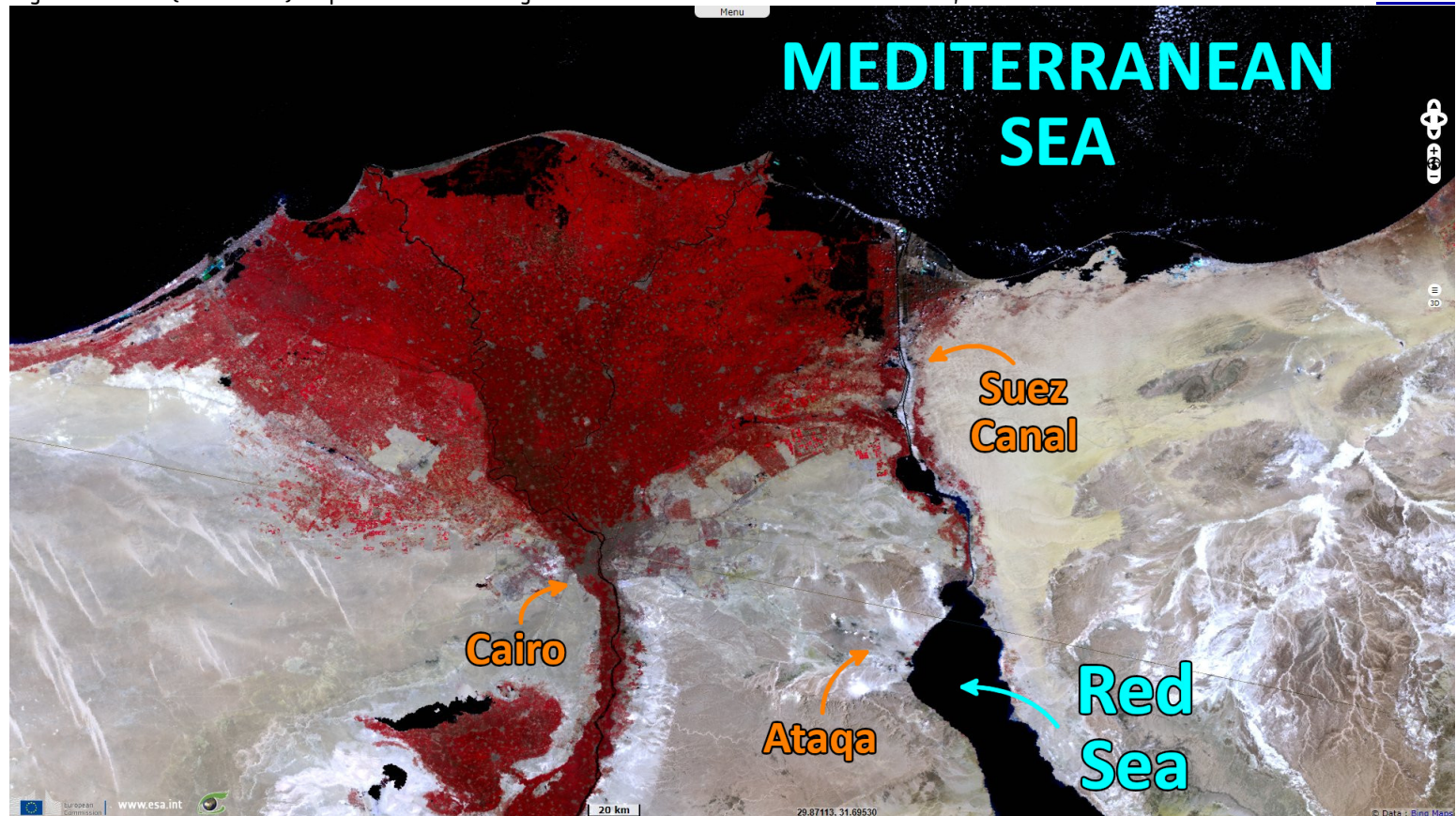


Fig. 6 - S5P TROPOMI (21.03.2023->08.04.2023) - Suez Canal and the Nile Valley are major contributors in the continent which effects add up near Cairo.



The shipping lane of the canal and its queue are well showed by combining multiple images. The density in the canal is such that the lane shows as a long white line, the silhouette of the ships merging together.

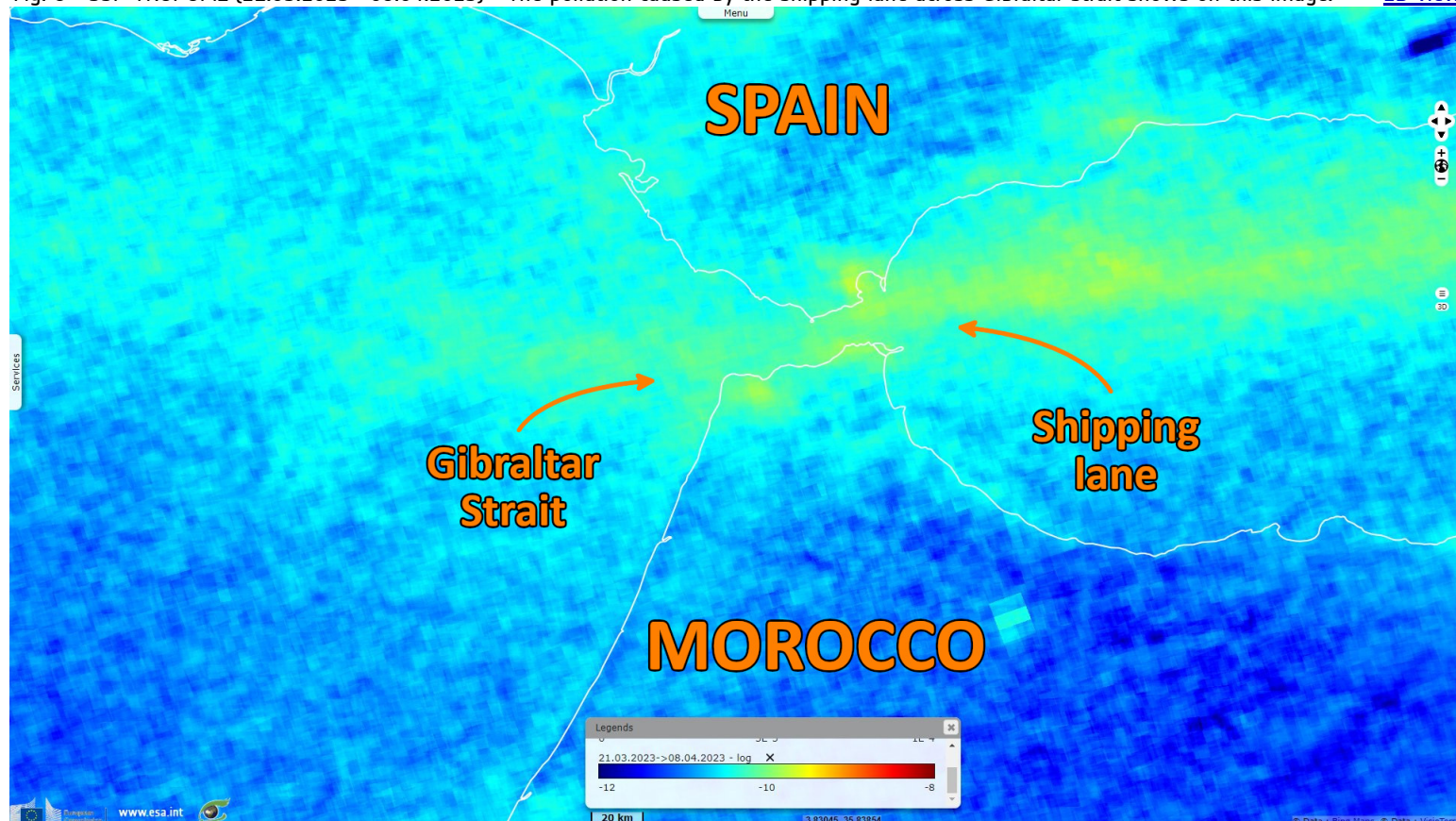
Fig. 7 - S3 OLCI (28.08.2021) - Optical view of the region between the Nile Delta and the Red Sea, it coincides with NO2 emissions..



Air pollution remains a major challenge in Africa [points](#) the United Nations Environment Programme (UNEP): "About 600 000 deaths every year across the continent are associated with this invisible killer. With 23 per cent of global deaths (12.6 million) linked to environmental factors, WHO estimates that air pollution is responsible for 7 million deaths every year."

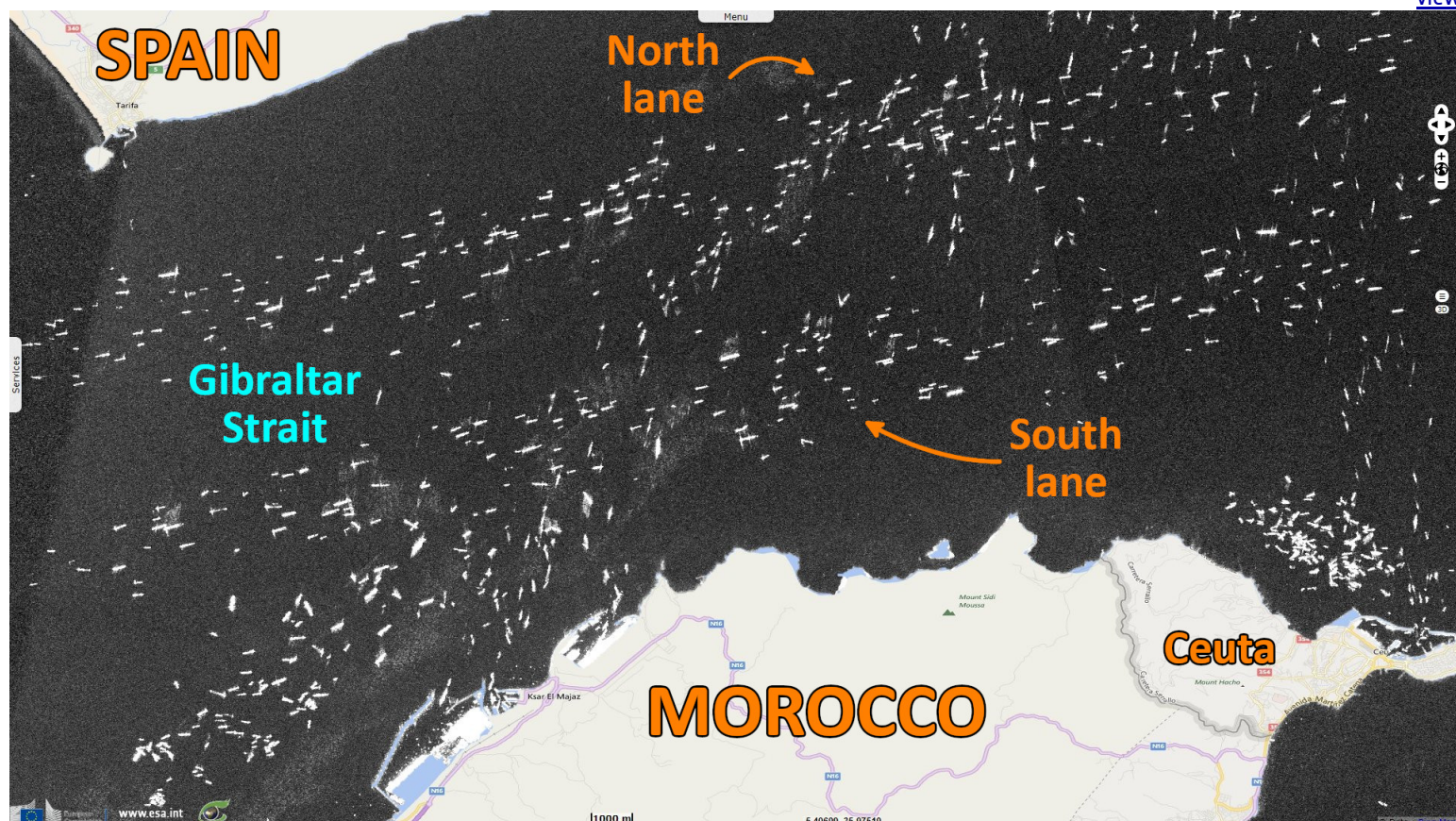


Fig. 8 - S5P TROPOMI (21.03.2023->08.04.2023) - The pollution caused by the shipping lane across Gibraltar strait shows on this image. [2D view](#)



"Air pollution is caused by harmful particulates and gases, released in high quantities into the air. These pollutants cause disease and death to humans, damage to other living organisms such as animals and food crops, and harm our ecosystems. Air pollution is caused by indoor and outdoor activities though the latter, which is largely a result of burning fossil fuels to produce electricity and to power vehicles, is responsible for most of the world's air pollution. Large and small scale industrial activities also cause air pollution by emitting substances into the air, which are harmful to human health and are the root cause of many of the respiratory diseases and cancers in humans."

Fig. 9 - S1 (2015-2022) - This multidecade processing shows the traffic is divided between two main lines, one for each direction through the strait. [2D view](#)



According to [GreenPeace](#), "The world's largest NO<sub>2</sub> air pollution hotspot across six continents is Mpumalanga province in South Africa. The province has a cluster of 12 coal fired power stations owned and operated by Eskom, with a capacity of more than 32 Gigawatts. South Africa therefore has the most polluting cluster of coal-fired power stations in the world. The analysis points to coal and transport as the two principle sources of emissions.increasing the risk of chronic diseases in long-term exposure."



Fig. 10 - S5P TROPOMI (21.03.2023->08.04.2023) - Bab el Mandeb Strait, between the Red Sea and the Indian Ocean.

[2D view](#)

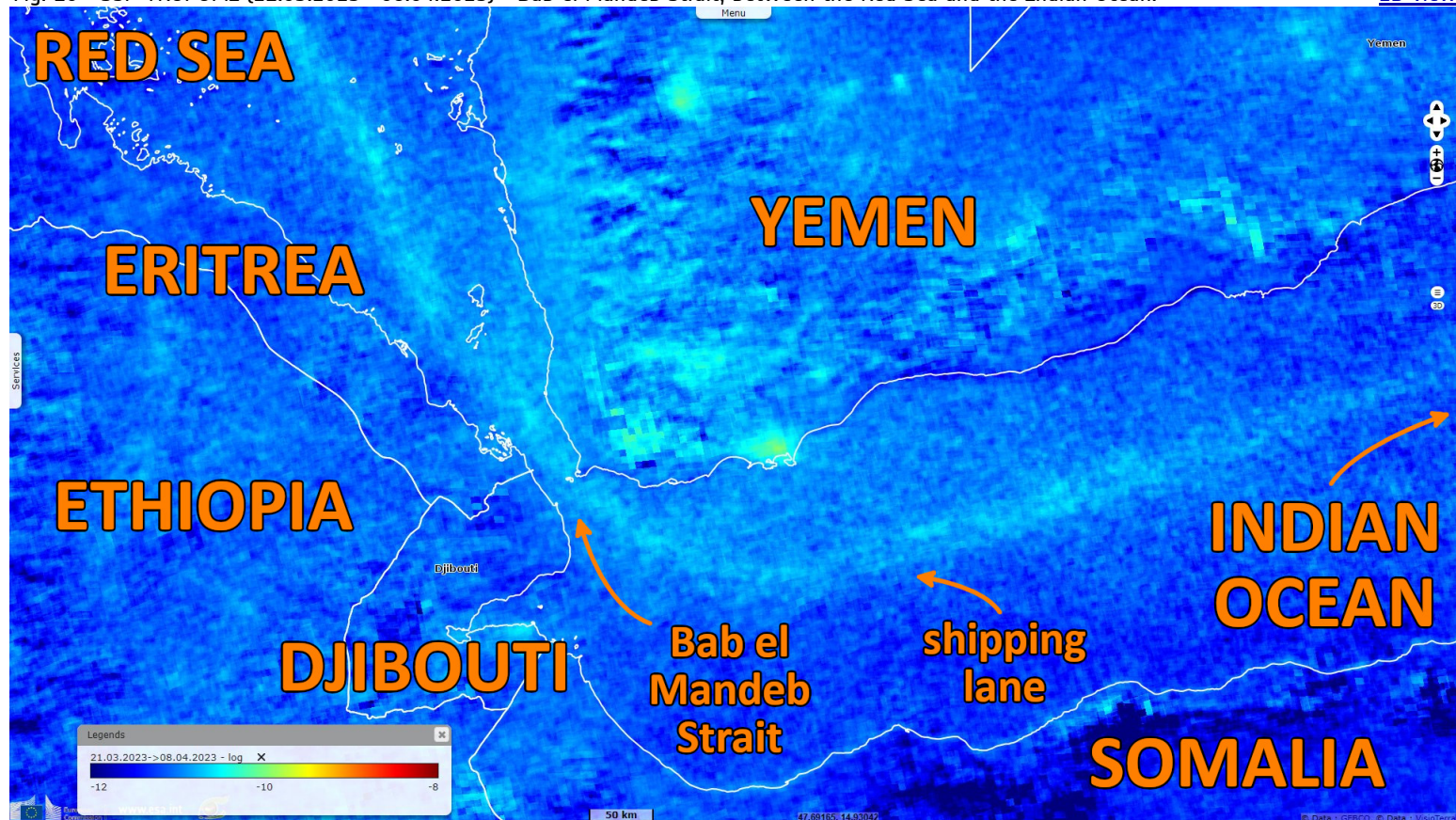


Fig. 11 - S1 (2020-2022) - The major shipping lane is also a big contributor to the air pollution in Africa.

[2D view](#)

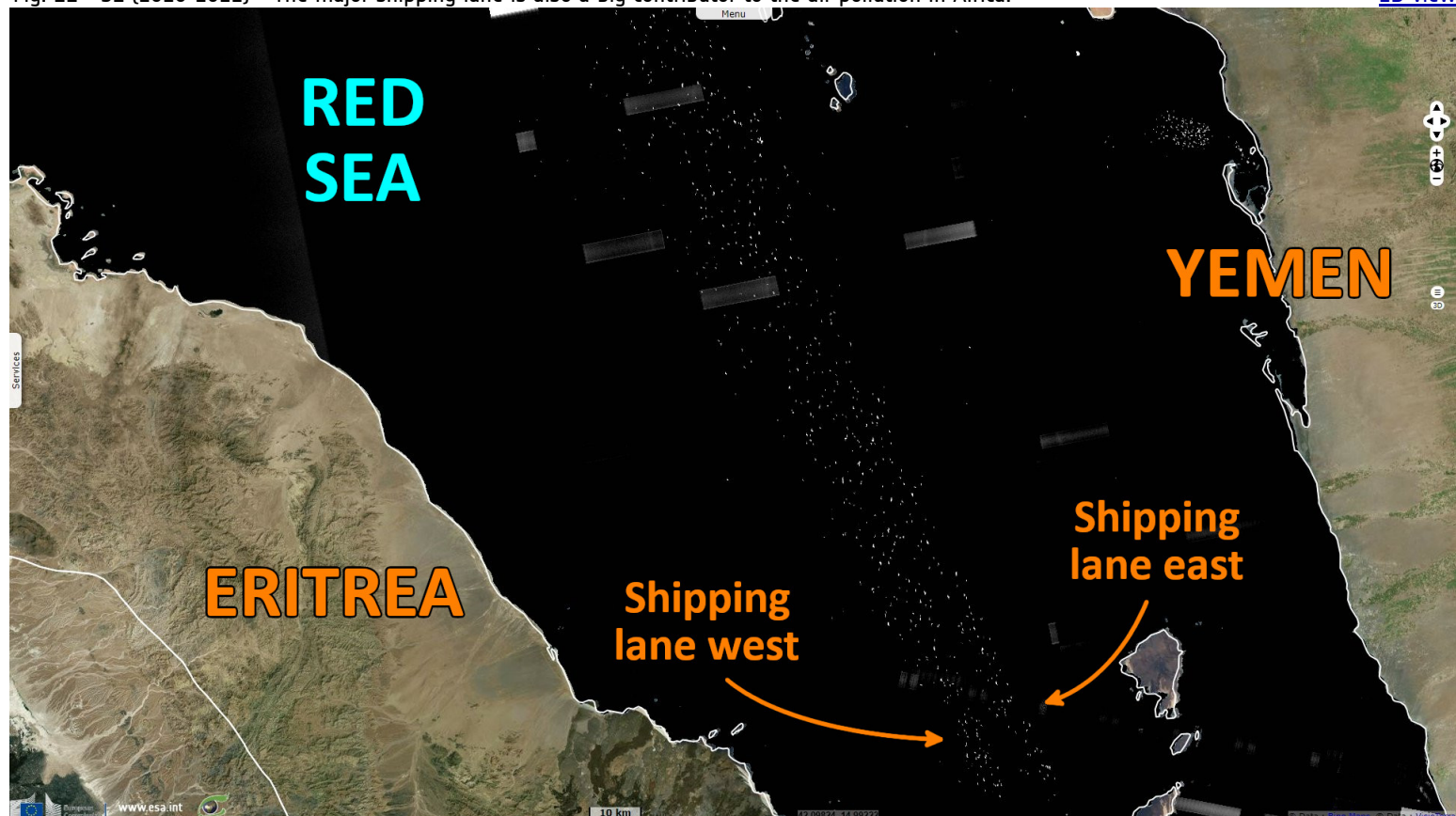




Fig. 12 - S5P TROPOMI (21.03.2023->08.04.2023) / S3 SLSTR (03.01.2020) - Widespread N<sub>2</sub>O pollution has been found over Sierra Leone.

[2D view](#)  
[2D view](#)

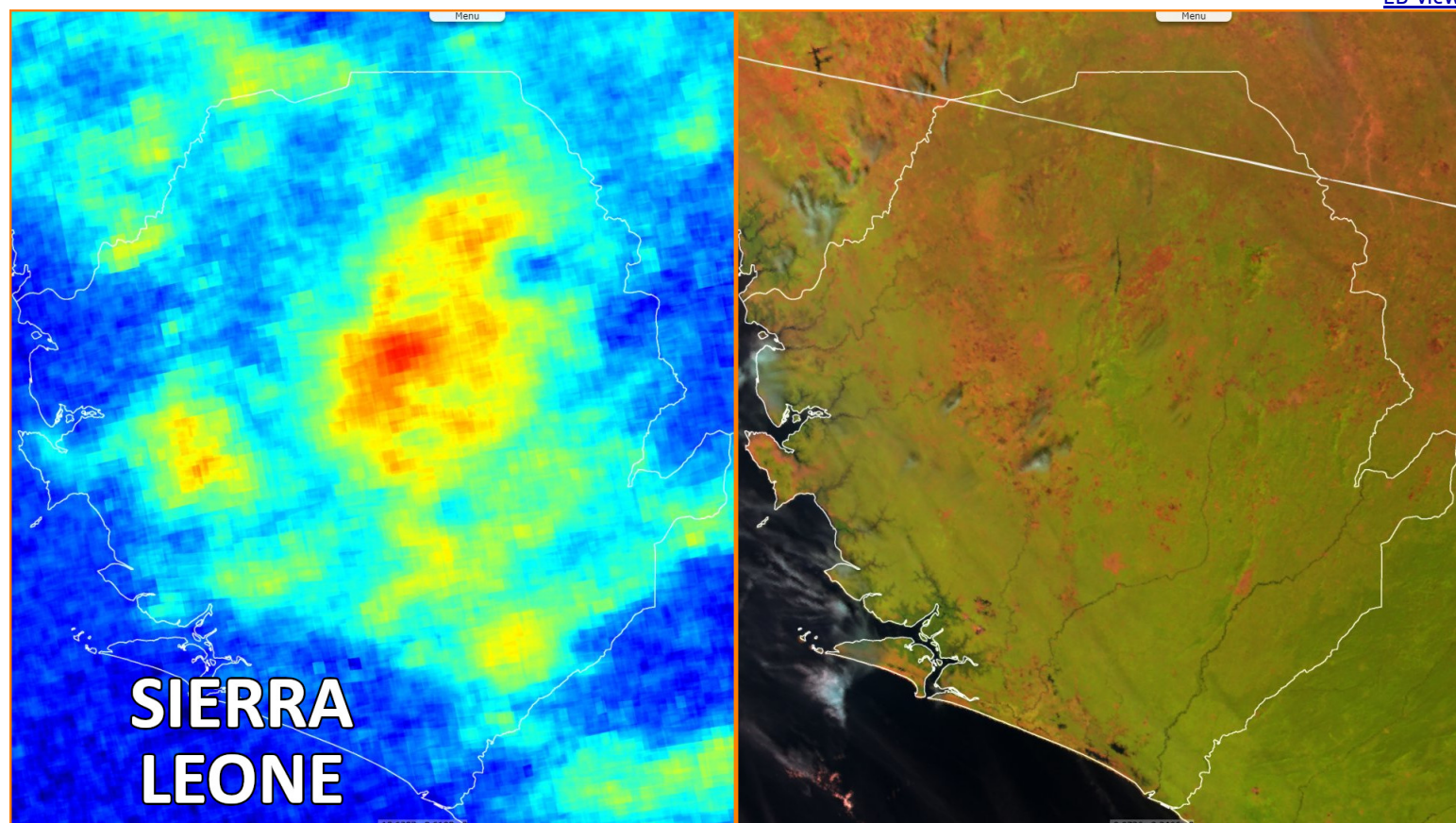


Fig. 13 - S5P TROPOMI (21.03.2023->08.04.2023) - Casamance in Senegal is another source of N<sub>2</sub>O, in particular over burnt areas on this image.

[2D view](#)  
[2D view](#)

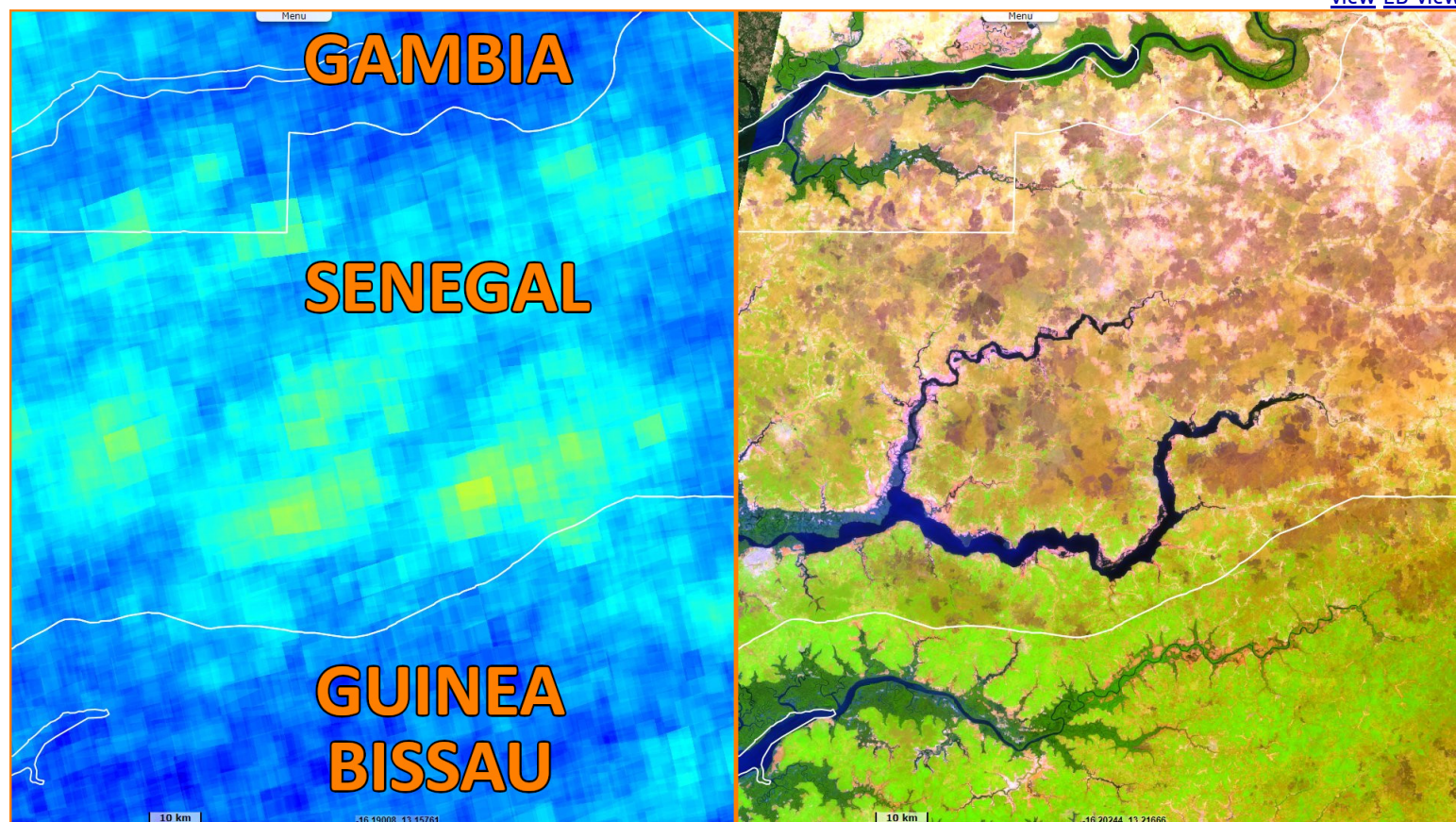
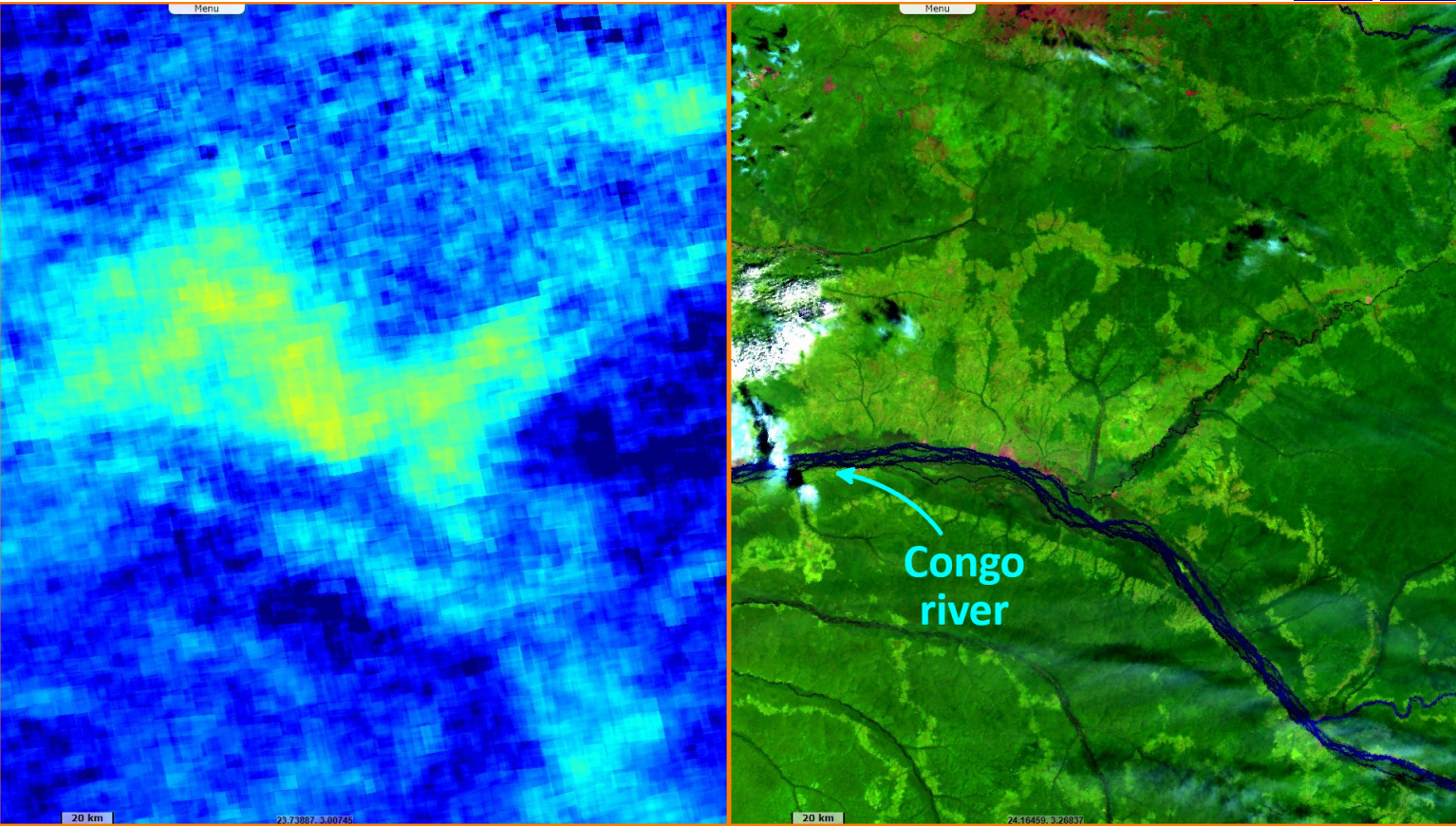
















Fig. 14 - S5P TROPOMI (21.03.2023->08.04.2023) / S3 SLSTR (21.01.2022) - A pollution hotspot along a deforested area of the bank of the Congo river.



*The views expressed herein can in no way be taken to reflect the official opinion of the European Space Agency or the European Union.  
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