Sentinel Vision
EVT-1011
20 January 2022

2D Layerstack

Tonga volcano causes the largest eruption in 30 years - local impact

Sentinel-2 MSI acquired on **03 December 2021** at 21:59:11 UTC
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Sentinel-1 CSAR IW acquired on **10 December 2021** at 17:08:38 UTC
Sentinel-2 MSI acquired on **17 January 2022** at 21:59:09 UTC
Sentinel-3 OLCI FR & WFR acquired on **19 January 2022** at 21:16:14 UTC

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Fig. 1 - S2 (14.01.2016) - North of the main island of Tonga archipelago, Hunga Tonga & Hunga Ha'apai islands after the 2015 eruption. 2D view

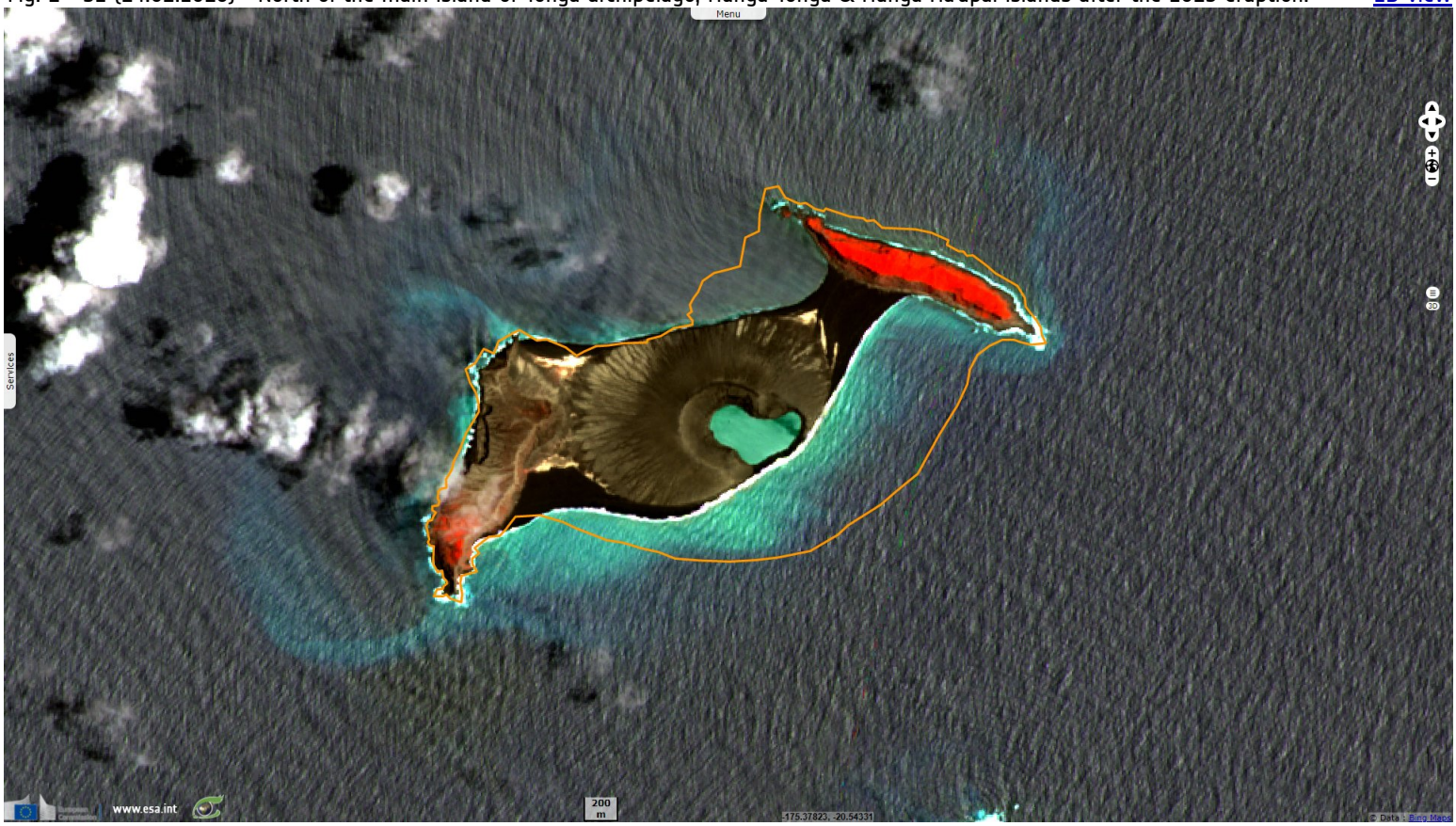


Fig. 2 - S2 (03.12.2021) - 5 years later, emerged areas were not the same and vegetation had settled on a larger area of the merged islands. 2D view

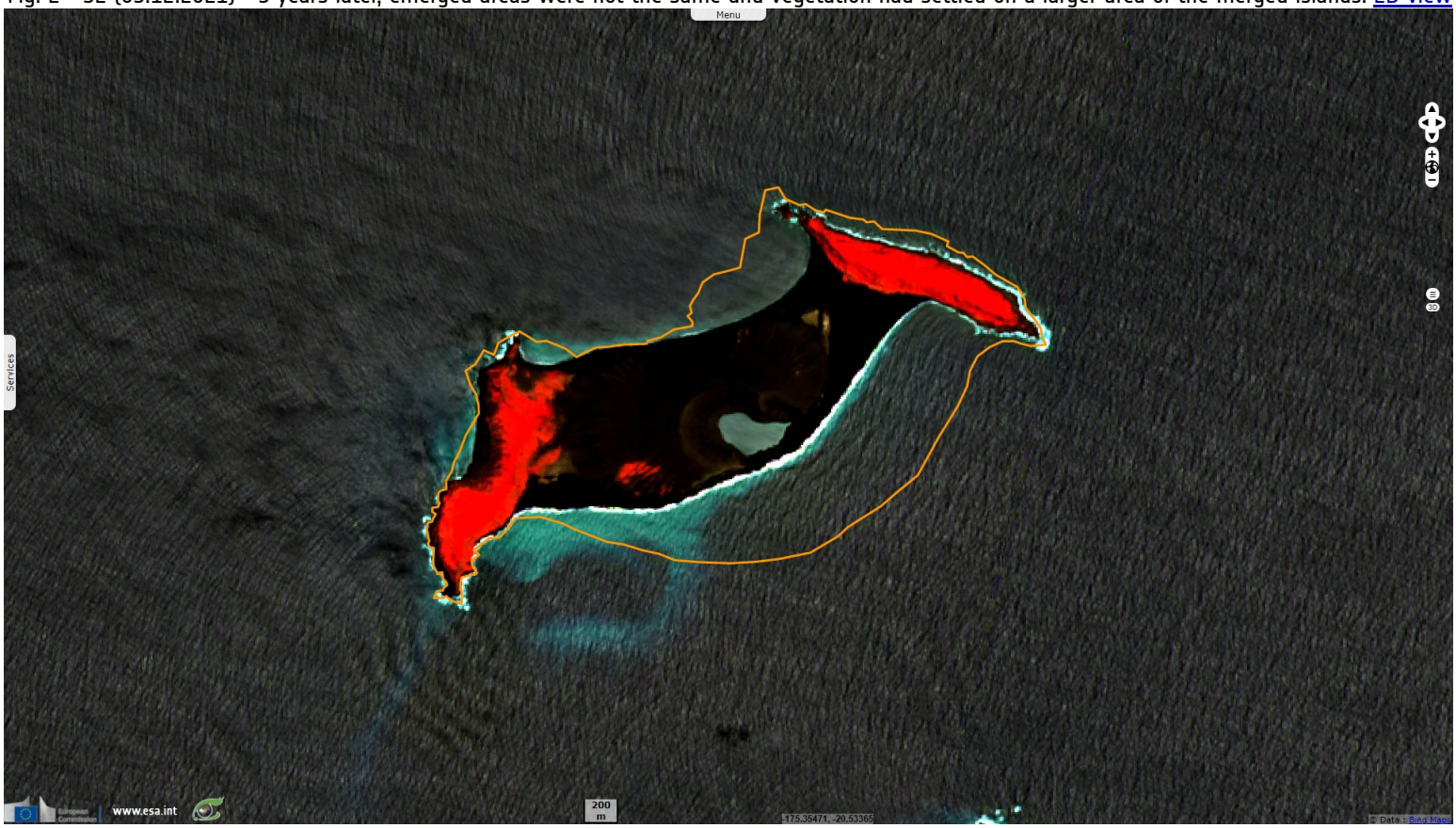
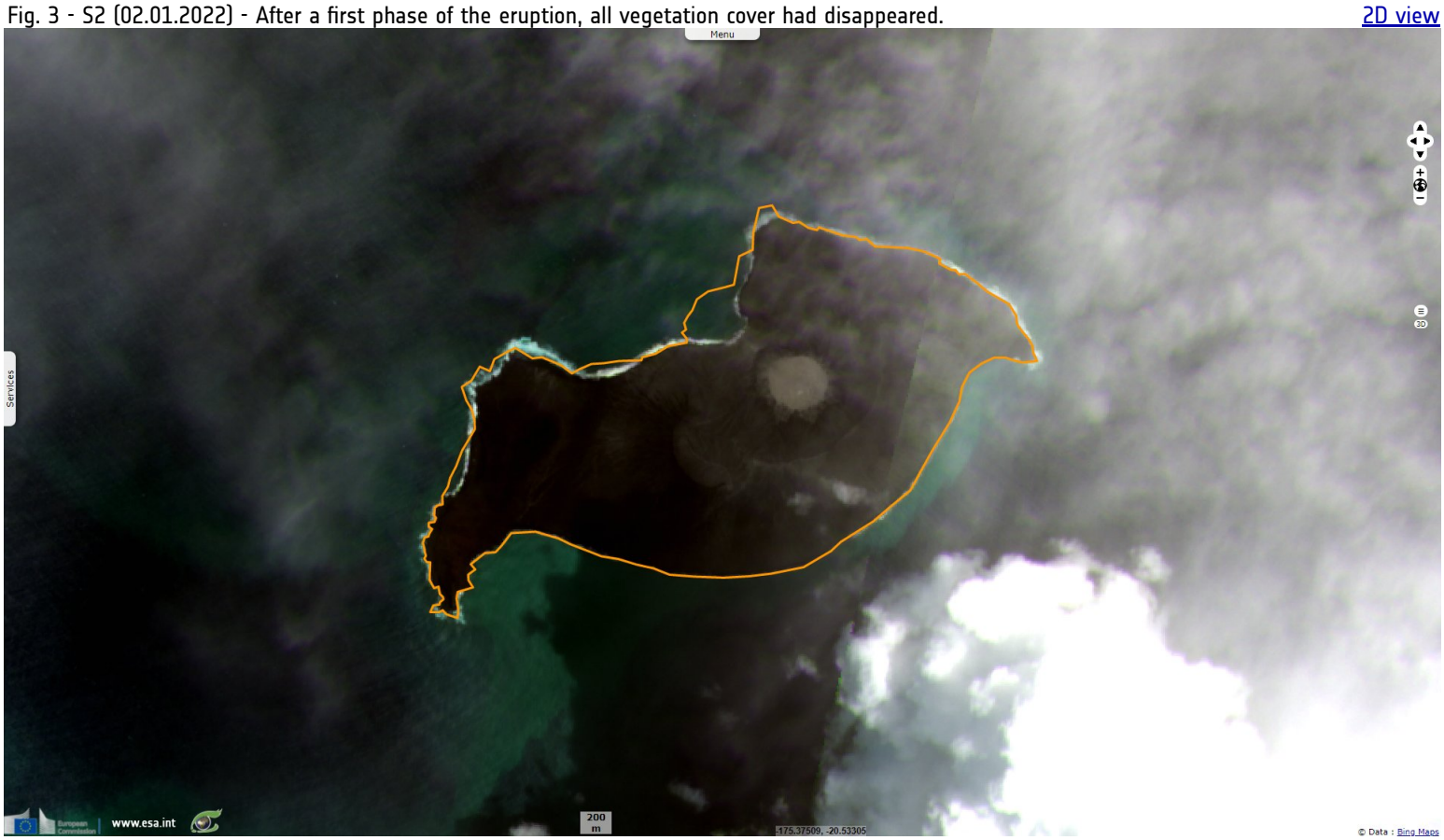


Fig. 3 - S2 (02.01.2022) - After a first phase of the eruption, all vegetation cover had disappeared. 2D view



Donna Lu, Nick Evershed and Josh Nicholas reported in the Guardian a massive eruption in Tonga islands: "*The undersea volcano is located about 65 km north of Tonga's capital, Nuku'alofa, and is part of a vast arc of volcanoes and ocean trenches known as the Pacific "Ring of Fire". Though it only rises 114 metres above sea level, the Hunga Tonga-Hunga Ha'apai volcano overall is 1.8 km high and 20km wide.*"

Fig. 4 - S2 (17.01.2022) - Near the end, the apex of the eruption destroyed most of the emerged part of the volcano, dividing it in 2 islands. 2D view

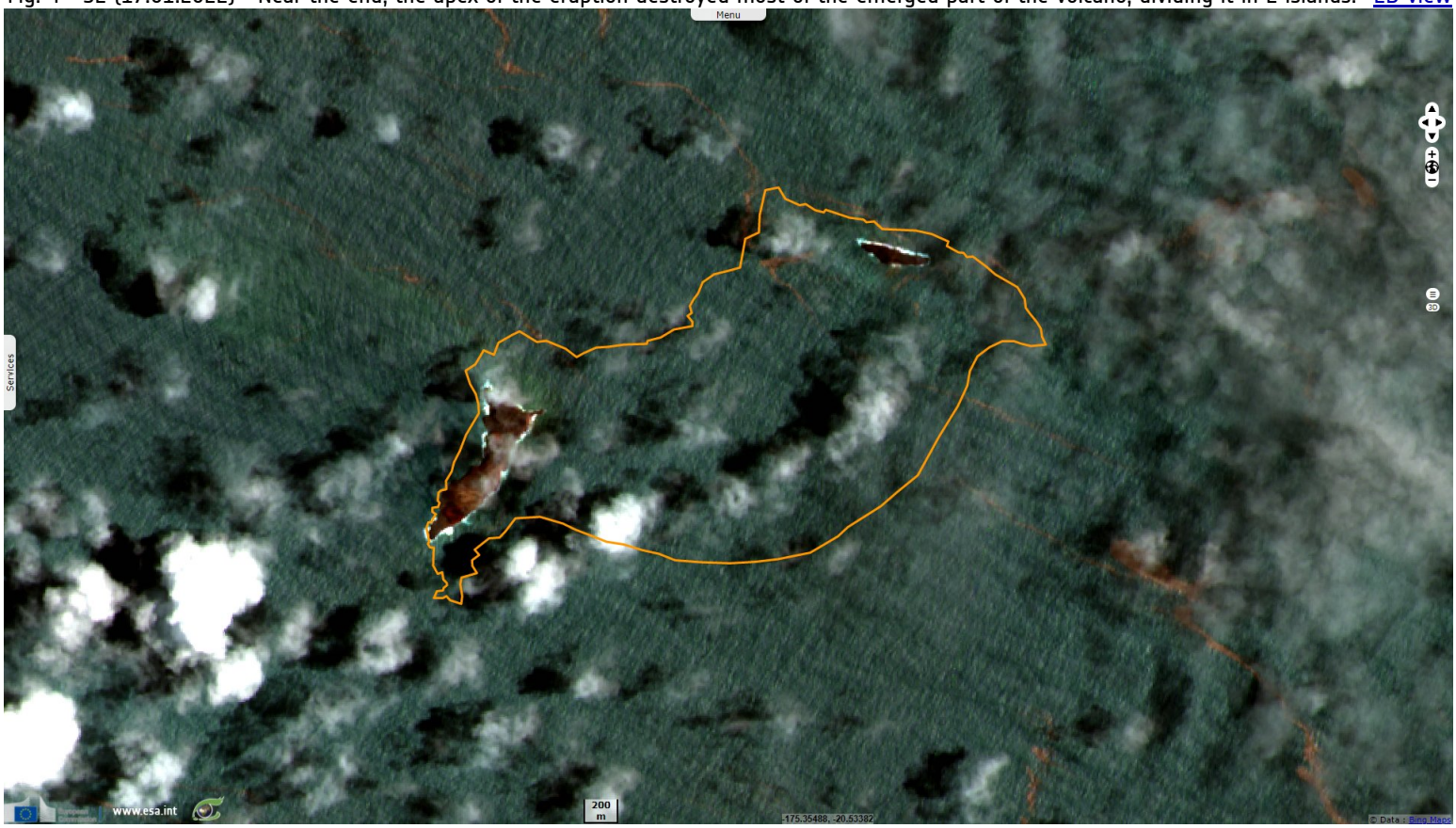
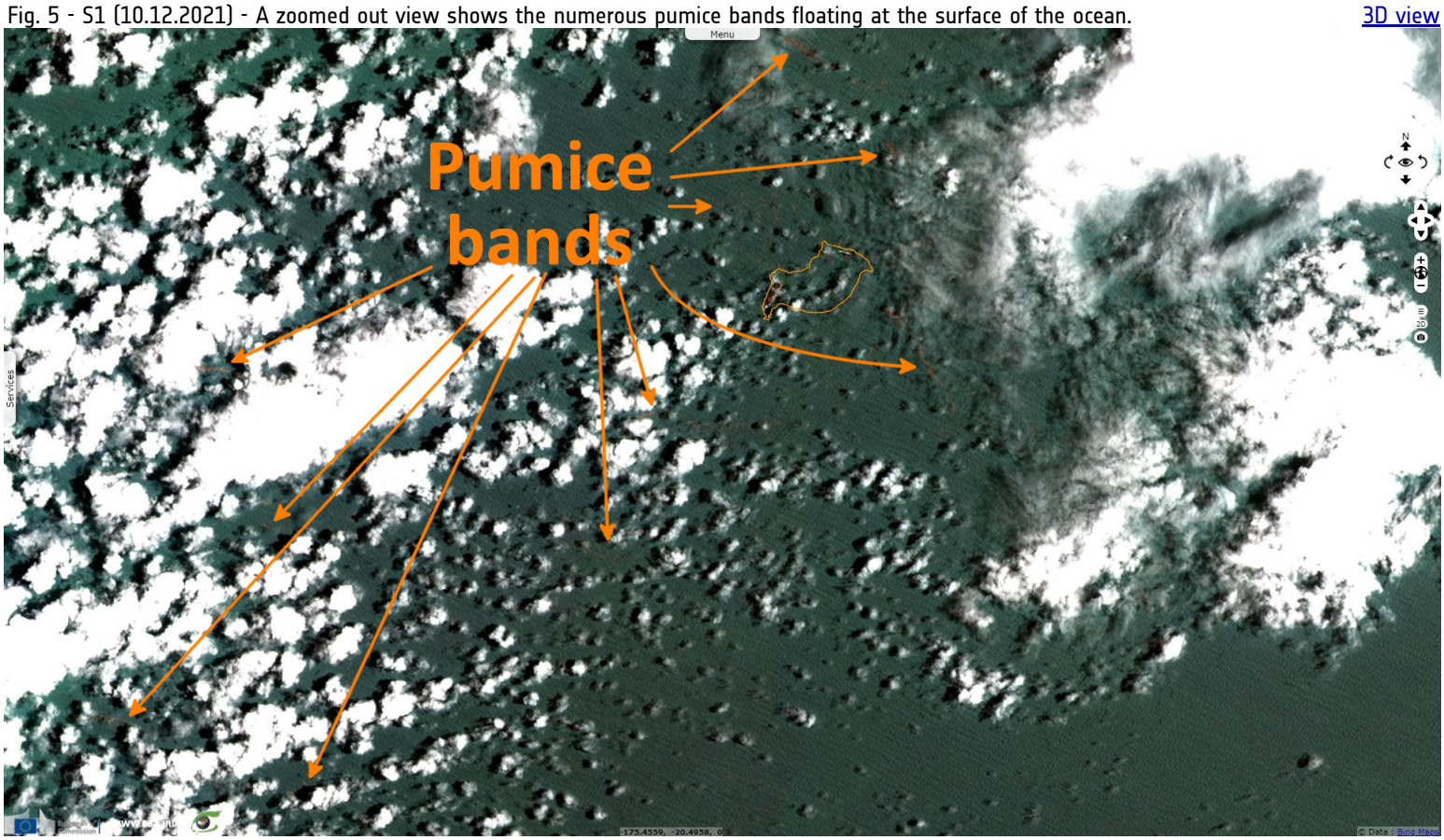


Fig. 5 - S1 (10.12.2021) - A zoomed out view shows the numerous pumice bands floating at the surface of the ocean. 3D view



"*A public notice issued by the Tonga Geological Services notes continuous eruption and a 5 km-wide plume. The volcano had been active since an earlier eruption on 20 December but was declared dormant by the authority on 11 January.*"

Fig. 6 - S1 (10.12.2021) - The merged islands in radar, shown before the eruption. 3D view

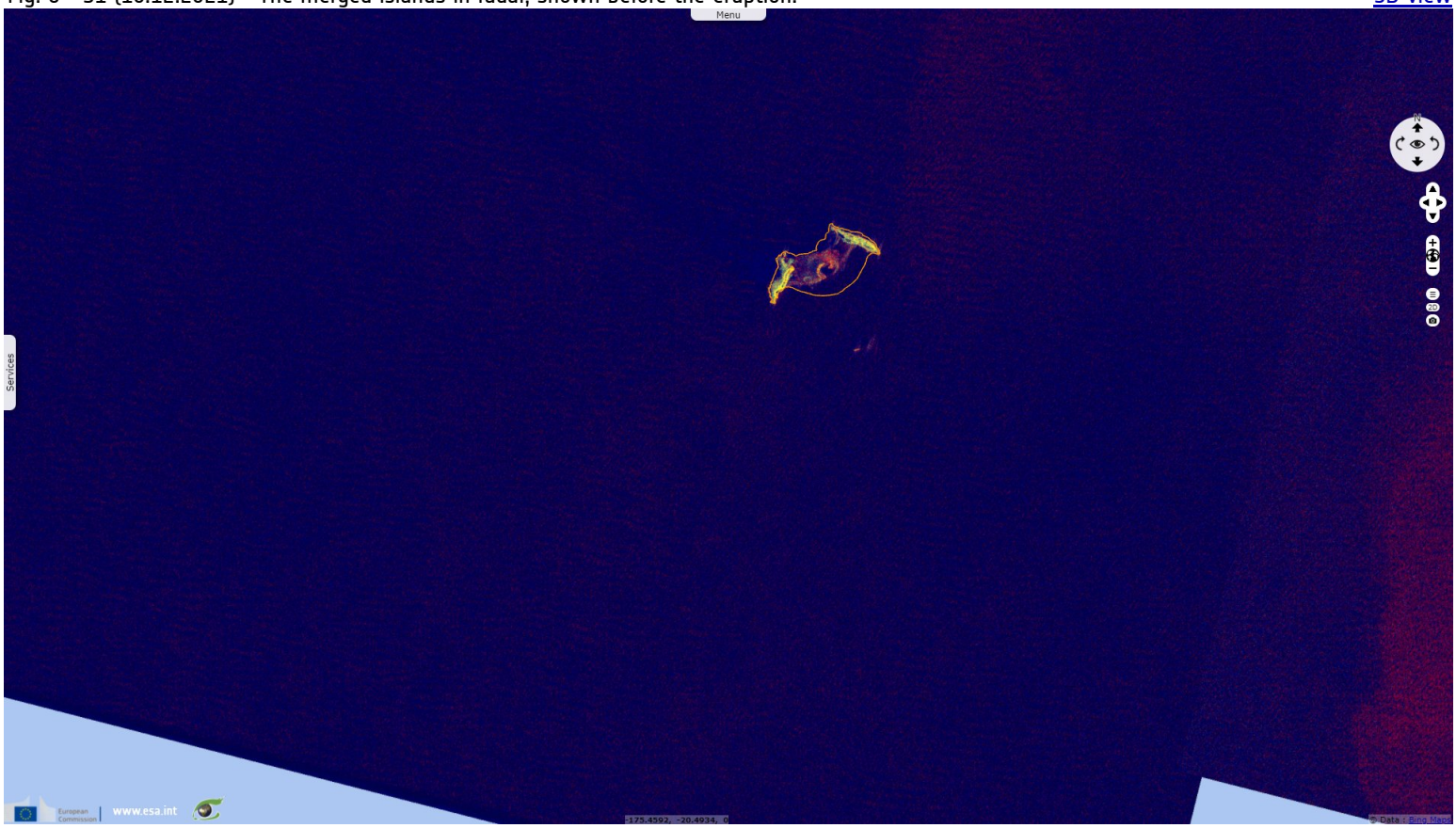
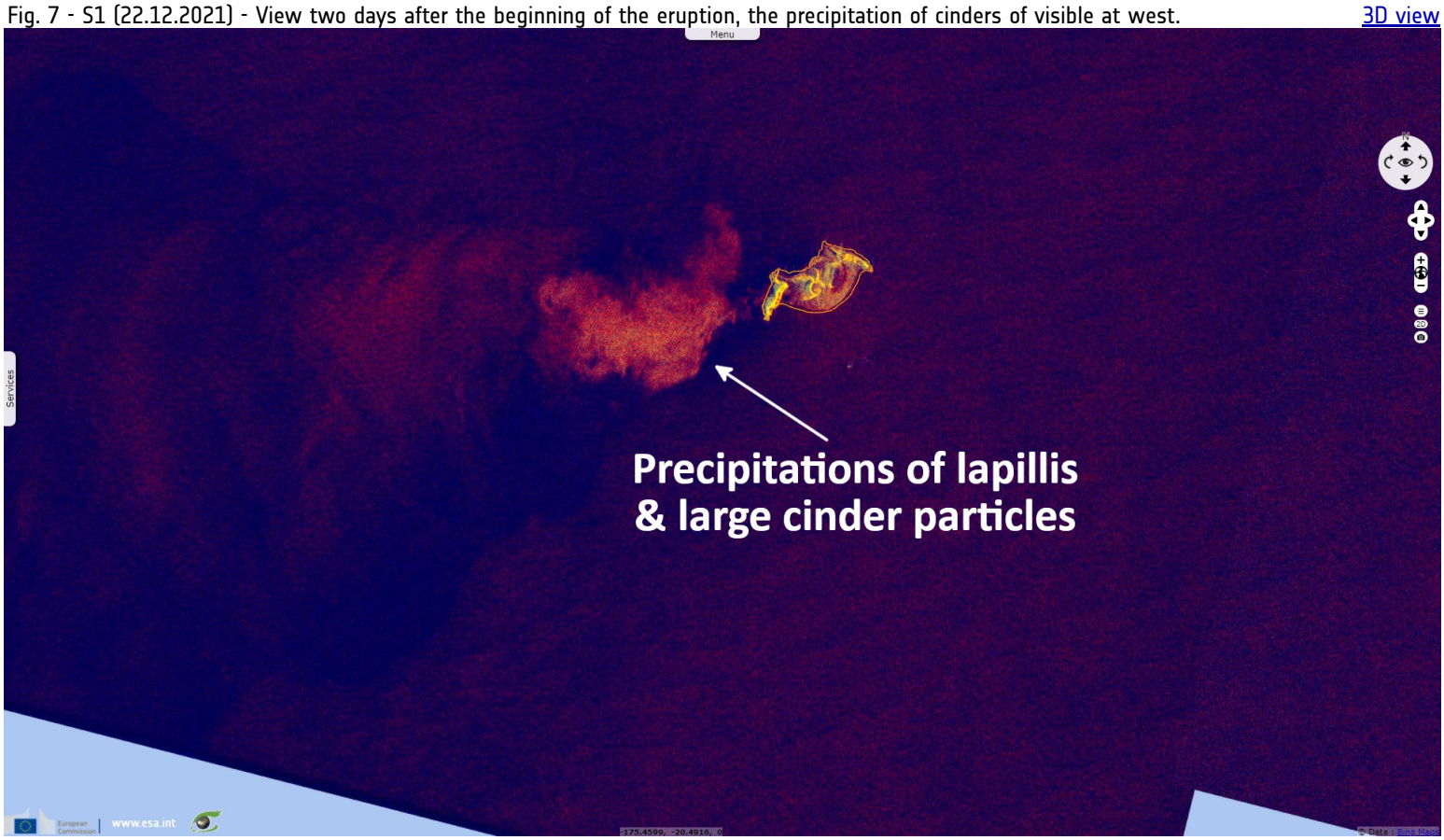


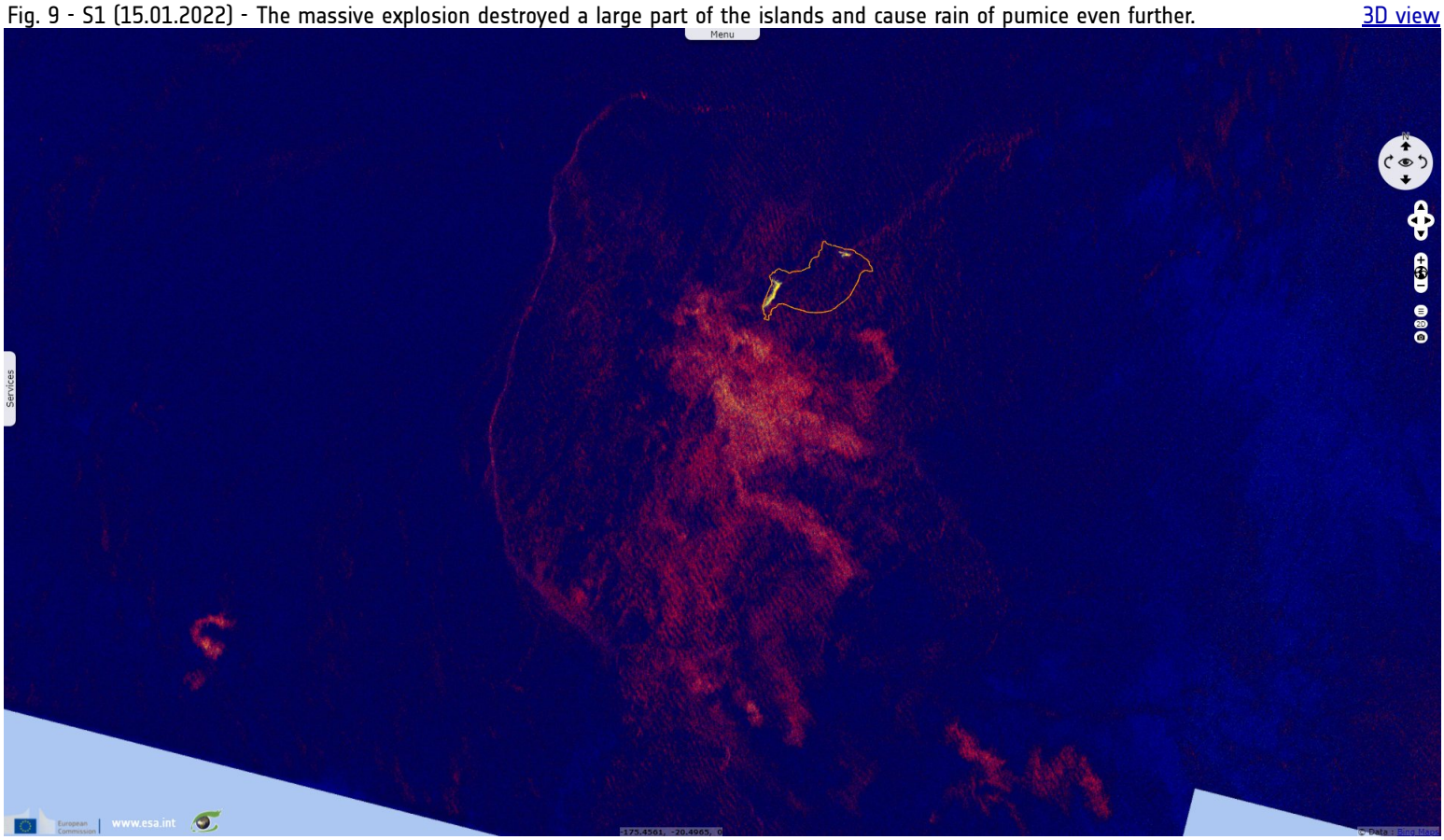
Fig. 7 - S1 (22.12.2021) - View two days after the beginning of the eruption, the precipitation of cinders of visible at west. 3D view



"*Volcanic activity in 2014 and 2015 had joined the islands of Hunga Tonga and Hunga Ha'apai, which were themselves produced by older volcanic eruptions. A satellite image taken after the eruption shows that the connecting volcanic cone has been largely destroyed.*"

Fig. 8 - S1 (03.01.2022) - In early January, the island reached its maximal extent. 3D view

Fig. 9 - S1 (15.01.2022) - The massive explosion destroyed a large part of the islands and cause rain of pumice even further. 3D view



"*The Hunga Tonga-Hunga Ha'apai volcano erupted again at 5.10pm local time on Saturday 15 January. The initial height of the ash plume is an estimated 15.2km in altitude, later rising up to 30 km high. The plume spreads to 260 km in diameter before being distorted by wind.*"

Fig. 10 - S3 OLCI (20.01.2022) - Soon after the nearby waters turned cyan. 3D view

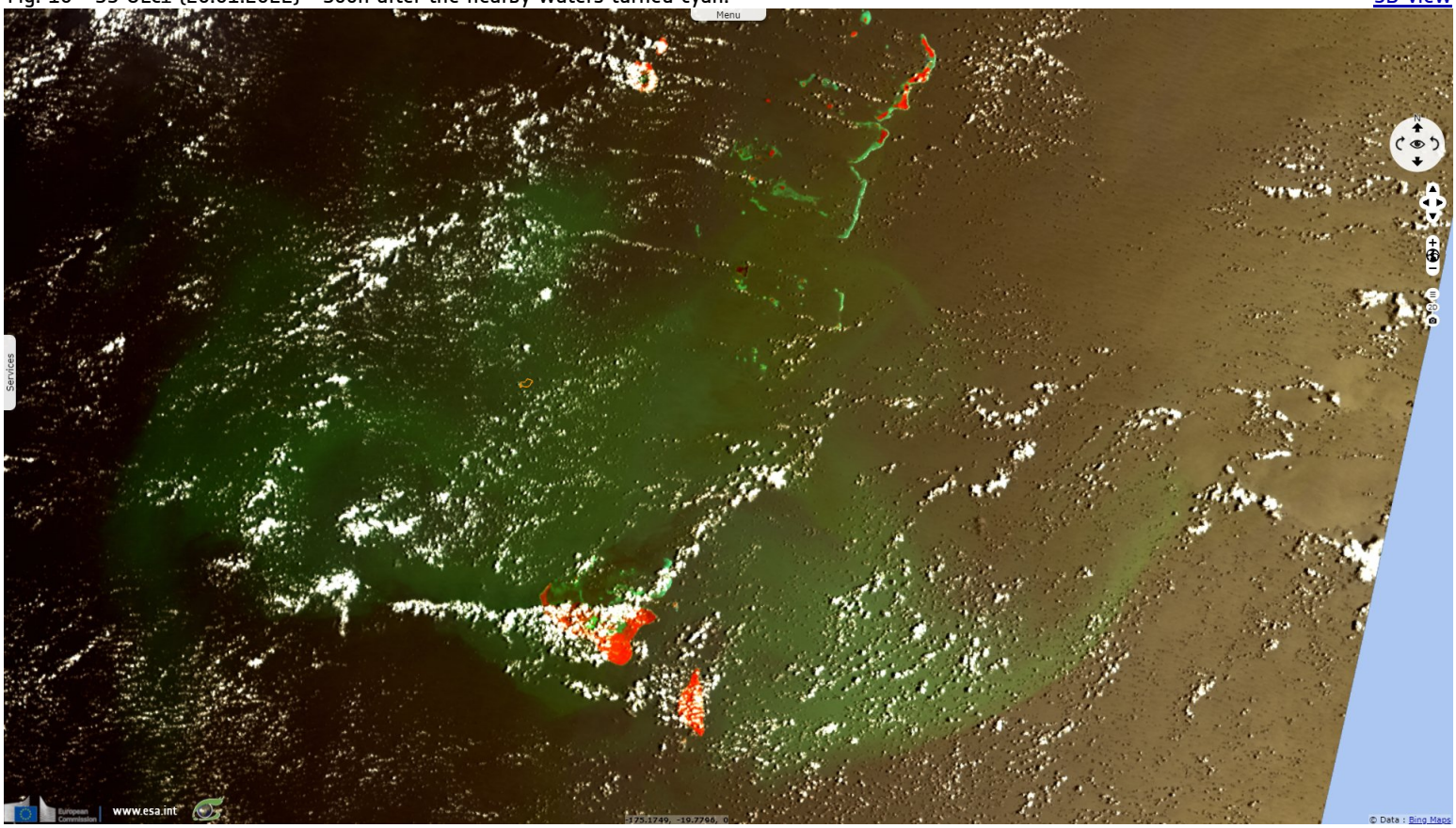
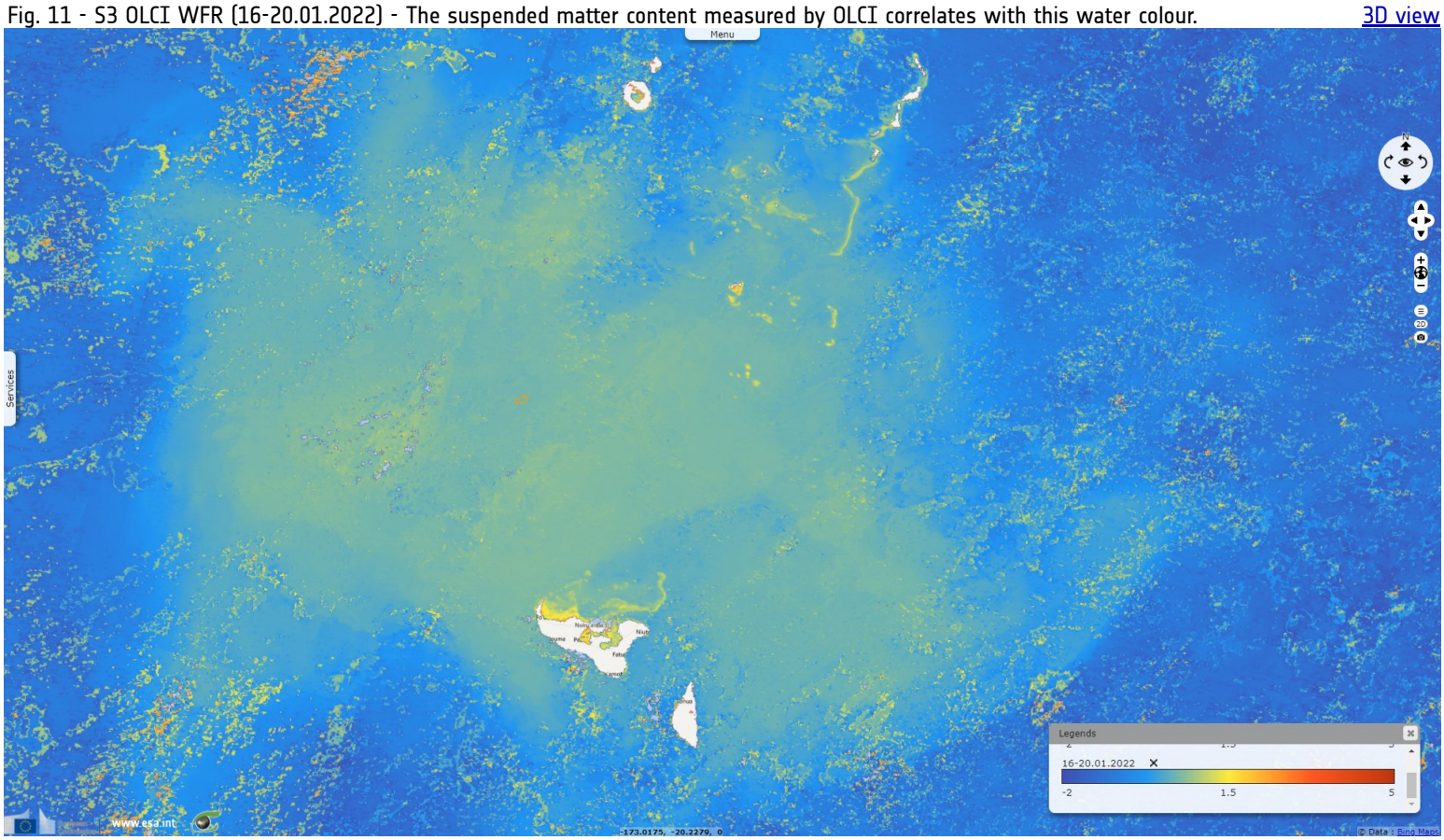


Fig. 11 - S3 OLCI WFR (16-20.01.2022) - The suspended matter content measured by OLCI correlates with this water colour. 3D view



The Japanese media Nikkei Asia continues: "*Shock waves from the eruption, which experts described as a "once-in-a-century" event, rippled through Earth's atmosphere and the Pacific Ocean. The eruption was estimated at 6 on the Volcanic Explosivity Index (VEI), an index that runs from 0 to 8 and is used to measure the scale of eruptions. It was the first level-6 event since the 1991 eruption of Mount Pinatubo in the Philippines*".

Fig. 12 - S3 OLCI WFR (16-20.01.2022) - This matter allowed an algal bloom, visible by the high chlorophyll content. 3D view

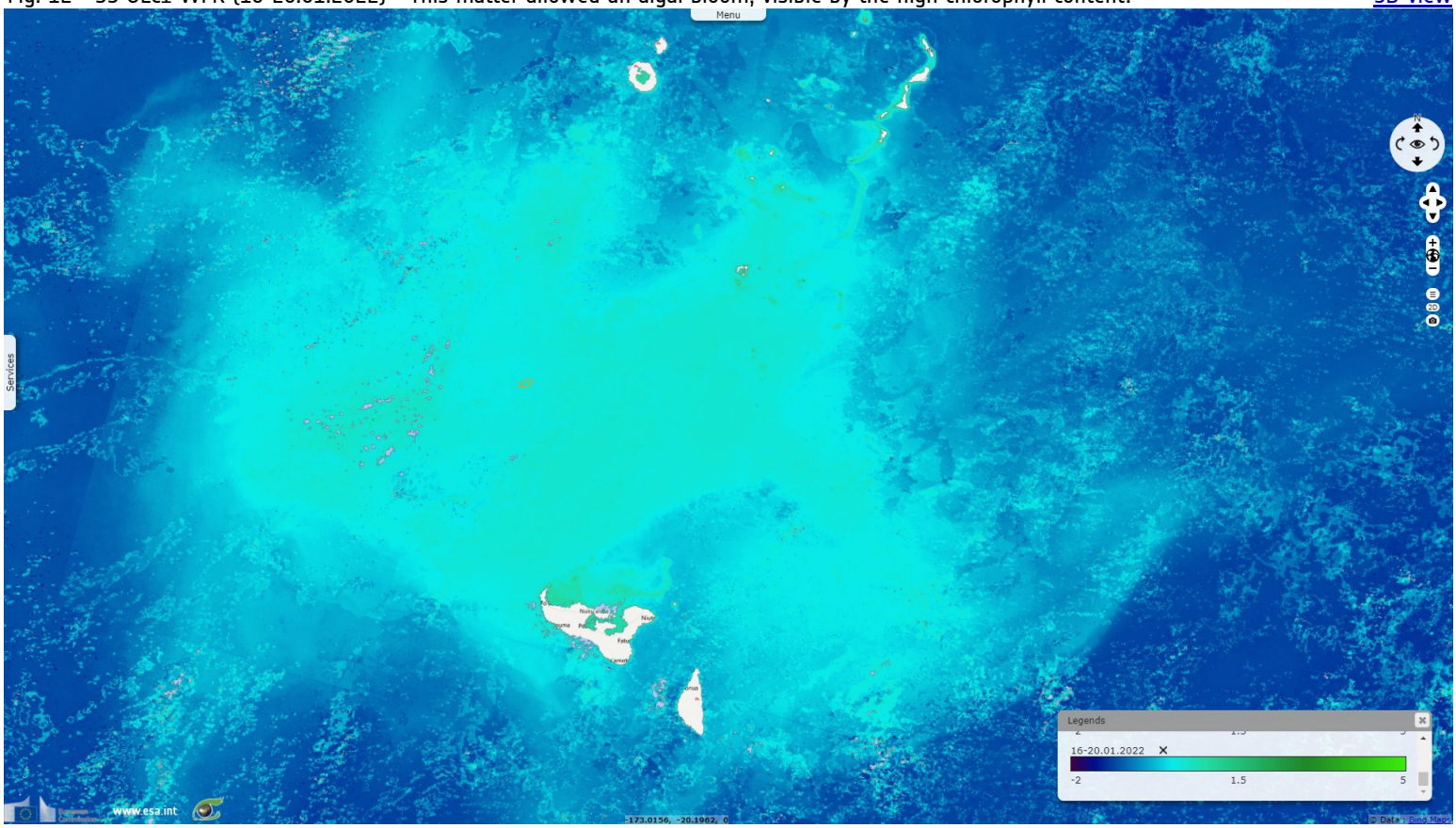
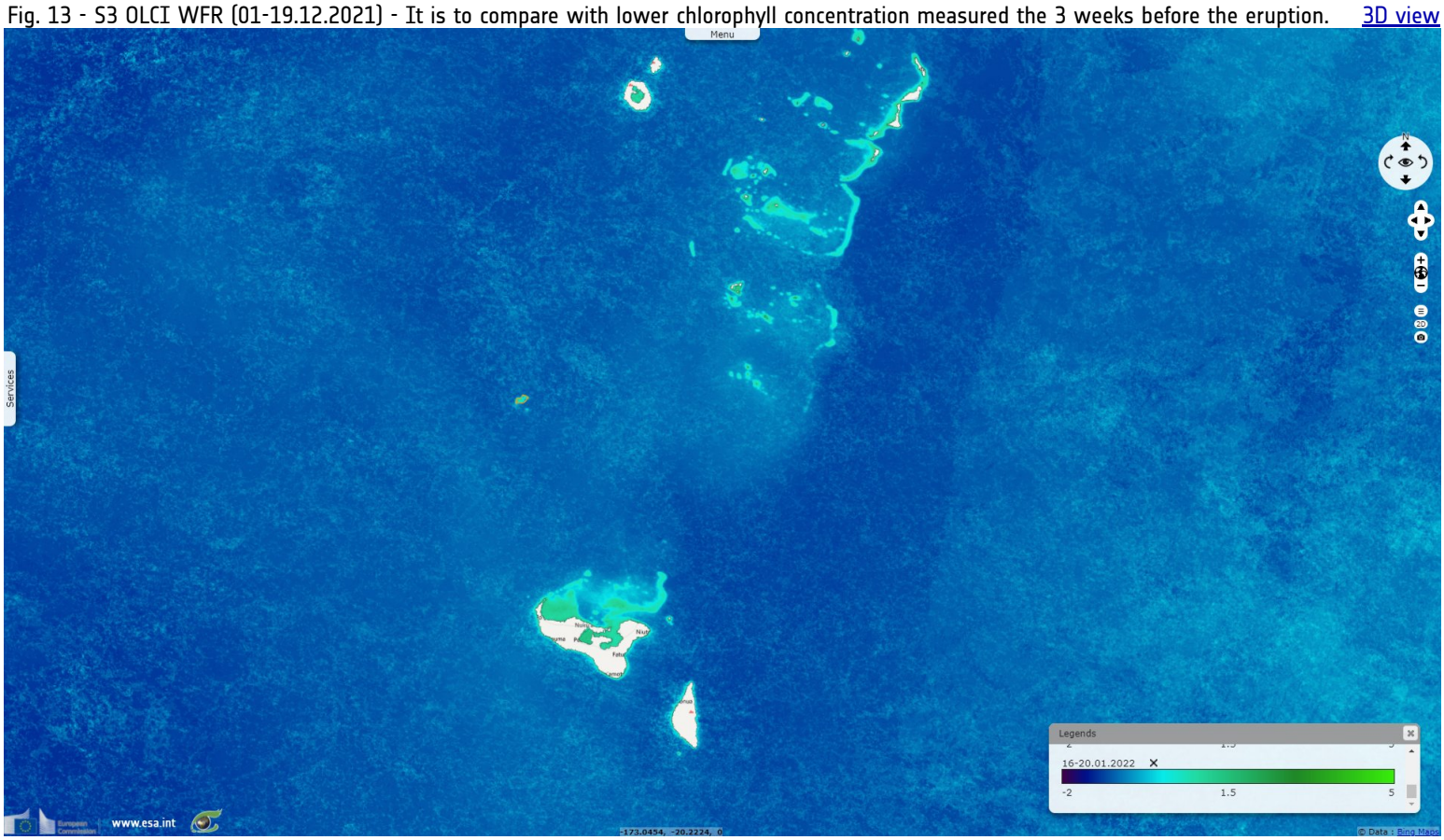


Fig. 13 - S3 OLCI WFR (01-19.12.2021) - It is to compare with lower chlorophyll concentration measured the 3 weeks before the eruption. 3D view



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