Sentinel Vision
EVT-167
04 January 2018

2D Layerstack

Hydrology in north-west China

Sentinel-3 OLCI FR acquired on **15 December 2016** from 03:55:04 to 04:01:04 UTC
Sentinel-2 MSI acquired on **29 March 2017** at 04:46:51 UTC
Sentinel-3 SLSTR RBT acquired on **22 October 2017** from 04:32:30 to 04:35:30 UTC
...
Sentinel-2 MSI acquired on **19 December 2017** at 04:01:51 UTC

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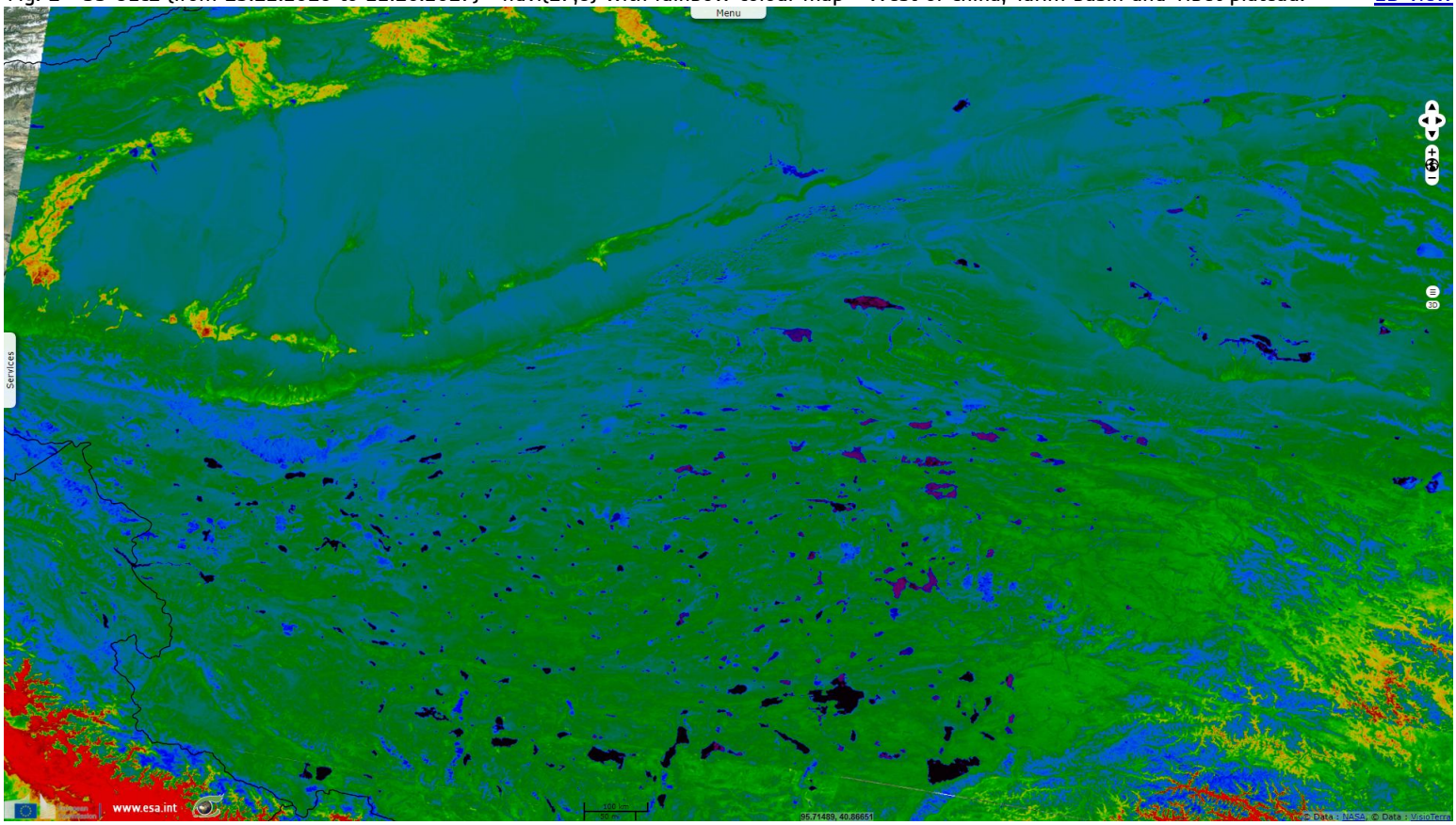
Fig. 1 - S3 OLCI (from 15.12.2016 to 22.10.2017) - ndvi(17,8) with rainbow colour map - West of China, Tarim basin and Tibet plateau. 2D view



While the climate of south east China is under strong oceanic influence, the north-west part of the country suffers more from the lack of water than of excessive precipitation. The collision of the Indian plaque with Eurasia has lifted several moutains ranges, Himalaya being the first of them which decrease precipitations on the leeward side due to the orographic precipitations. The different mountain ranges shaped several endorheic basins from which water cannot flow to the open sea, causing minerals to concentrate in depressions, either lakes or salt pans.

Figure 1 shows a mosaic of OLCI images acquired from the 15.12.2016 to the 22.10.2017. This mosaic is rendered using a Normalized Difference Vegetation Index to which was applied a rainbow colour map. While the windward side of Himalaya shows a strong presence of vegetation (South of the view, in red), the rest of the image indicates much less vegetation is present norther. Numerous Tibet lakes show in black to violet, they sustain since the limited water input is compensated by the limited evaporation on this cold plateau. On the north-east, the Tarim basin is circled by high mountains which snow melt feeds rivers. While crops are visible in the alluvial fans (red and yellow), vegetation struggles to sustain (shades of green) as this rivers go deeper in the Taklamakan Desert (lighter blue).

Fig. 2 - S3 SLSTR (22.10.2017) - SLSTR thermal band with a colour map - Zoom on the Tarim basin. 2D view

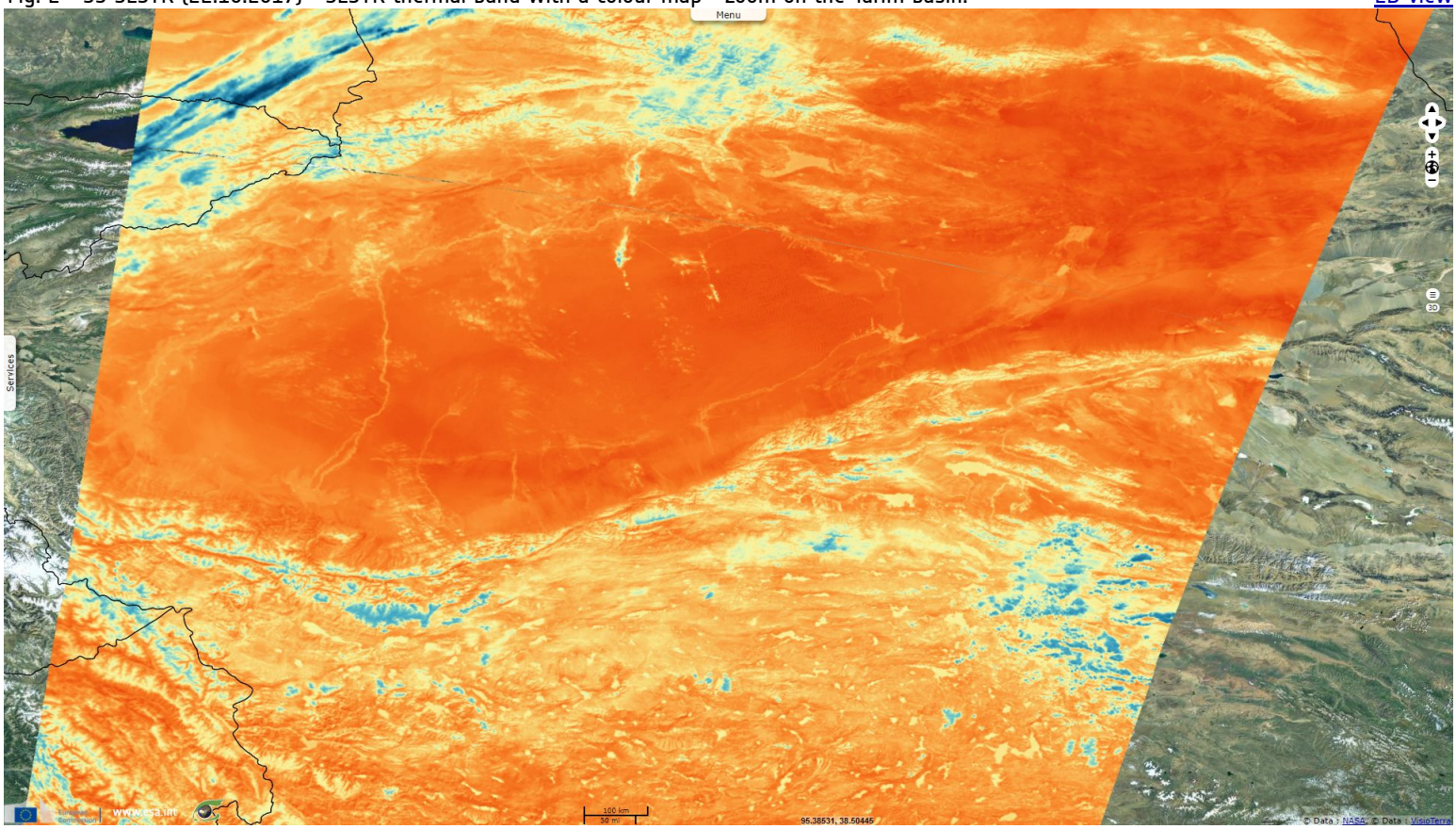
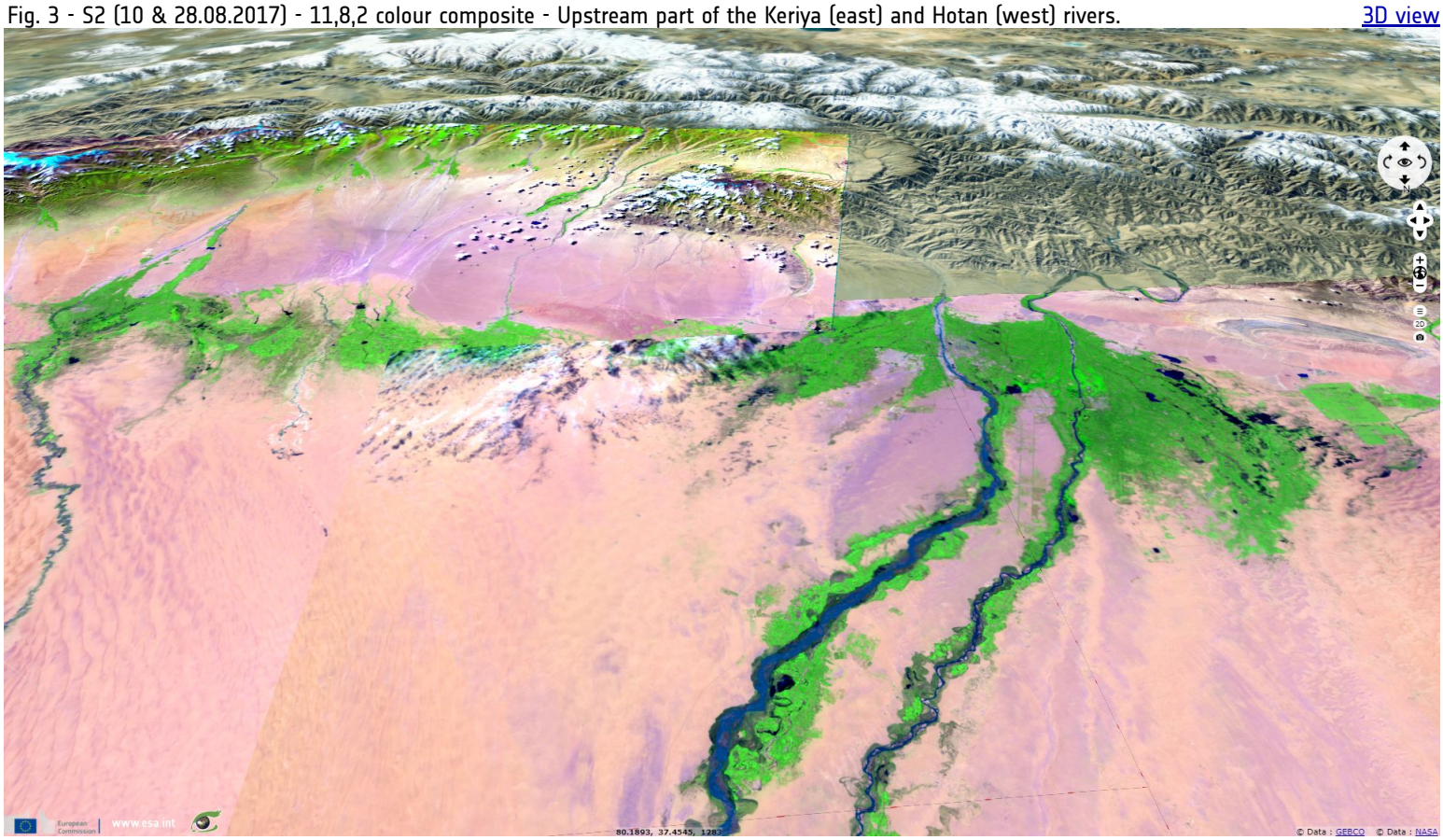


Figure 2 shows several consecutive SLSTR images acquired the 22.10.2017 rendered by applying a colour map to the thermal band S-8. The image still shows cold lakes of Tibet (yellow) while some snow capped regions appear in light blue. Further north, the river network of the Tarim Basin appears as yellow linear elements in the orange desert. Most rivers remain close to the mountains which provide fresh water, most water course evaporate as they leave the edge of the basin; only the Tarim and Hotan rivers are strong enough to cross the Taklamakan Desert from south to north. Water tends to flow toward the north-east tip of the basin in Lop Nur, the lowest point of this desert.

Fig. 3 - S2 (10 & 28.08.2017) - 11,8,2 colour composite - Upstream part of the Keriya (east) and Hotan (west) rivers. 3D view

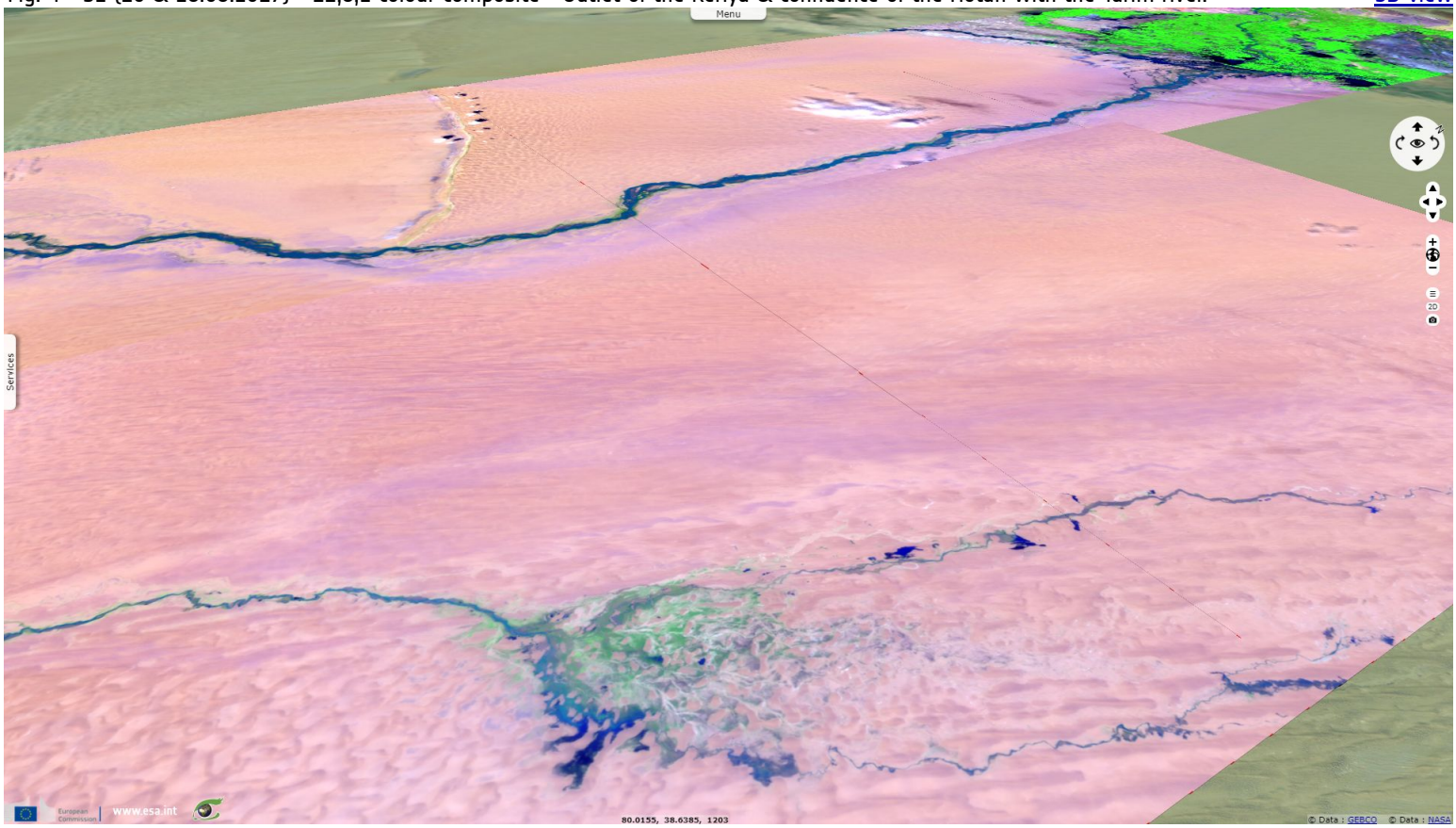


This view of the southern edge of the Tarim basin is composed of Sentinel-2 tiles acquired the 10 & 28.08.2017, shown on a Landsat mosaic background. The 11,8,2 colour composite has been chosen to enhance the presence of vegetation and water. In the background, one can see the Karakorum and Kunlun which provide water from the snow melt to many rivers. One of this contributors is the K2, second highest mountain in the World, which northern glacier flows in the Tarim Basin.

As these river find an outlet from the mountain, they reach the Taklamakan Desert. A part of these water keeps running in the open air, another part feeds the vegetation growing in the alluvial fans of this outlet and then on the borders of the rivers, weakened rivers may also disappear

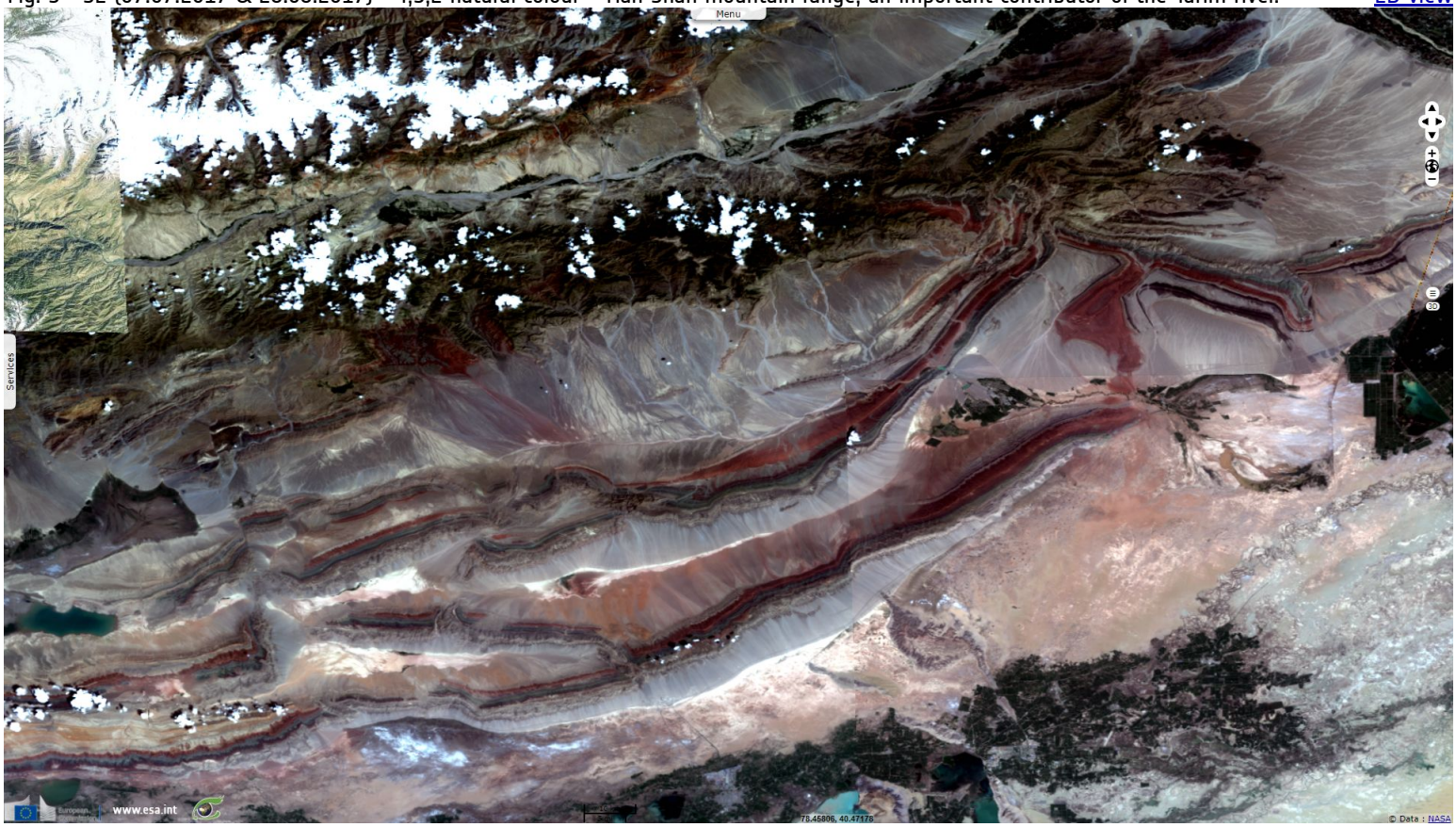
under the sand for some time, finally a lot of this water evaporates due to the arid climate. On the left is the Keriya river while on the right, the White Jade river and the Black Jade river unite, forming the Hotan river.

Fig. 4 - S2 (10 & 28.08.2017) - 11,8,2 colour composite - Outlet of the Keriya & confluence of the Hotan with the Tarim river. 3D view



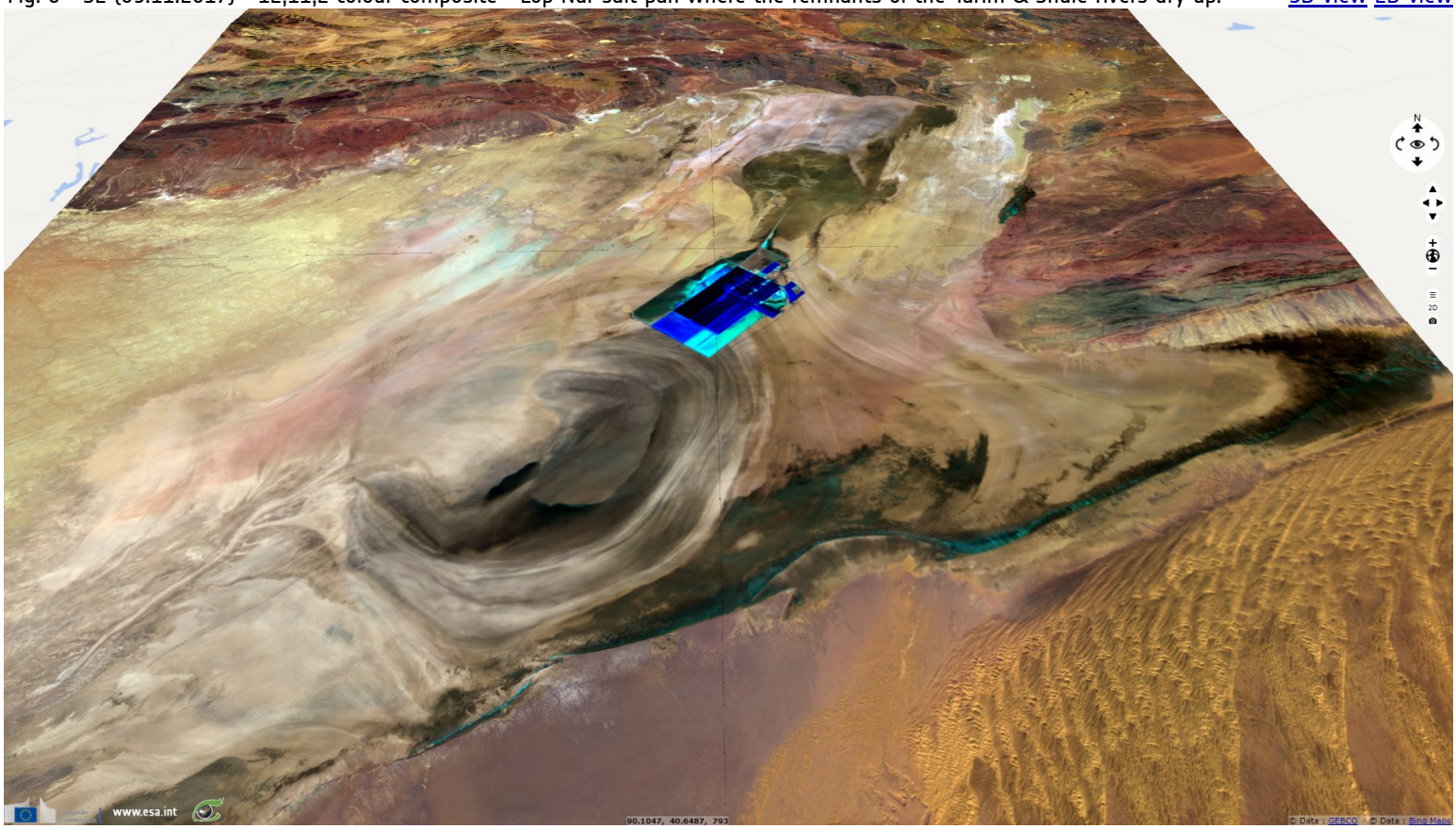
This views shows the same tiles and colour composite as the previous one. On the foreground, the now-reduced Keriya forms a small delta from which only two smaller watercourses emerge before disappearing soon after. In the background, the stronger Hotan river reaches the northern border of the Taklamakan Desert where it joins the Tarim river in its eastward journey. Notice the anticline, here in yellow, visible on the western side of the Hotan river.

Fig. 5 - S2 (07.07.2017 & 28.08.2017) - 4,3,2 natural colour - Tian Shan mountain range, an important contributor of the Tarim river. 2D view



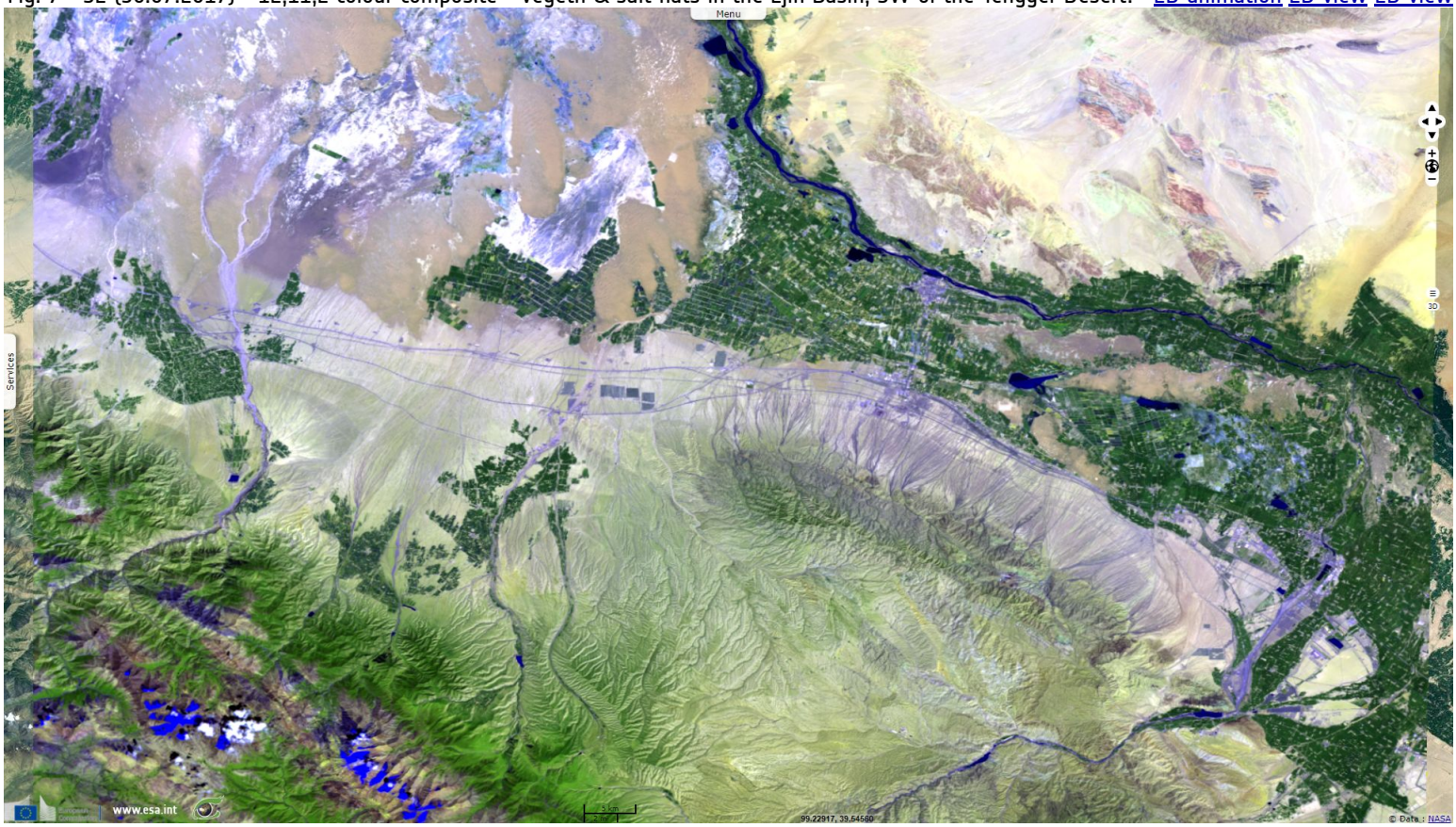
This view of the northern edge of the Tarim basin is composed of Sentinel-2 tiles acquired the 07.07.2017 & 28.08.2017, here using a natural colour composite. Run by several faults, the southern part of the Tian Shan mountains contains several closed sub basins feeding endorheic lakes and salt pans. Only the eastern section allows water to form the Toxkan river which later converges into the Tarim river.

Fig. 6 - S2 (09.11.2017) - 12,11,2 colour composite - Lop Nur salt pan where the remnants of the Tarim & Shule rivers dry up. 3D view 2D view



This view of the north-east tip of the Taklamakan Desert is composed of 4 Sentinel-2 tiles acquired the 09.11.2017 and processed as 12,11,2 colour composite. Lop Nur was an important lake collecting waters from a large part of the Tarim basin. It is now a seasonal marsh fed by the Tarim river and the westward flowing Shule River. This salt lake contains large quantity of minerals as evidenced by the solar evaporation ponds visible in the centre of the view, here for potash exploitation.

Fig. 7 - S2 (30.07.2017) - 12,11,2 colour composite - Vegetn & salt flats in the Ejin Basin, SW of the Tengger Desert. 2D animation 2D view 2D view



This Sentinel-2 tiles was acquired the 30.07.2017 south east of the Tengger Desert and processed as 12,11,2 colour composite. At the north east of the image, begins the Tengger Desert. At the south, one can see several rivers which find their source in the north-west - south-east oriented Qilian Mountains. These rivers allow important crops to grow at the foot of the mountain. Their course circumvent the desert, many converge into the Ejin river but all that does not evaporate on its way finally ends in a salty depression further north.

Fig. 8 - S2 (19.12.2017) - 4,3,2 natural colour - Salty patches of water between the dunes of Tengger Desert. 2D view

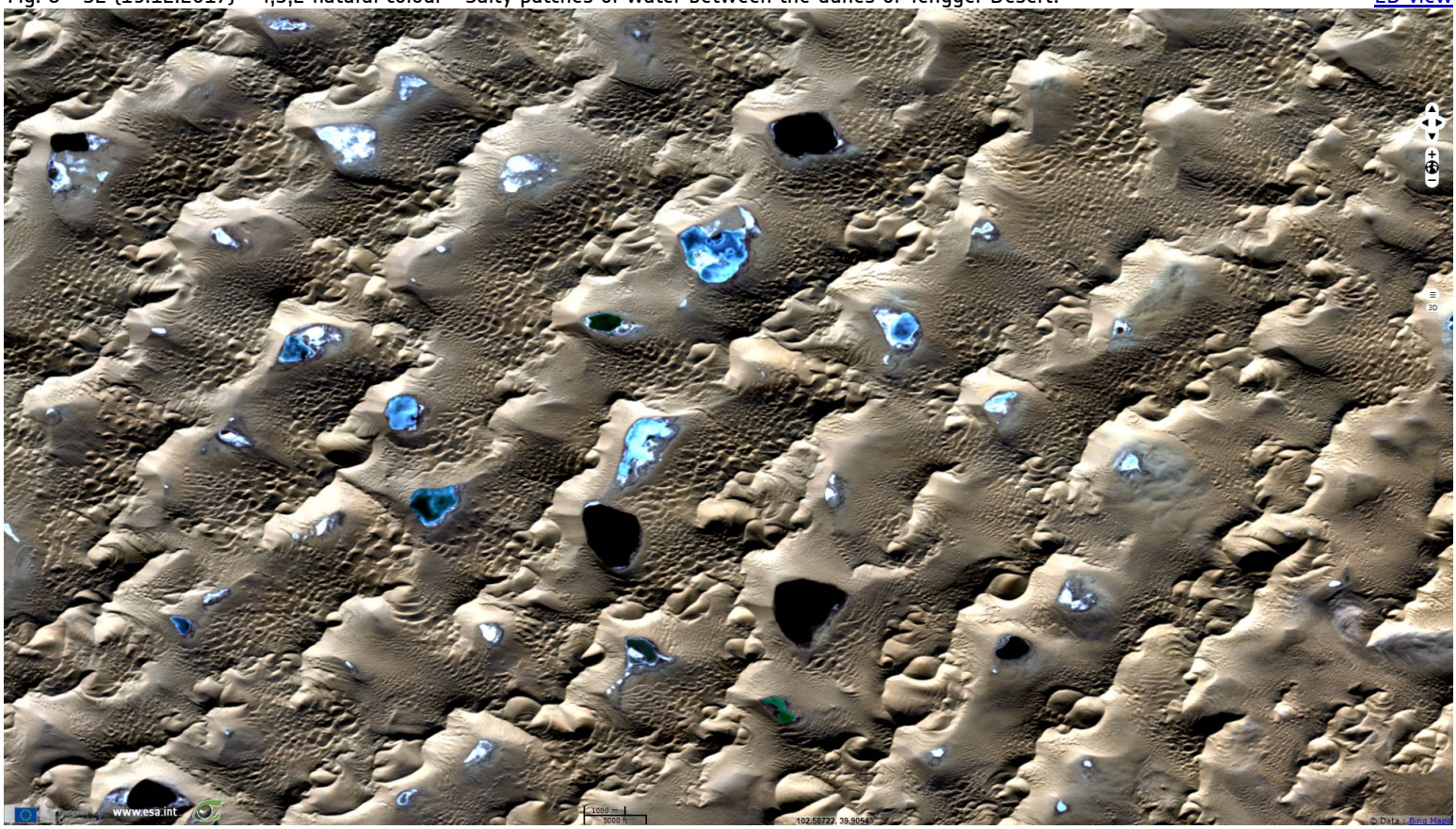
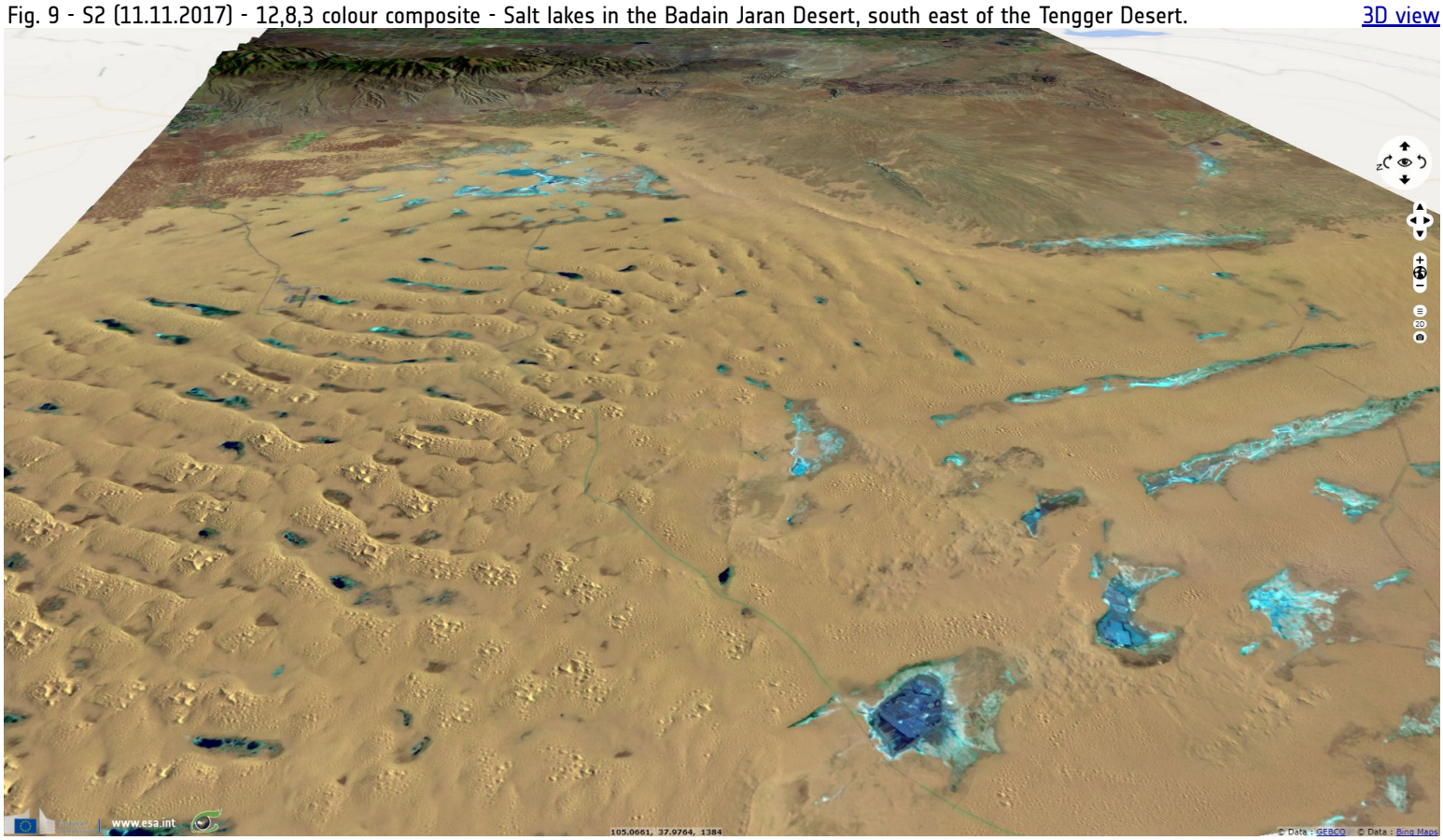


Fig. 9 - S2 (11.11.2017) - 12,8,3 colour composite - Salt lakes in the Badain Jaran Desert, south east of the Tengger Desert. 3D view



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