Sentinel Vision
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2D Layerstack

Tatra National Park between Poland & Slovakia

Sentinel-2 MSI acquired on **20 April 2019** at 09:40:39 UTC
Sentinel-1 CSAR IW acquired on **20 August 2019** at 04:53:23 UTC
Sentinel-2 MSI acquired on **22 September 2019** at 09:40:31 UTC

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Fig. 1 - S2 (22.09.2019) - 12,11,2 colour composite - Tatra National Park is a mountainous park located both in Slovakia and in Poland. 2D view

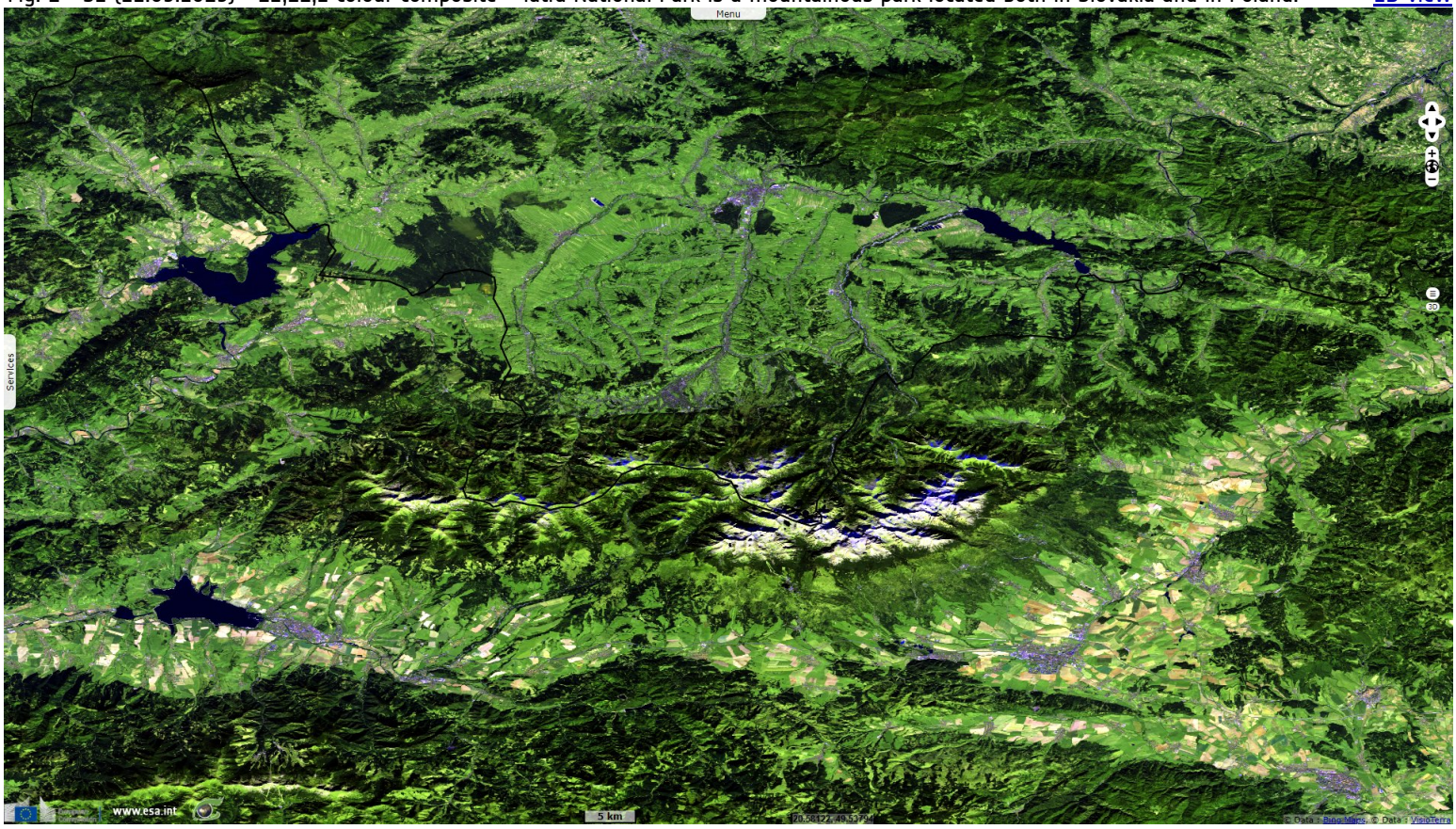
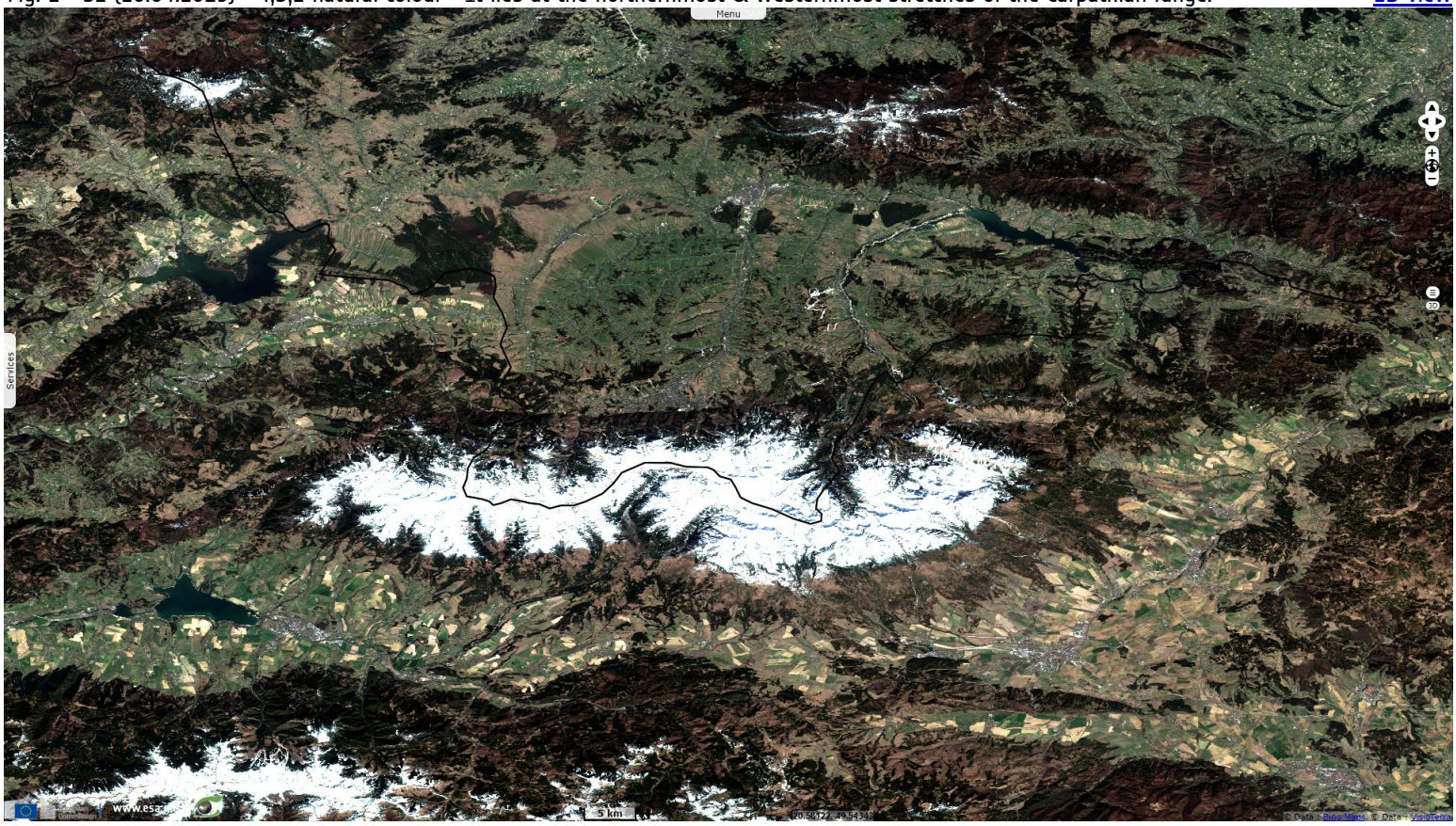
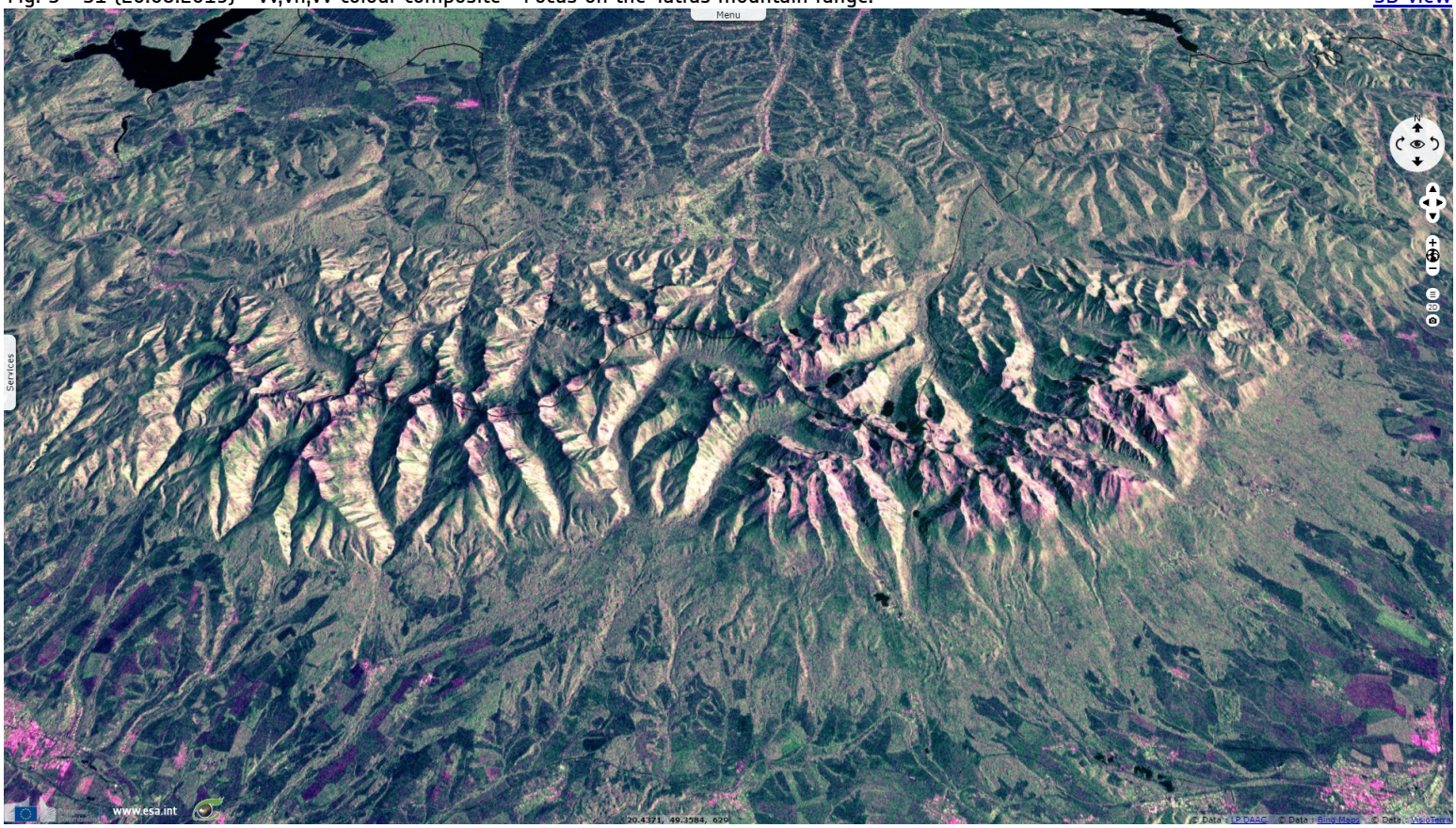


Fig. 2 - S2 (20.04.2019) - 4,3,2 natural colour - It lies at the northernmost & westernmost stretches of the Carpathian range. 2D view



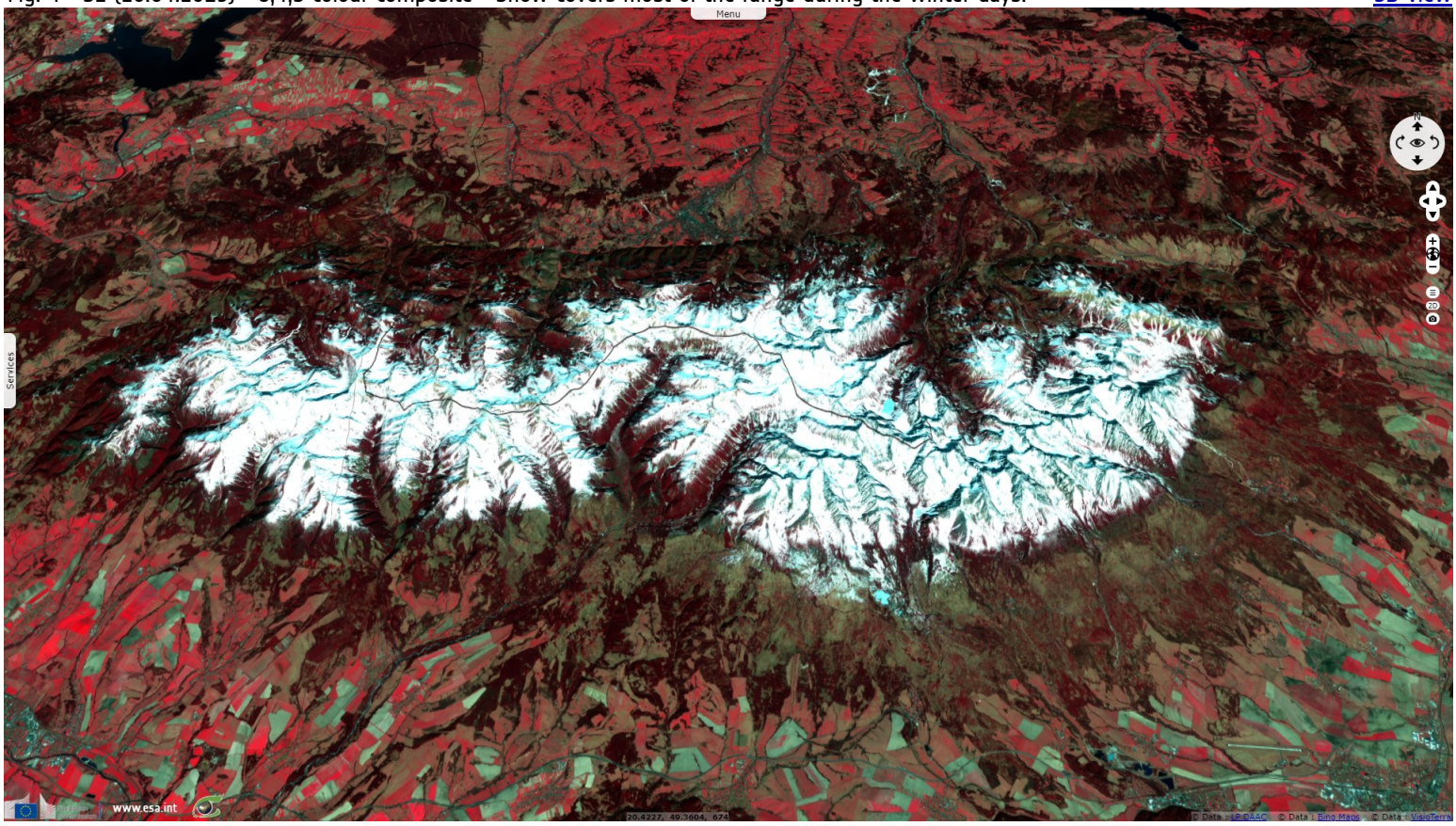
Tatra National Park is a mountainous park located both in Slovakia and in Poland. It includes valleys, meadows and dense forests, as well as caves. There are tenths of mountain lakes, the largest of which are Morskie Oko and Wielki, located in the Five Lakes Valley. The Chocholow Valley meadow is the largest of the Polish Tatras, and is one of the main mountain pastures in the region. Many torrents give rise to waterfalls, including the Wielka Siklawa, literally "the big waterfall", which jumps 70 meters. The TAtra NAtional Park (TANAP, Slovak side) was established in 1949 and is the oldest of the Slovak national parks. The Tatra National Park (TPN, Polish side) was created in 1954, by decision of the Polish Government. Since 1993, TANAP and TPN (Polish side) have together constituted a UNESCO transboundary biosphere reserve.

Fig. 3 - S1 (20.08.2019) - vv,vh,vv colour composite - Focus on the Tatras mountain range. 3D view



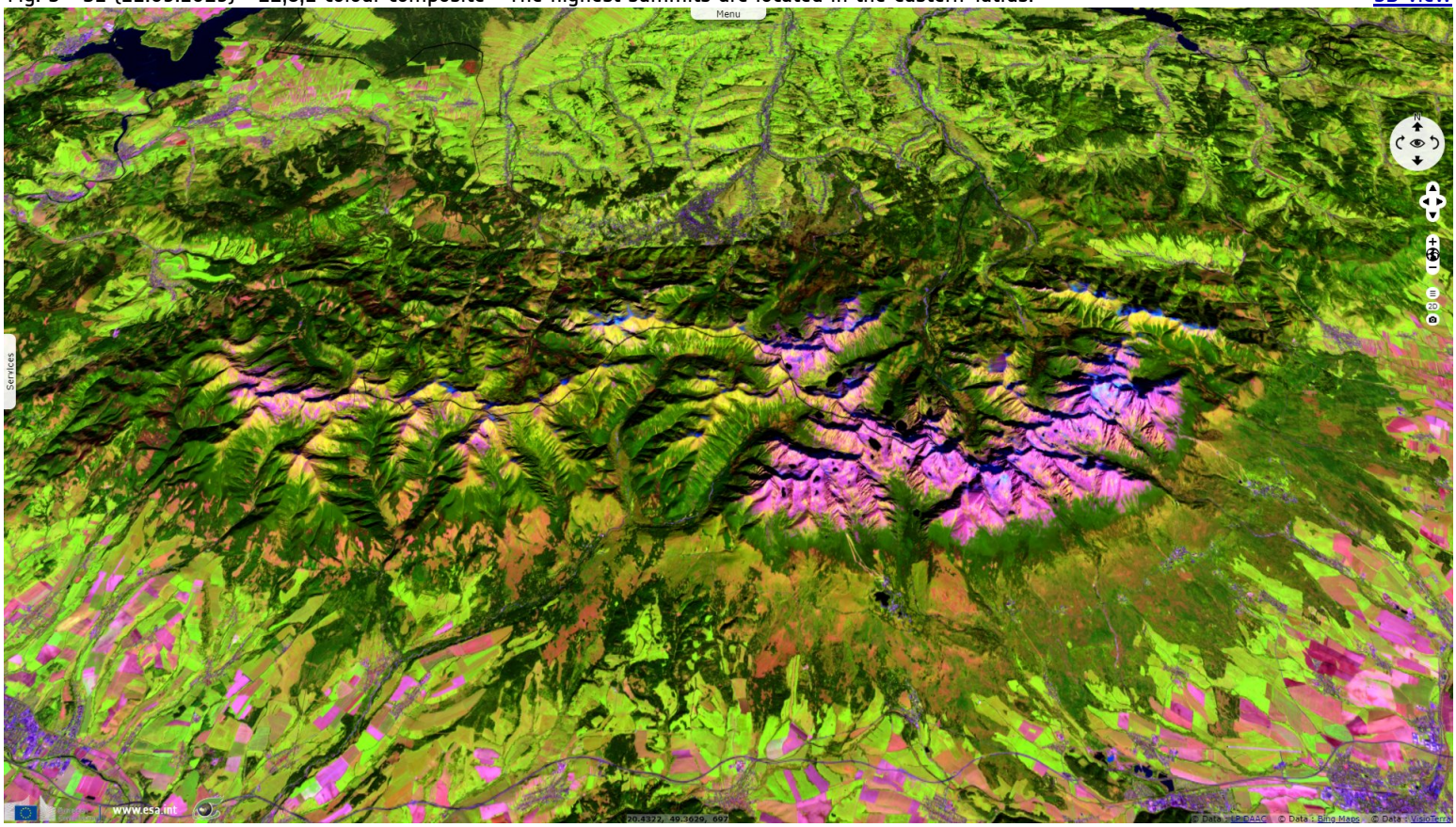
UNESCO describes the Tatra National Park biosphere reserve as follows: "*The Tatra Mountains are the highest mountains in the long Carpathian range, which stretches from Slovakia into Romania via Hungary, Poland and Ukraine. The territory of the biosphere reserve covers two national parks on each side of the political boundary between Poland and Slovakia. A variety of natural features are represented within this transboundary biosphere reserve, including karst topography with dolomites and limestone, canyons and waterfalls, a dwarf pine belt, alpine meadows, lakes and rocky peaks.*"

Fig. 4 - S2 (20.04.2019) - 8,4,3 colour composite - Snow covers most of the range during the winter days. 3D view



The Slovak TANAP Tourist Guide provides additional information regarding the geologic context: "*The Tatra Mountains represent from the geological viewpoint a relatively young mountain range. They ware folded by mountain building movements in the late Tertiary, i.e. 5-20 million years ago. For the sake of comparison, the low Tatras, the Fatra chain, The Ore Mountains of Spis and Gemer originated at the turn of Mezoic and Tertiary (about 65 million years ago). The Tatra Mountain range can be divided into two basic units - The West Tatras and The East Tatras. In the geological composition granites and crystalline schists prevail, especially in the orographic group of the High Tatras - in the East Tatras. In the West Tatras and in the East Tatras, limestones and dolomites prevail. Modelling of the Tatra Mountain surface into a presentday shape is due to triple glaciation in early Quaternary.*"

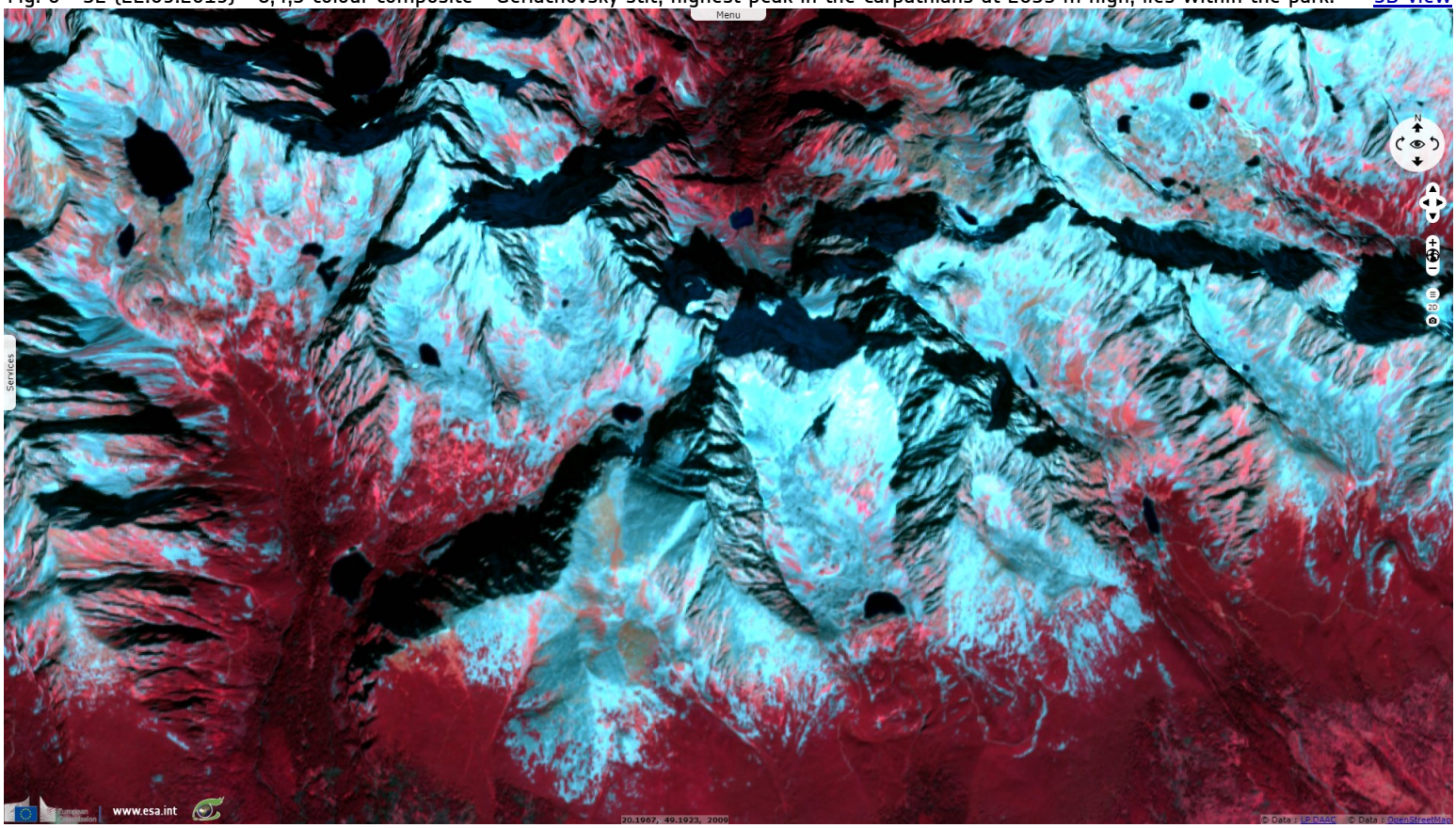
Fig. 5 - S2 (22.09.2019) - 11,8,2 colour composite - The highest summits are located in the eastern Tatras. 3D view



"*In this way originated characteristic relief features of the Tatra Mountains which are represented by peaks, glaciers, kettles (glacial cirques), glacial troughs. From among some tens of glaciers the biggest one was in the valley Bielovodska dolina the total lenght of which was 14 km, the thickness was about 300 m. The glacier recession was accompanied by the formation of moraine drifts and fluvioglacial cones at the Tatra Mountain base. In those times more than 100 mountain lakes originated, the biggest and the deepest being the lake Velke Hincovo pleso (20.08 ha, 53.7 m). The limestone parts of the Tatras are characterized by a frequent occurence of karst phenomena. To them belong karrens, abysses, limestone caves, including the cave Belianska jaskyna in Tatranska Kotlina which was made accessible to the public. A great value of inorganic nature rests mainly on the diversity of a very attractive surface relief being concentrated on relatively small area.*"

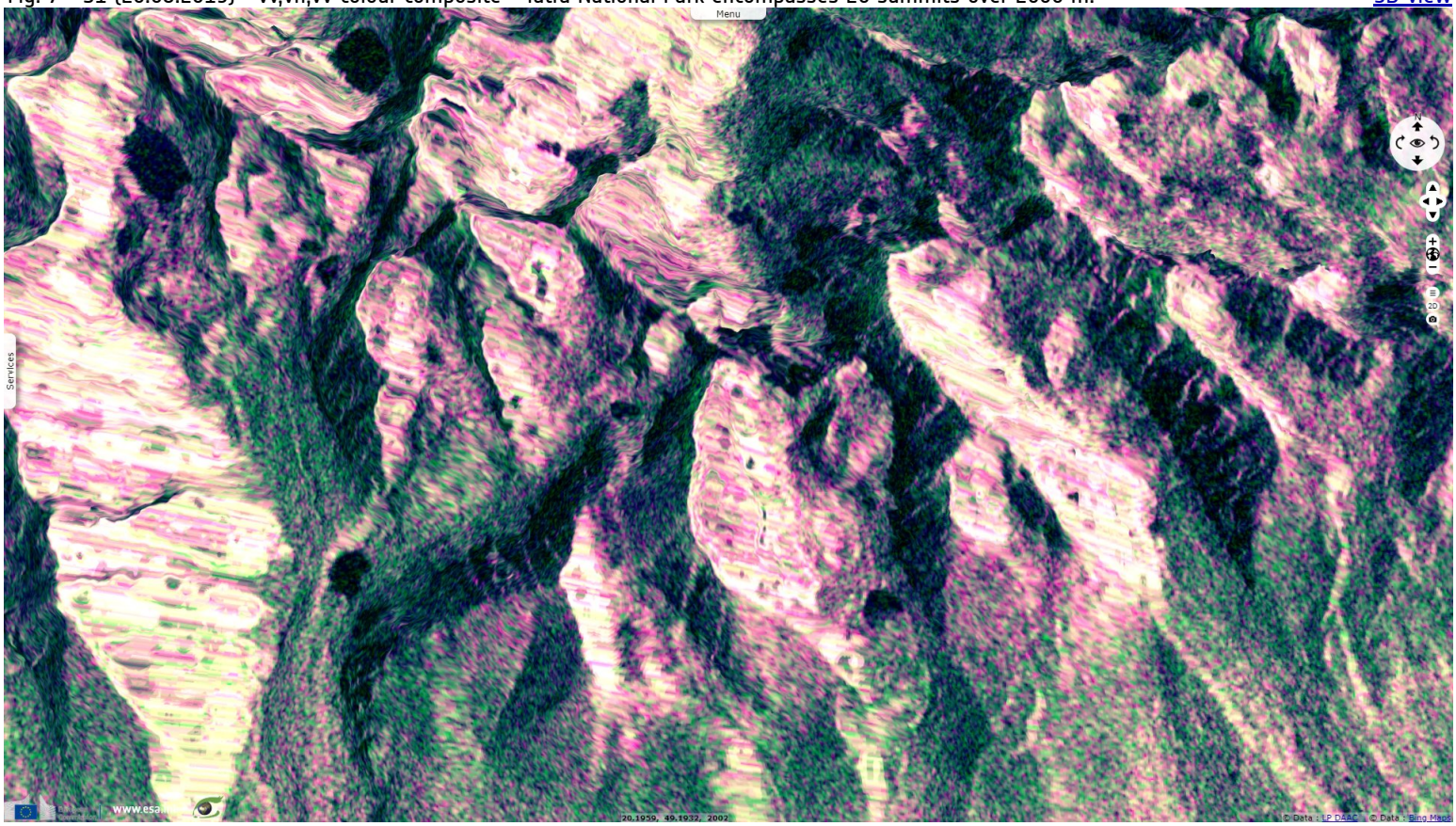
Tatra National Park, Poland - Source.

Fig. 6 - S2 (22.09.2019) - 8,4,3 colour composite - Gerlachovský štít, highest peak in the Carpathians at 2655 m high, lies within the park. 3D view



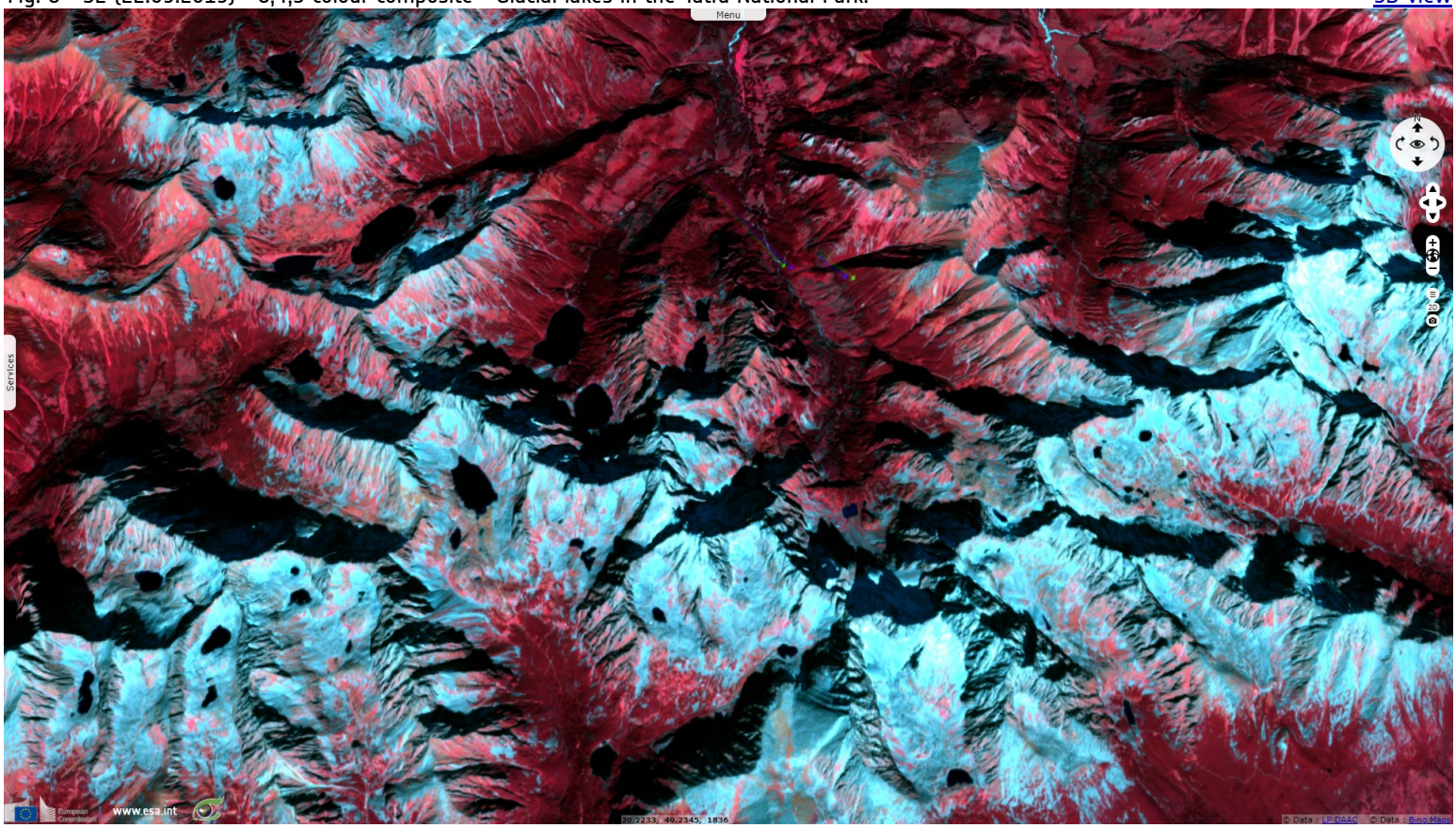
Several climate areas define different biomes in the Tatra National Park as specified by UNESCO: "*The main objective of the reserve is to protect the alpine character of the highest range in the Carpathian Mountain chain. The Tatras cover five climatic zones including plants from lower montane forests, subalpine forests, dwarf mountain pine, alpine grasslands and sub-nival. A variety of natural features are represented within this reserve, such as karst topography with dolomites and limestone, canyons and waterfalls, a dwarf pine belt, alpine meadows, lakes and rocky peaks.*"

Fig. 7 - S1 (20.08.2019) - vv,vh,vv colour composite - Tatra National Park encompasses 20 summits over 2000 m. 3D view



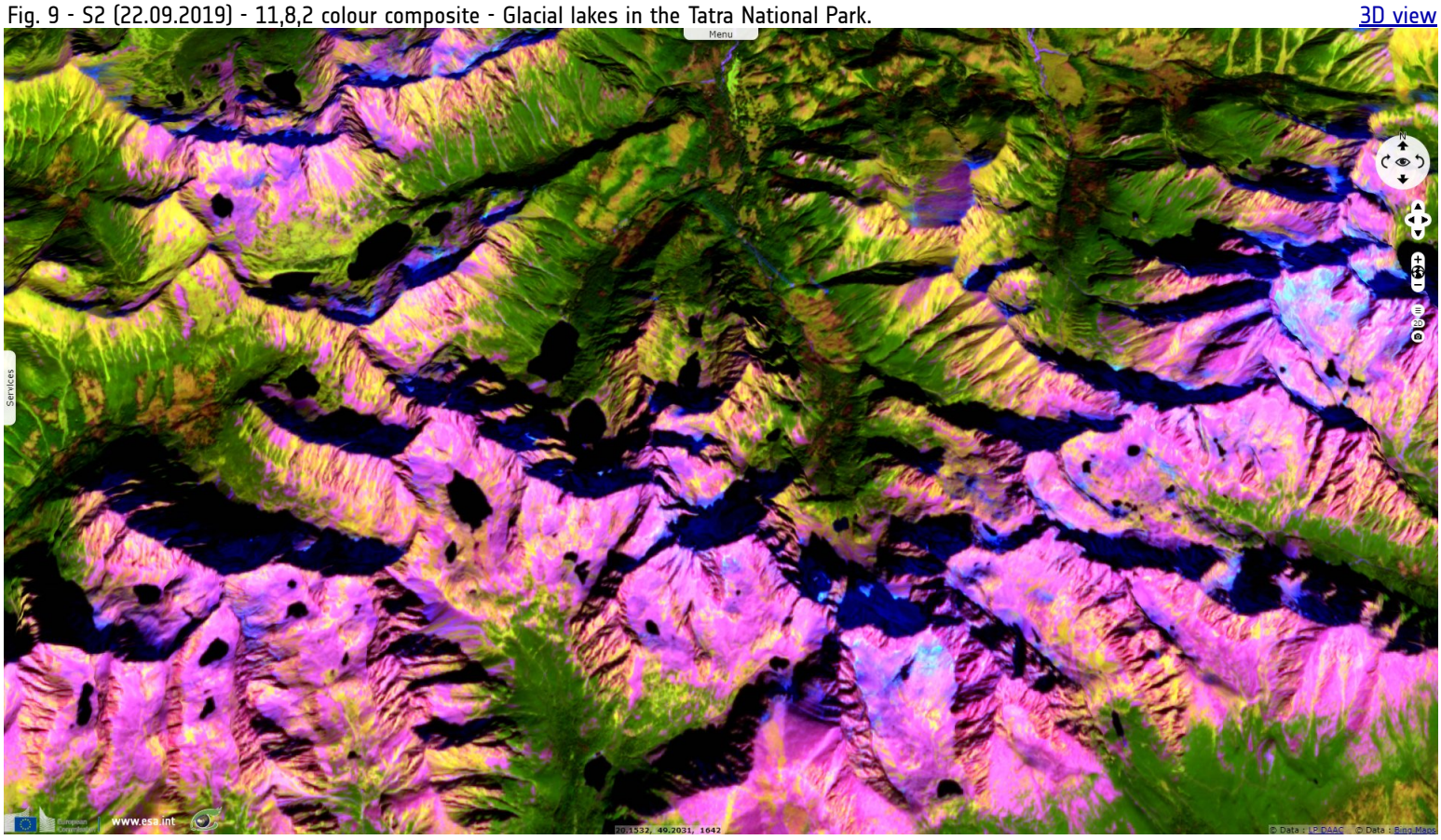
Almost two thirds of the park are covered with forests, mainly with spruce. The most widespread tree is the Norway spruce, followed by the Scots pine, Swiss pine, European larch, and mountain pine. Leafy trees, especially maples, mainly grow in the Belianske Tatras. UNESCO adds that "*Among the nearly 1300 species of plants in the Tatras, the most valuable are 27 endemic and sub-endemic species. There are also numerous relics of Pliocene and glacial flora. Plant species include the European beech, the mountain pine, the highland rush and the Oreochla disticha.*" Notable plants endemic to the Tatras include 27 varieties of orchids, edelweiss, Tatra scurvy-grass, species of the wallflower genus, species of the genus Erigeron, and others. Ice age relicts include glacier crowfoot, species of the genus Dianthus, blue gentians, wild primroses, yellow mountain saxifrage, dwarf willow, net-leaved willow, and others.

Fig. 8 - S2 (22.09.2019) - 8,4,3 colour composite - Glacial lakes in the Tatra National Park. 3D view



TANAP Tourist Guide reminds "*A similar diversity occurs also in animal kingdom. Many animal and plant species are rare, because they are living witnesses of ancient times. They are called relicts because of their Tertiary or Quaternary glacial descent.*" UNESCO complements "*Numerous animal species are found in the reserve, including the largest European predators: the European brown bear, the Eurasian lynx and the European wolf. High-altitude species such as the marmot, the snow vole and the chamois can also be found. Since 2000, the chamois population has increased by almost 850 due to the efforts of the Tatra Chamois Rescue Project.*" Animals are represented by 115 species of birds, 42 mammals, 8 reptiles, 3 amphibians and many invertebratesv including deers, fox, marten, otters, capercaillie, as well as pomarin eagles and hawks. Notable ice age relicts are fairy shrimp, the three-toed woodpecker, ring ouzel, spotted nutcracker and others.

Fig. 9 - S2 (22.09.2019) - 11,8,2 colour composite - Glacial lakes in the Tatra National Park. 3D view



This area of glacial lakes in the Tatra National Park has been declared a Ramsar site. According to its sheet: "*The Site consists of ten separate areas, and includes the small lakes of the High Tatra mountains and their immediate surroundings, together with the Dudowe Stawki ponds and the Siwe Stawki lakes in the Western Tatra mountains. The biggest lakes are Morskie Oko, Wielki Staw and Czarny Staw pod Rysami. The majority of the lakes are situated in depressions created by erosion and in areas of glacial accumulation; however the lakes in the Gąsienicowa valley are the result of karst genesis. The marshy lake banks and the adjoining peat areas provide habitats for some notable vascular plants.*"

Fig. 10 - S1 (20.08.2019) - vv,vh,vv colour composite - Glacial lakes in the Tatra National Park. 3D view

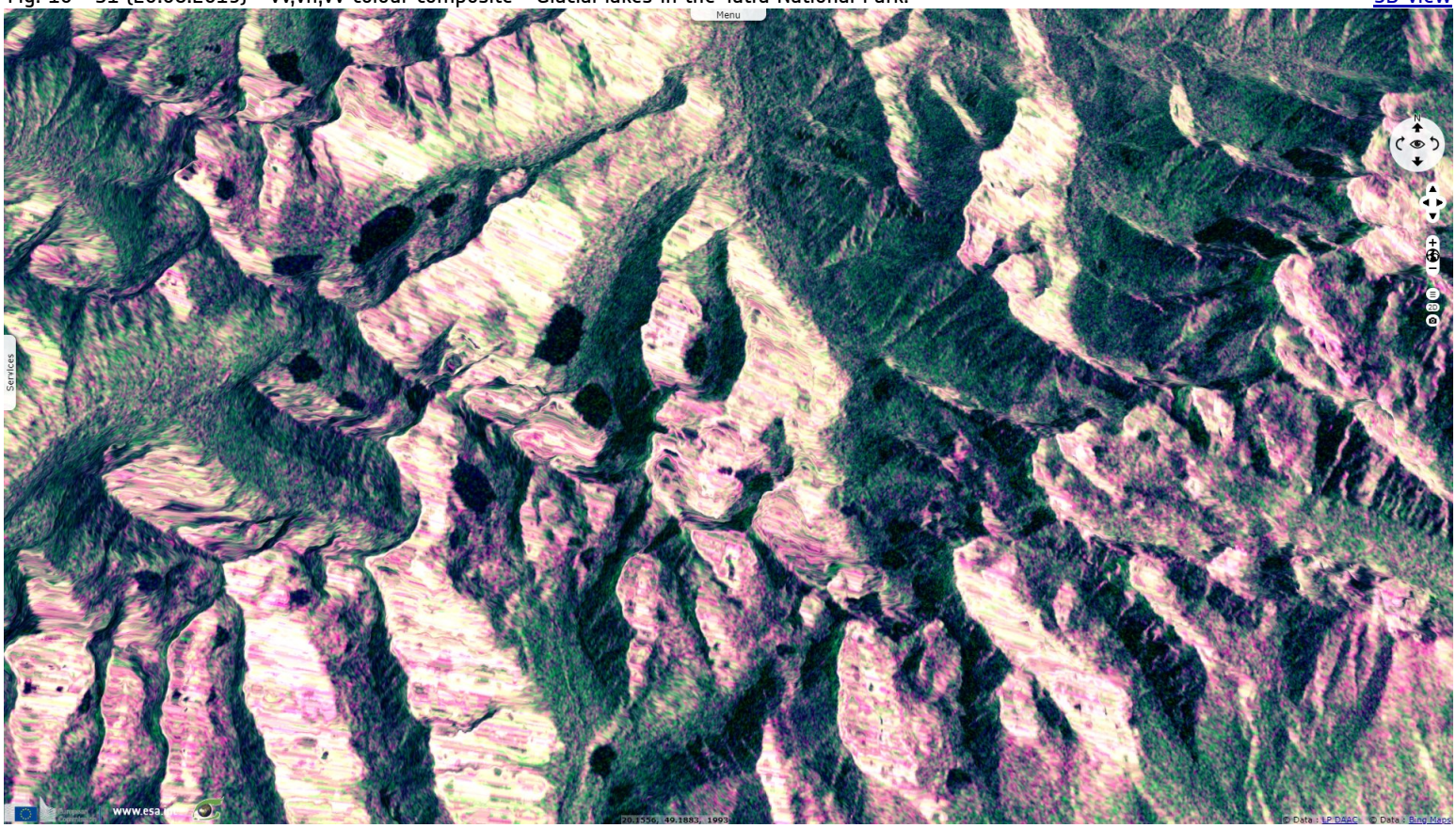
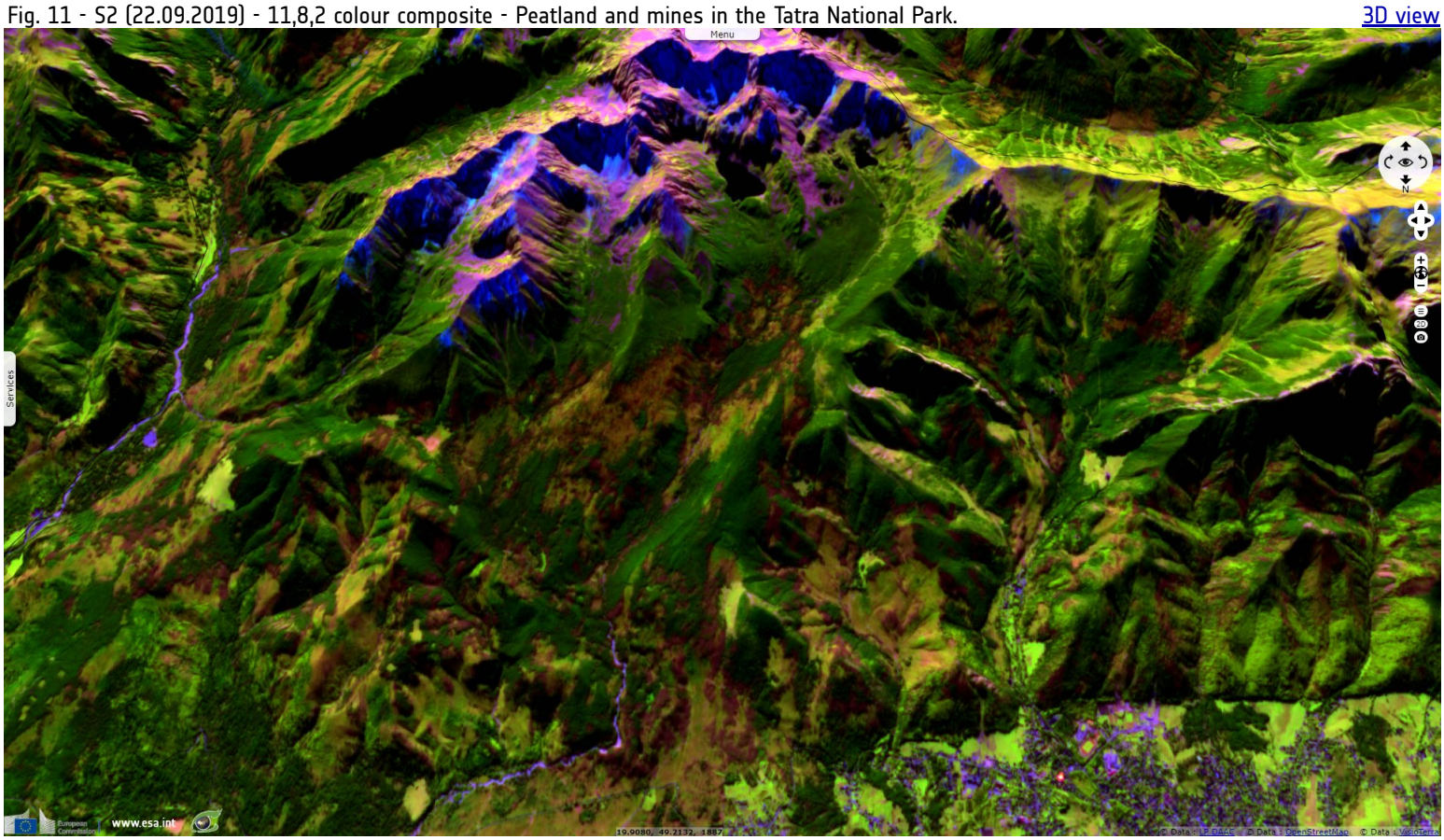


Fig. 11 - S2 (22.09.2019) - 11,8,2 colour composite - Peatland and mines in the Tatra National Park. 3D view



On the northern face, there are several peatlands which constitute a Ramsar conservation area, the peat bogs in the Tatra National Park. It is described as follows: "*The Site consists of four separate areas representing diverse types of mountain wetlands of European importance, and almost all typical Carpathian wetland types such as mountain raised bogs, transition mires and quaking bogs, small dystrophic lakes and Bazzanio-Piceetum spruce forest. It comprises wetlands in the High Tatra and in the Western Tatra mountains, and a bigger forest area in the Pańszczyca and Sucha Woda valleys. There are transitional mires in the marginal zones of small mountain raised bogs and acid fens among montane belt grasslands and in upper montane spruce forests. Some of the peatlands were born of vegetation succession in water bodies. The valuable wetlands occur mainly in the depressions on acid and poor habitats and they are supplied by rainfall.*"

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