The rocks from the mine

The black gold of the Resartico has a tropical origin. It is difficult to imagine, but Resiutta and the Julian Prealps were once a **placid coral lagoon**, or rather their rocks were, and pushed here by forces originating from within the Earth itself.

In fact. the Earth's crust is fragmented into **plates** that, like rafts at the mercy of the sea, move on a semi-fluid mantle. During the **Triassic period** (200 million years ago) the drifting **African** and **Eurasian continental** "rafts" opened up, forming a large basin, called the **Tethys**. In this sea, the rocks were deposited that would later give rise to the Alps.

At that time, south of the Tethys Sea, a large lagoon formed, separated from the open sea by a coral reef. In that lagoon, characterised by warm, shallow waters and rich in life, carbonate sediments and remains of living organisms were deposited.

The sea advanced and retreated several times, often changing the conditions of sedimentation, so that the deposits were transformed into different rocks, such as dolomites, shales and limestones.

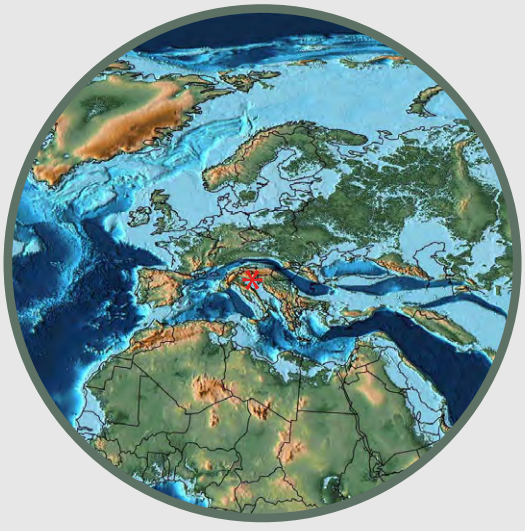
The **organic laminites** of the Rio Resartico date back to this period.

In the era following, the **Cenozoic**, the African and European plates moved closer together again and, once the basin that separated them had closed, they collided. As a result of the collision, their edges overlapped and overlay one another, giving rise to the **Alpine Orogeny**.

50 million years ago, the Julian Prealps emerged from the sea. The layers of **sediment**, accumulated on the seabed over millions of years, were **folded** and **fractured** during the uplift, giving the Resartico laminations their characteristic wavy pattern.

✳ Position of the Resartico area during the Late Triassic (120 million years ago).

✳ Position of the Resartico area during the Alpine Orogeny (starting 50 million years ago).



Reconstruction of the Triassic depositional environment.

The rocks from the mine

Main Dolomite

A double carbonate of calcium and magnesium

Origin: 215-205 million years ago (Norian, Triassic)

Depositional environment: tidal flats with cycles of emergence and immersion in shallow water, with high temperatures and an arid climate.

On **Monte Plauris** the Main Dolomite has a thickness of about 1,000 metres, while the entire Rio Resartico valley is cut into it. This is a **stratified rock**, **white and grey in colour**. It derives from sediments of an originally calcareous nature, which, over millions of years, gave up part of their calcium to become enriched with the **magnesium** contained in the **sea water**.

In some layers, millimetric laminations of algal carpets (**Stromatolites**) are visible, which testify to the phases of rising and falling of the sea. In other levels, fossils of molluscs (**Megalodon**) appear, characterised by their thick aragonite shells with a typical heart-shaped section. Of these invertebrates, only the internal cast has been preserved, with the cavities being filled by sediments that were then transformed into rock.

Within the Main Dolomite lies a rock horizon known as the Rio Resartico **bituminous shale**, as it is known in the literature and is referred to as the "**Rio Resartico organic laminite-bound layer**".

Outcrop of Main Dolomite near the mine.

Megalodon, fossil molluscs within the Main Dolomite.

Overall view of the area around the mine.

The rocks from the mine

Bituminous shales

Organic laminites rich in hydrocarbons

Origin: 210 million years ago (Norian, Triassic)

Depositional environment: small, asphyxiated lagoon basins, enclosed within the continental shelf, with a tropical climate.

Bitumen shales are decimetric **layers of dark, clayey dolomites**, rich in **organic matter**. They are found in intercalations up to 114 metres thick, about two-thirds of the way up from the base of the banks of Main Dolomite. They were formed on the bottom of a **lagoon basin**, isolated within the shelf by algal barriers, similar to current coral reefs.

In these dark, unmixed and asphyxiated waters, the **low oxygen circulation** prevented the development of organisms that populate the seabed. The organic remains were therefore able to settle without being destroyed, making the rock layers very **rich in organic matte**r. The laminites of the Rio Resartico have an **organic carbon content of up to 45%**, transformed over time into hydrocarbons. Remains of fossil fish can also be identified.

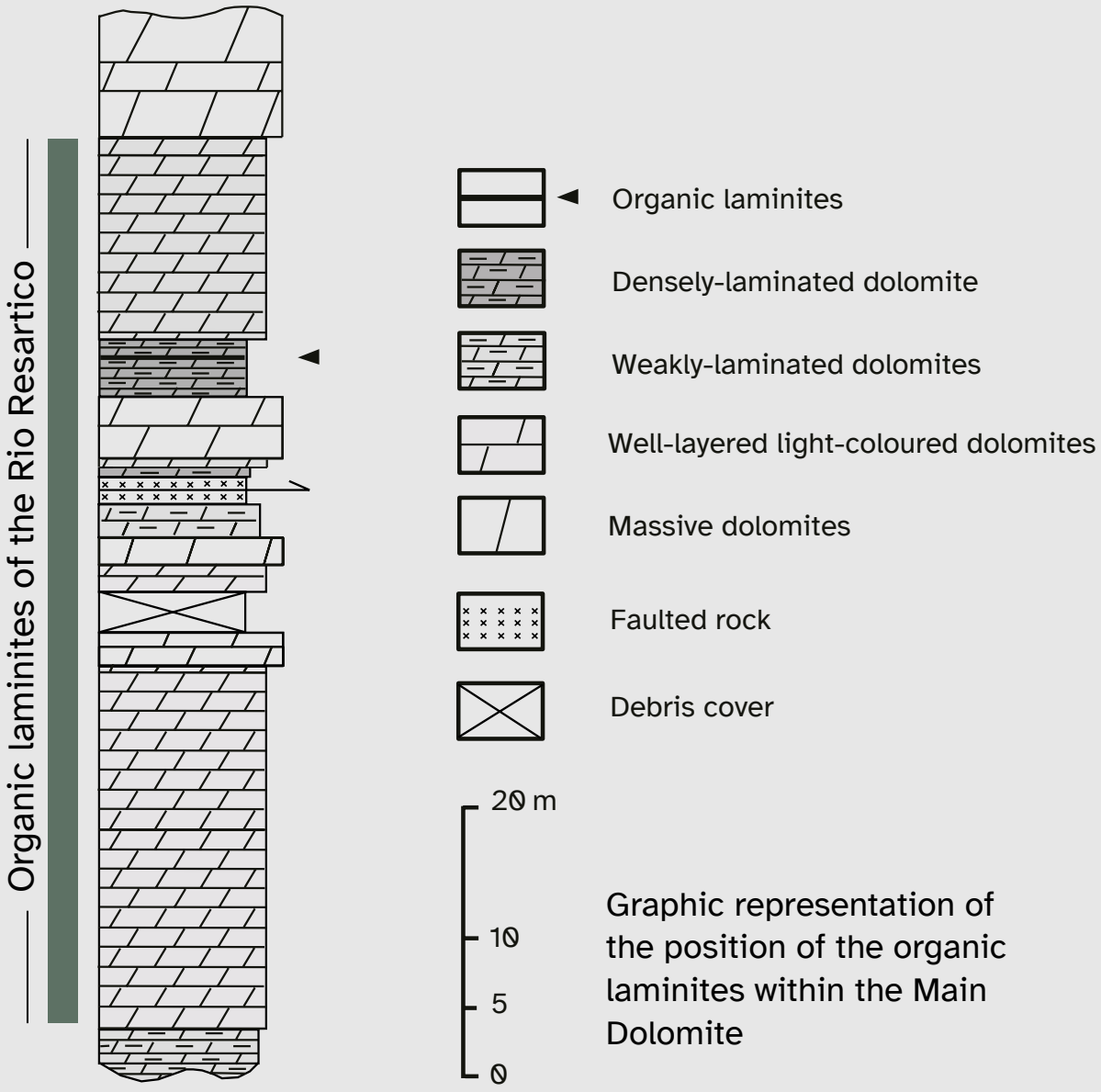
The **oil industry has been interested** in the bituminous layers for several years. This interest is purely exploratory, aimed at characterizing source rocks, which potentially generate hydrocarbons, whether liquid (oil) or gaseous (methane and other gases). These studies are conducted to analyse their characteristics and develop models useful **in the search for oil or gas** in other areas, such as **beneath the Friulian Plain**, where they may still be trapped.

Layer of organic laminites subject to mining exploitation.

Layer of organic laminites subject to mining exploitation.

Outcrop of a layer of bituminous schists.

The rocks from the mine



Graphic representation of the position of the organic laminites within the Main Dolomite