INFOMAR Integrated Mapping for the Sustainable Development of Ireland's Marine Resource

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Marine Geoscience Report 013

The Skelligs

Overview

Off the coast of the Iveragh Peninsula in south-west Ireland, the Skellig Islands rise dramatically from the Atlantic Ocean. Comprising Skellig Michael, also known as Great Skellig, and Little Skellig, they are steep, rocky outcrops located about 12 km south-west of the mainland. The name Skellig derives from the Old Irish word *sceillec*, meaning a steep rock or crag (Bourke, et al., 2011). The two islands cover a total area of about 0.3 km², with Skellig Michael reaching a height of 218 m and Little Skellig standing at 134 m above sea level.

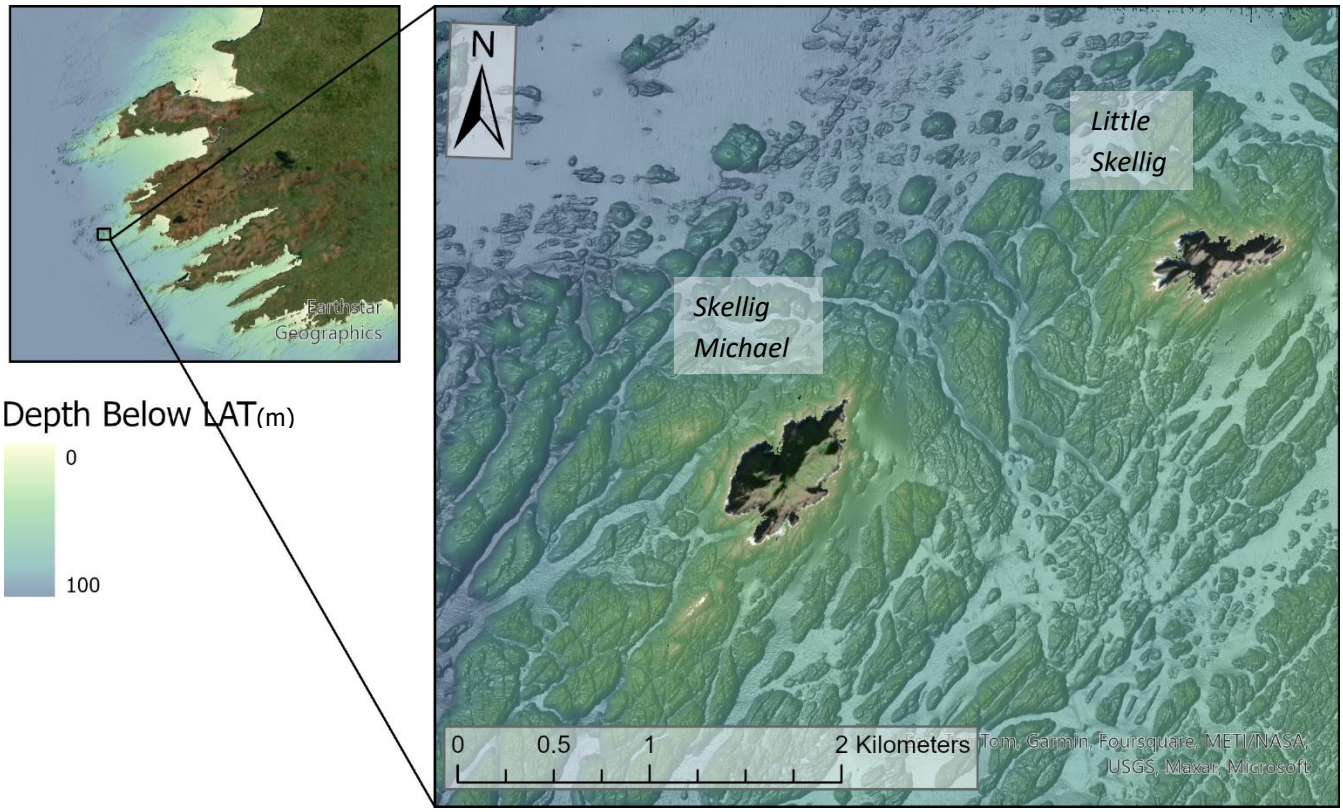

Figure 1: Overview of bathymetry around the Skellig Islands. Depths are referenced to Lowest Astronomical Tide (LAT).

A notable geological feature of Skellig Michael is its twin peaks, separated by a deep U-shaped valley known as Christ's Saddle (UNESCO World Heritage Convention, 1996). This landform reflects faulting and folding within Devonian sandstone, which helped shape the island's present topography.

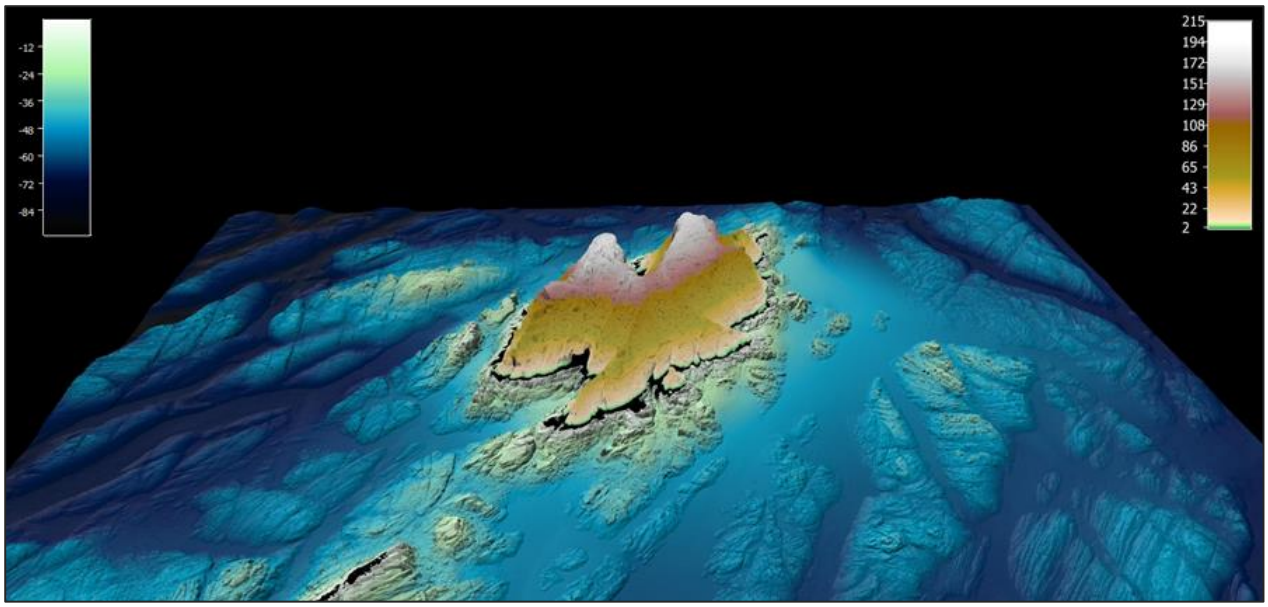

Figure 2: 3D Imagery with LiDAR data (legend inset on the right) and INFOMAR bathymetry data (legend inset on the left). Units are in metres.

INFOMAR bathymetry data show that the Skellig Islands lie on the north-west corner of a submerged bedrock platform, extending from the Iveragh Peninsula (Meere, et al., 2019). The surrounding seabed includes submerged ridges and fault-controlled troughs shaped by tectonic deformation and later sedimentary processes. The islands are also well known for their rich biodiversity, their importance as seabird breeding sites and their historical significance.

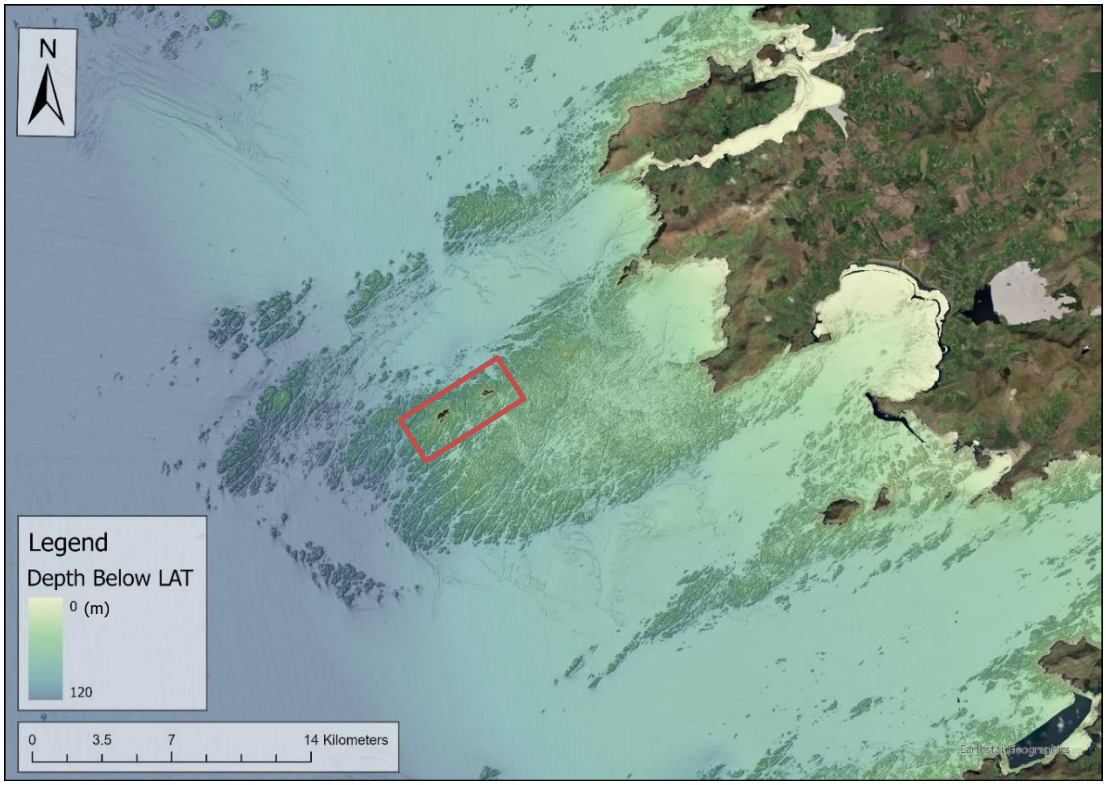

Figure 3: Regional bathymetry showing the extent of the rock platform, with the location of the Skelligs indicated by the red rectangle.

History

Skellig Michael is a UNESCO World Heritage Site, recognised for its well-preserved early Christian monastic settlement, which is considered an outstanding example of religious isolation and resilience in an extreme environment (UNESCO World Heritage Convention, 1996). The monastery, attributed to St. Fionán, was founded sometime between the 6th and 8th centuries (Bourke, et al., 2011).

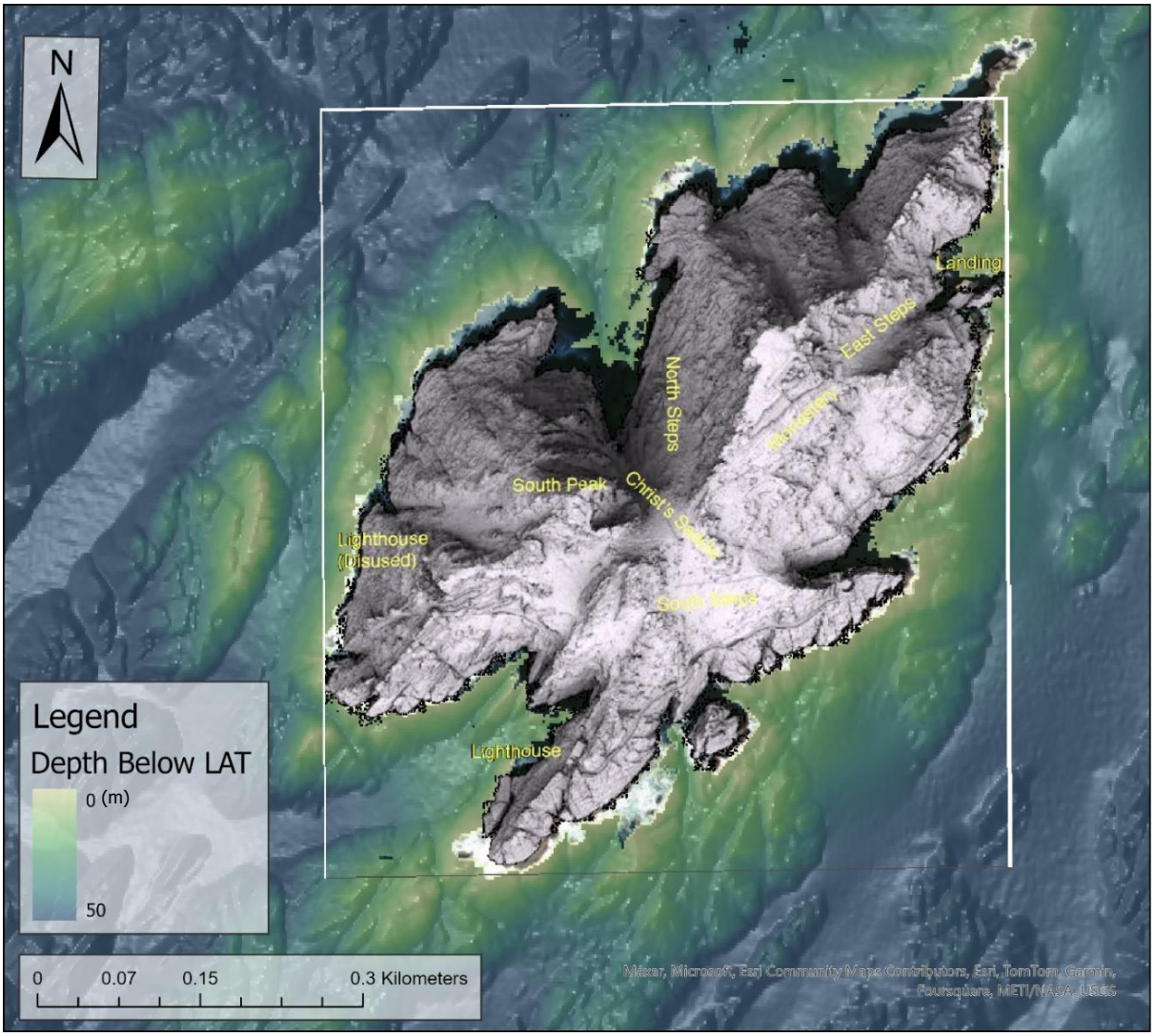

Figure 4: Bathymetry of Skellig Michael with labelled terrestrial LiDAR data from (Bourke, et al., 2011).

The monks lived in beehive-shaped stone huts, constructed on narrow, terraced ledges. These were supported by substantial dry-stone retaining walls that created habitable space on the island's steep slopes. The settlement remained active for 600 years, with the monks leaving in the 13th century (Bourke, et al., 2011).

Beyond its Christian heritage, there are legendary accounts suggesting that Skellig Michael may have had spiritual significance in pre-Christian times, possibly dating back to pagan Ireland (Devane, 2014). Aside from the construction of a lighthouse in the 1820s, the island has remained largely untouched by modern development (UNESCO World Heritage Convention, 1996).

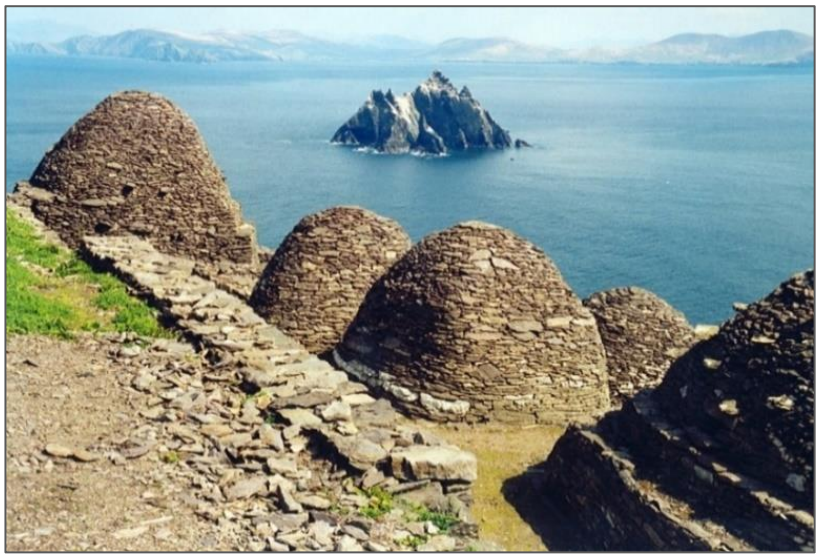

Figure 5: Beehive huts on Skellig Michael, with Little Skellig in the background, looking to the north-east. Image from (Zwegers, 2000).

Geology of the Skelligs

The Skellig Islands are among the most westerly exposures of Devonian Old Red Sandstone (ORS) in Europe. These rocks were deposited between about 374 and 360 Ma within the Munster Basin (Bourke, et al., 2011). At that time, Ireland lay in the southern hemisphere at subtropical latitudes on the southern margin of the continent of Laurussia. The Munster Basin was a major extensional sedimentary basin, where sedimentation began in the mid-Devonian and continued into the late Devonian. It contains one of the thickest non-marine Devonian sedimentary sequences in Europe, exceeding 6 km of sedimentary deposits (Sleeman, et al., 2004).

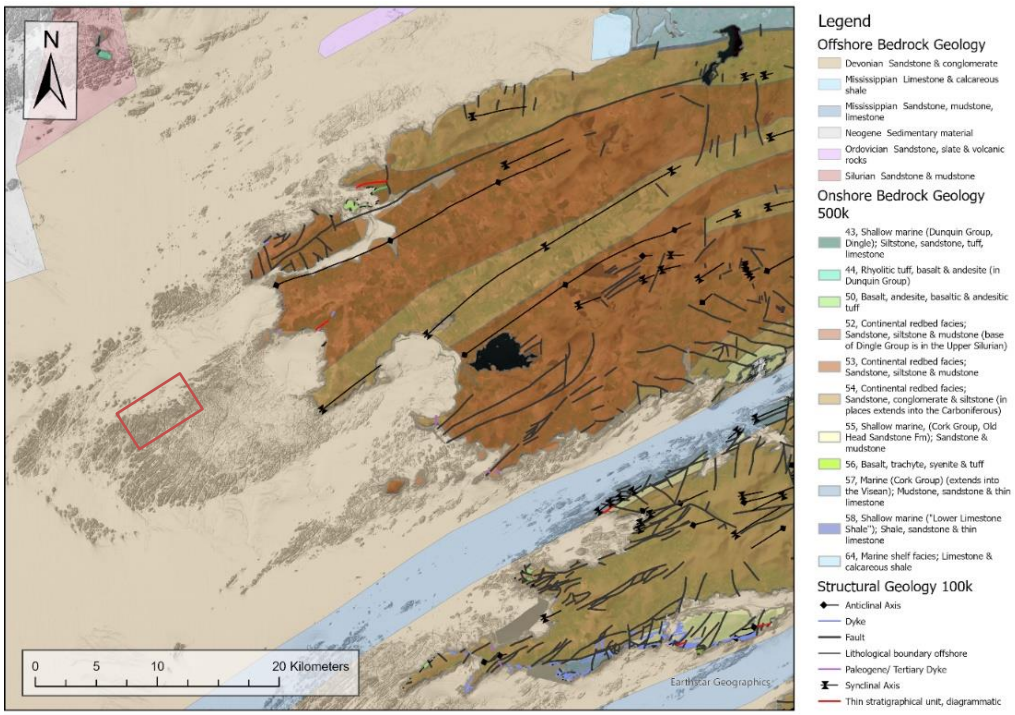

Figure 6: Geology of the Iveragh Peninsula, with the location of the Skelligs indicated by the red rectangle.

These sandstones were deposited in a hot, semi-arid climate, with flash floods eroding material from uplands to the north and transporting it into the basin through alluvial fans and river systems. On Skellig Michael, the ORS is dominated by fine-grained sandstone interbedded with siltstone, typical of sheet-flood and fluvial environments. Veins of white quartz are also recorded on the islands. These formed when silica-rich fluids moved through fractures in the rock and later cooled and crystallised. The Skellig succession correlates with the St Fionán's Sandstone Formation on the mainland within the Iveragh Group of south-west Kerry (Meere, et al., 2025).

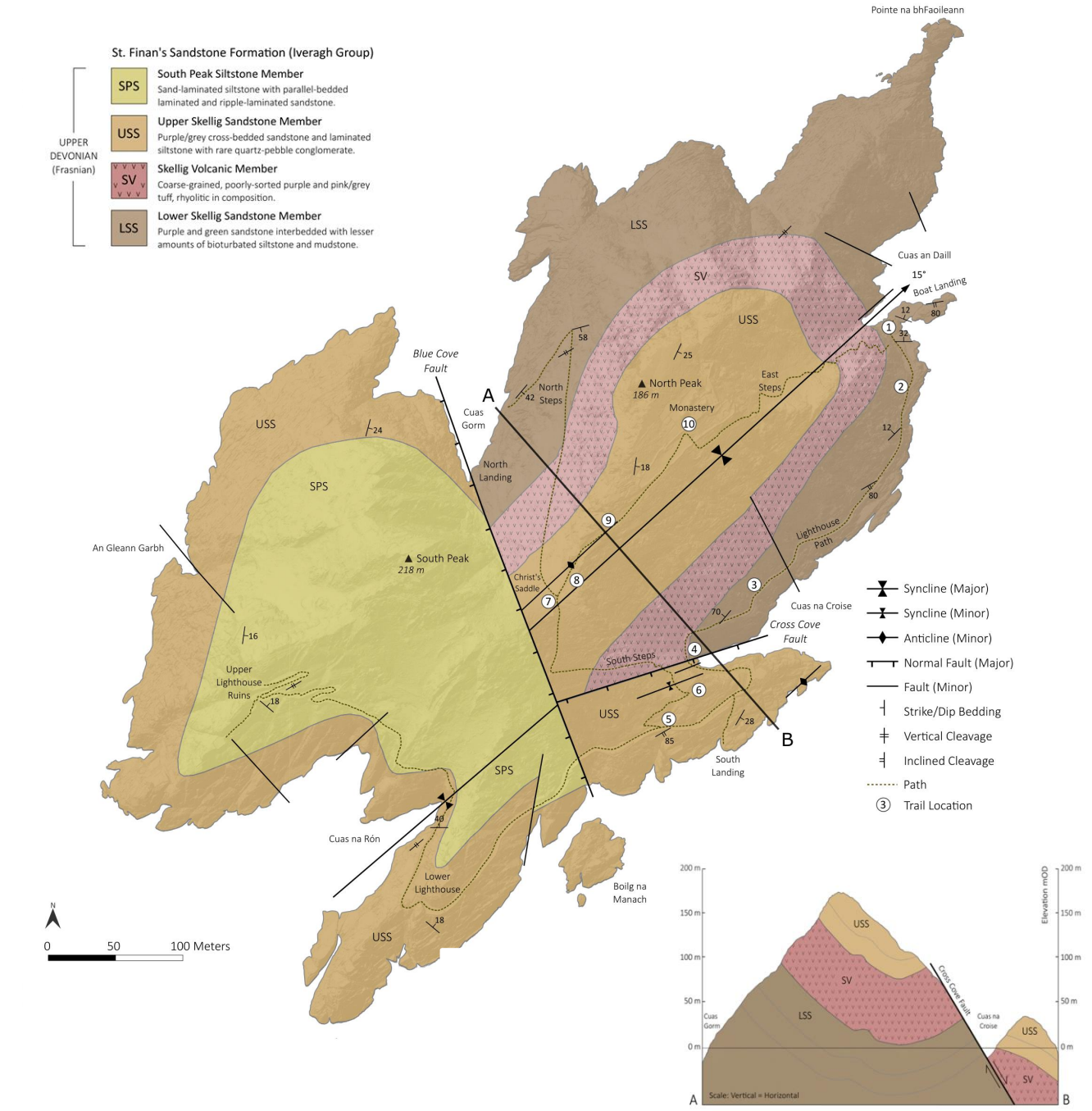

Figure 7: Geology of Skellig Michael, with cross-section inset. Image from (Meere, et al., 2025).

During the Variscan Orogeny, a continental collision and mountain-building event around 300 Ma, the Devonian rocks of the Skelligs were deformed by compression from the south. The main structural feature on Skellig Michael is a large open syncline, a downward fold in rock layers, with a fold axis plunging gently to the north-east. This structure is associated with fractures, faults and a strong cleavage fabric, a planar structure in the rock produced by compression during the Variscan event (Meere, et al., 2025).

Two main fault sets are present, trending south-west to north-east and north-north-west to south-south-east. These fracture patterns, which are visible in the bathymetric data, suggest a multi-phase deformation history (Meere, et al., 2025). The first phase involved folding, followed by the formation of south-west to north-east trending faults, which were later displaced by north-north-west to south-south-east faults. A major north-north-west to south-south-east trending fault, the Blue Cove Fault, is responsible for the formation of Christ's Saddle, the distinctive U-shaped valley that separates the island's twin peaks. This faulting places contrasting lithologies on either side of the saddle and explains its preferential erosion.

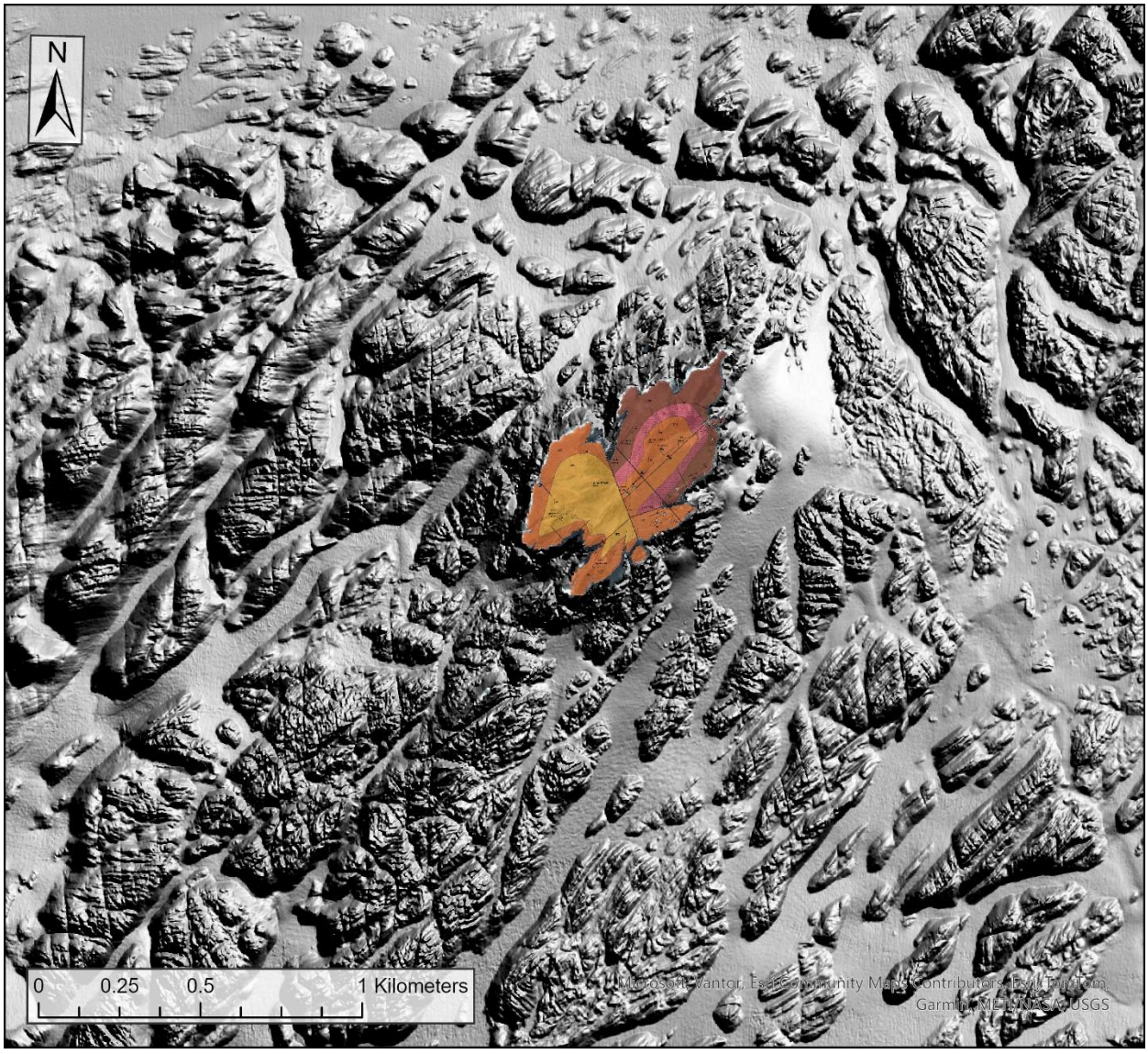

Figure 8: Geology map of Great Skellig, from (Meere, et al., 2025), with shaded relief bathymetry.

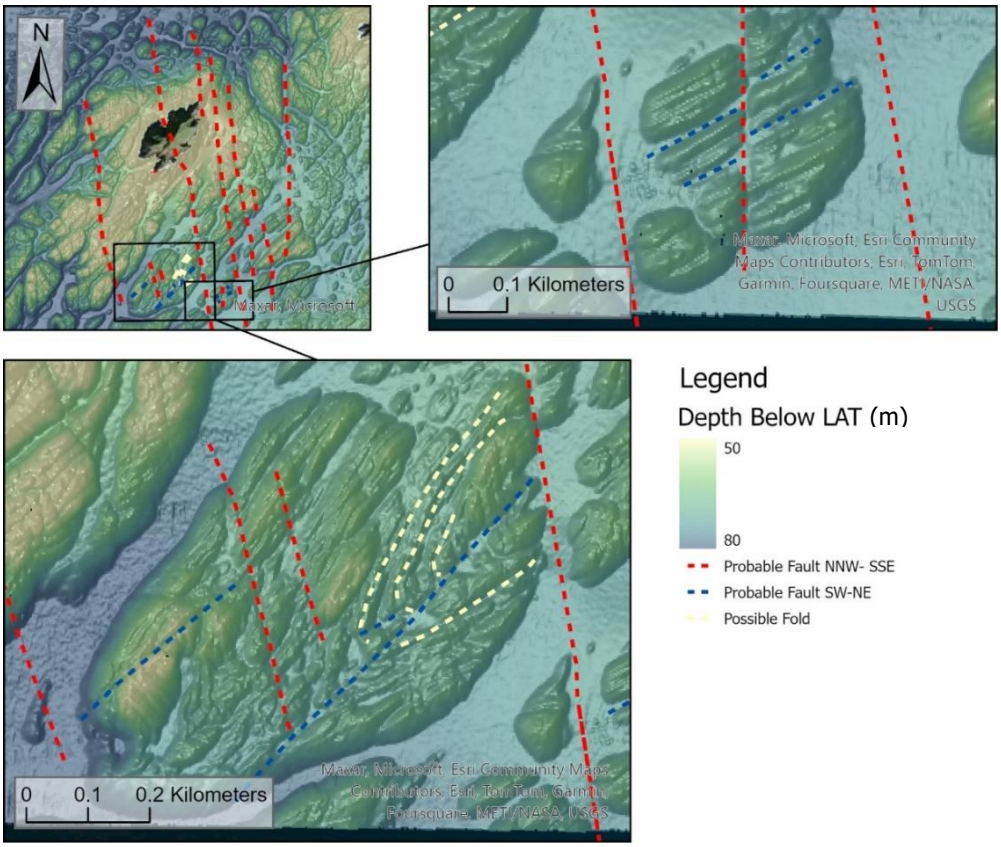

Figure 9: Bathymetry south of Skellig Michael, showing folds and offset faults.

The bathymetry around the Skelligs shows a complex submarine landscape, shaped by tectonic deformation, sediment transport, and coastal erosion. The shallow submarine platform extending from the Iveragh Peninsula includes fault-controlled ridges and troughs that mirror the structural patterns observed on the islands. Rockfall deposits are visible in the troughs, suggesting ongoing coastal erosion and mass-wasting processes.

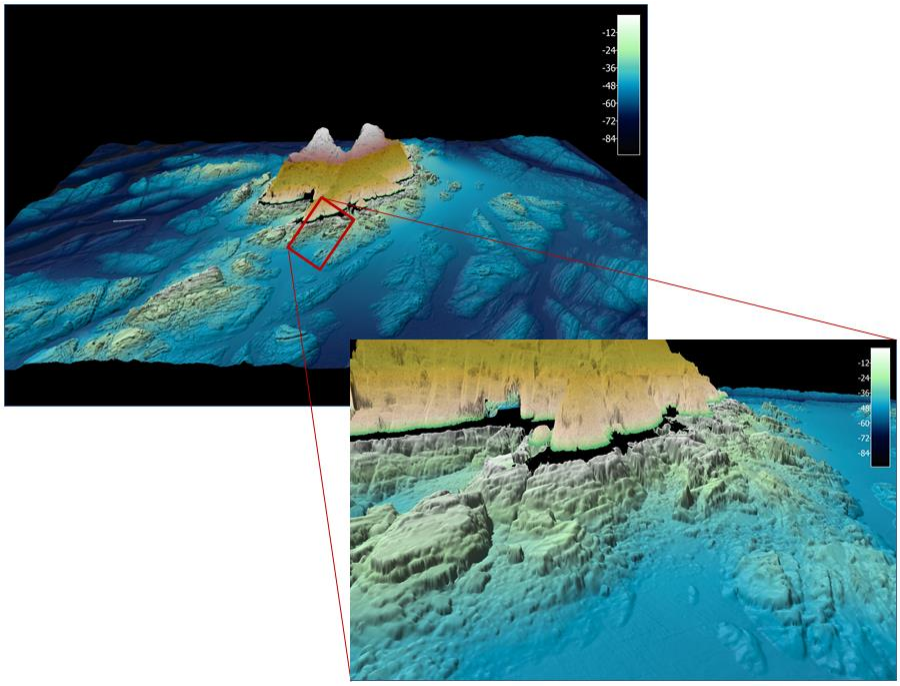

Figure 10: 3D bathymetry showing rockfall in the trough.

Sandwave fields have been identified within these troughs, with individual sandwaves reaching heights of up to 50 cm. These features indicate active sediment transport driven by tidal currents and storm waves.

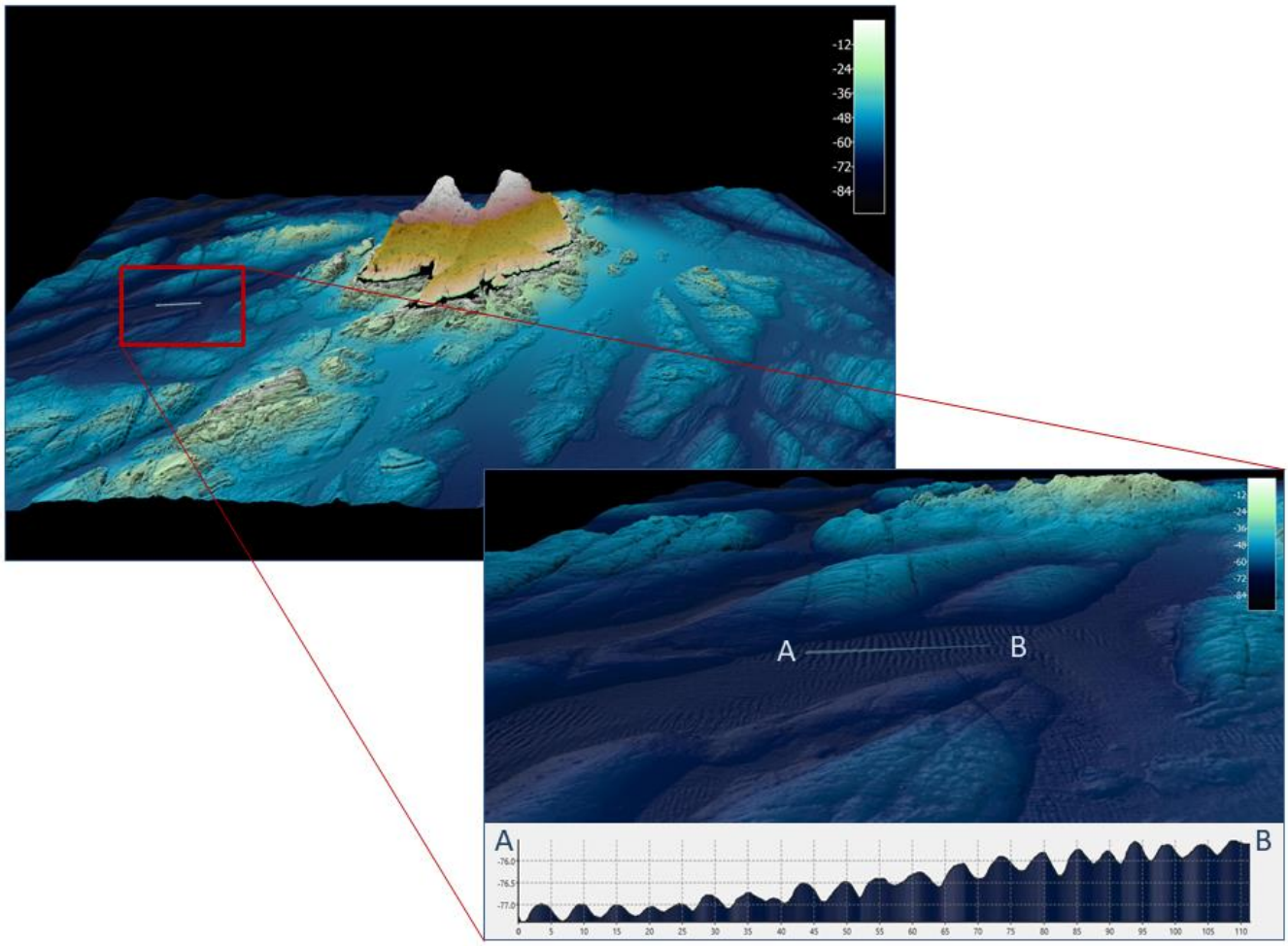

Figure 11: 3D Bathymetry with elevation profile of symmetrical sandwaves.

Biodiversity

The Skellig Islands are internationally recognised for their importance as seabird breeding sites. The islands are designated as a Special Protection Area (SPA) under the EU Birds Directive (National Parks & Wildlife Service, 2015) and an Important Bird Area (IBA) by BirdLife International (BirdLife International, 2009).

Both Skellig Michael and Little Skellig support large colonies of species such as the northern fulmar, Manx shearwater, black-legged kittiwake, and Atlantic puffin (Loughran, 2023). Little Skellig is particularly notable for supporting one of the largest northern gannet colonies in the world, with nearly 30,000 pairs recorded (BirdLife International, 2009). The islands' steep cliffs and isolated location provide seabirds with a safe nesting environment, largely free from most land predators.

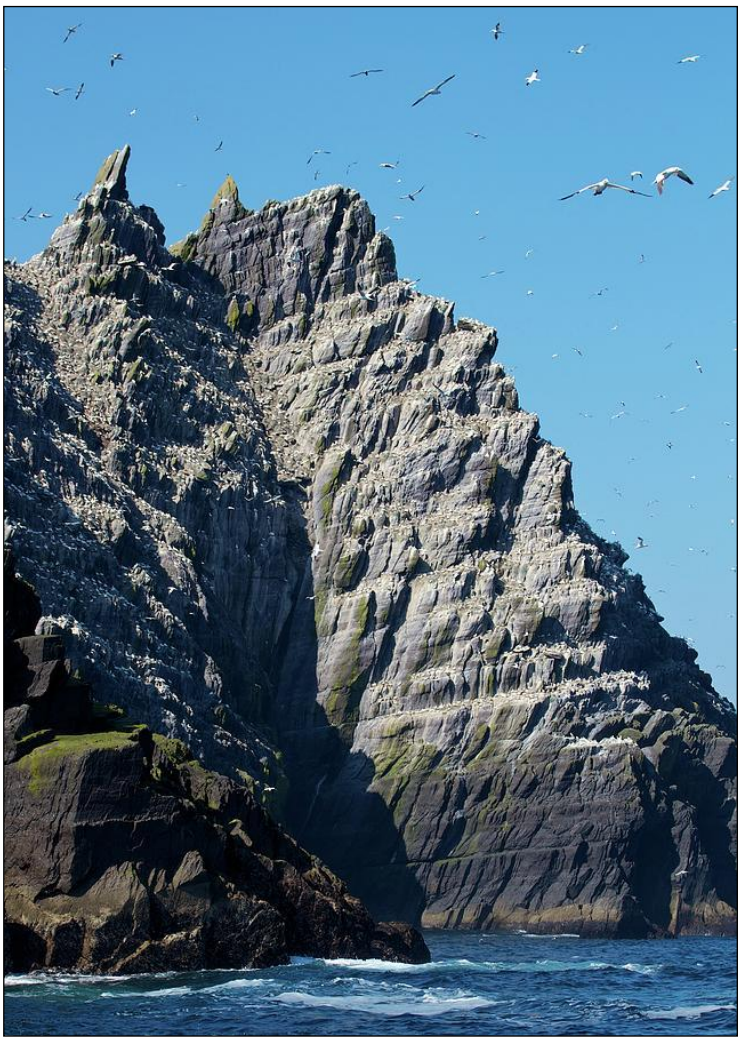

Figure 12: Gannetries on Little Skellig. Image from (McCabe, n.d.).

Little Skellig is largely unvegetated, as its sheer rock faces and exposed setting limit plant growth. In contrast, Great Skellig supports a sparse maritime flora, with vegetation surviving in shallow soils on the less exposed slopes and terraces (National Parks & Wildlife Service, 2015).

Conclusion

The Skellig Islands are geologically, ecologically and historically significant features off Ireland's south-west coast. They preserve a record of Devonian sedimentation, Variscan deformation and post-glacial coastal processes, providing insight into the geological development of the south-west Irish coast. This tectonic history is expressed in prominent joint sets, cleavage planes, folds and faults, many of which are aligned with regional structural trends.

The surrounding seafloor, with its fault-controlled ridges, rockfall deposits and sandwaves, reflects the ongoing influence of Atlantic wave action, tidal currents and sediment transport. The steep cliffs and rugged terrain, shaped by the underlying sandstone formations, also provide important habitat for seabird colonies, making the islands a key conservation area. Skellig Michael's early Christian monastery adds further cultural importance, linking the islands' physical landscape with a long history of settlement, isolation and resilience.

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