SPOTLIGHT 5 | Great Meteor Seamount

30°00.00'N, 28°30.00'W

By Christian Mohn

Great Meteor Seamount is one of the largest seamounts in the Atlantic Ocean, rising from 4200-m depth at the seafloor to 270-m depth beneath the sea surface (Figure 1). Its elliptical plateau encompasses an area of 1500 km^2, roughly matching the size of the Spanish island of Gran Canaria. There is a long tradition of multidisciplinary research at Great Meteor Seamount, dating back to 1967. It has become one of the best-studied seamounts globally, with research aimed at better understanding the connections between oceanic motion around seamount structures and biological distribution patterns. Meincke (1971) was the first to identify a circulation system in the form of an anticyclonic vortex trapped atop Great Meteor Seamount, with the potential to accumulate mesopelagic zooplankton, micronekton, and even fish species with weak swimming capabilities. Later studies revealed a more complex flow spectrum at the seamount (Figure 2), dominated by tidal and internal tidal motions (e.g., van Haren, 2005) and a high level of spatial and temporal variability (e.g., Mouriño et al., 2001). These findings, together with similar studies at other seamounts (see Lavelle and Mohn, 2010, for an overview), indicate that seamounts play a role in ocean biology far beyond the classical view of particle retention inside stationary and closed circulation cells.

Despite the geographic isolation and poor nutritional conditions of the North Atlantic subtropical gyre, the fauna around and at Great Meteor Seamount hosts a rich and diverse species composition. Prominent megafaunal taxa include sponges, corals, and sea urchins. A total of 53 fish species are known from Great Meteor Seamount, with seamount slope dwellers forming the largest ecological group. Seventeen of the 45 fish species collected by Uiblein et al. (1999) on the R/V *Meteor* cruise M42/3 in September 1998 had never before been recorded for the Great Meteor Seamount area. A biogeographic comparison with other oceanic regions reveals only a low level of endemism within the seamount fish fauna. In fact, only one species,

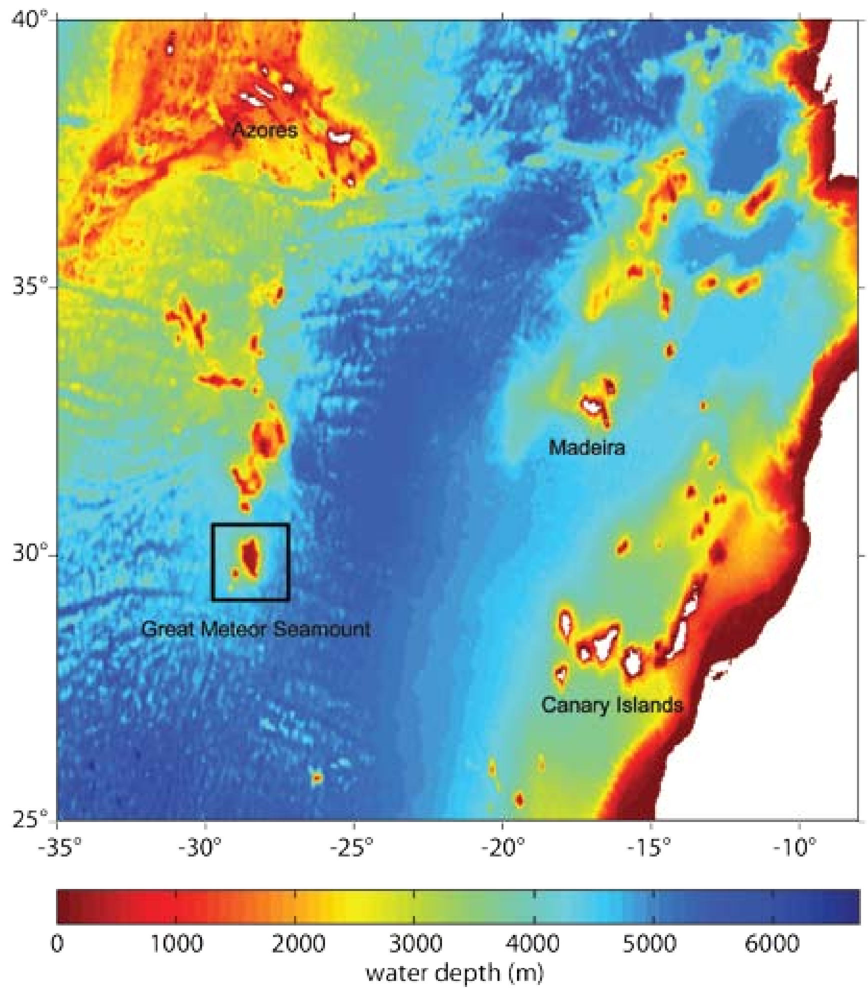

Figure 1. Great Meteor Seamount is located approximately 1400 km west of the Canary Islands and 900 km south of the Azores, centered at 30°N, 28°30'W, at the eastern approaches of the Mid-Atlantic Ridge. It was discovered in 1938 during the Gulf Stream Expedition of the first survey vessel *Meteor*.

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Protogrammus sousai (Callionymidae), is endemic to Great Meteor Seamount, whereas most other species have global distribution (Uiblein et al., 1999). The fish fauna are, however, considered ecologically distinct, with some evidence for morphologic adaption of certain fish populations (e.g., *Phycis phycis*) to the special food-poor conditions at the seamount (Uiblein et al., 1999). In contrast, meiofaunal groups of copepods (Figure 3) and nematodes exhibit pronounced endemism on the species level. For example, 54 of 56 observed species of the copepod *Harpacticoida* were completely new to science (George and Schminke, 2002). Developing a clear picture of the role of physical processes for shaping seamount ecology and supporting endemism remains a future challenge for seamount research. Great Meteor Seamount is no exception.

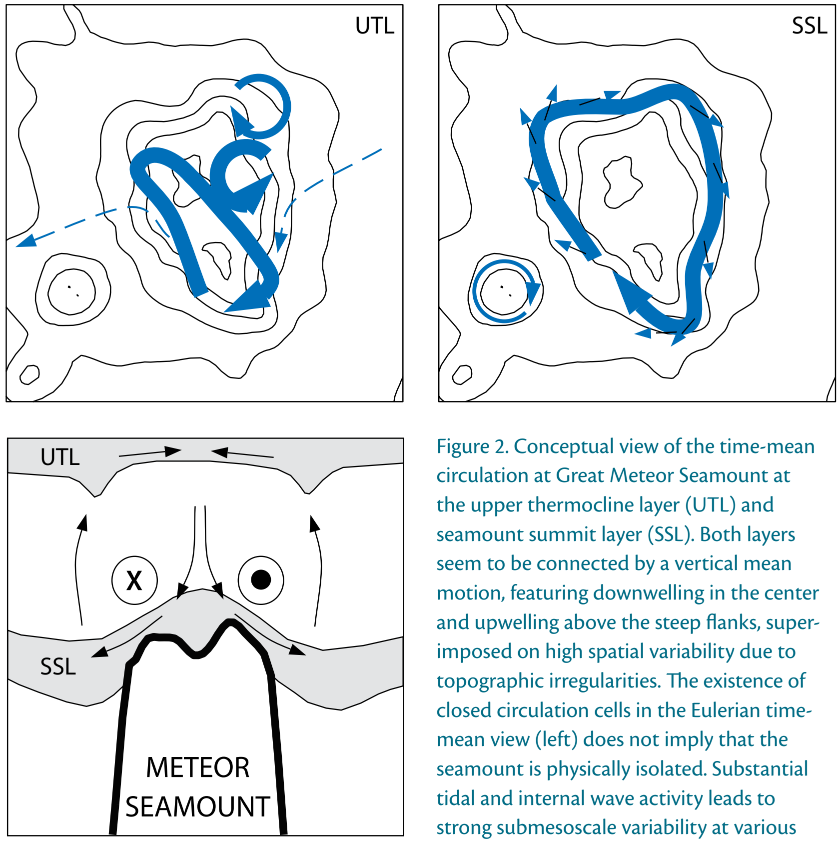

Figure 2. Conceptual view of the time-mean circulation at Great Meteor Seamount at the upper thermocline layer (UTL) and seamount summit layer (SSL). Both layers seem to be connected by a vertical mean motion, featuring downwelling in the center and upwelling above the steep flanks, superimposed on high spatial variability due to topographic irregularities. The existence of closed circulation cells in the Eulerian time-mean view (left) does not imply that the seamount is physically isolated. Substantial tidal and internal wave activity leads to strong submesoscale variability at various time scales in the area. *Figure 9 in Mohn and Beckmann, 2002.*

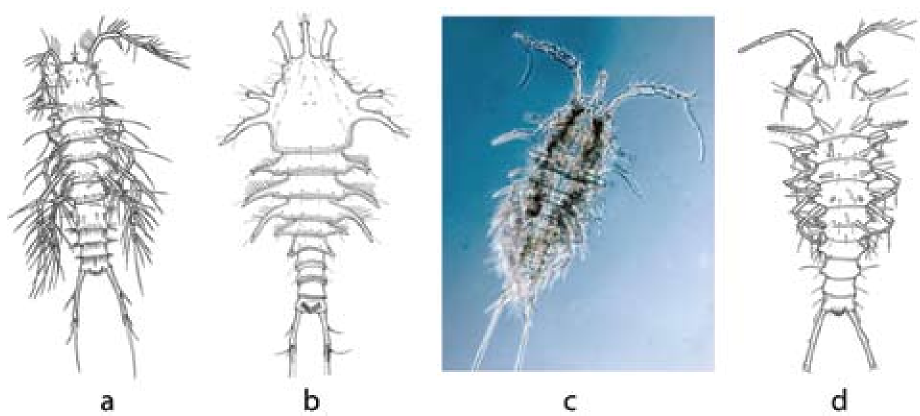

Figure 3. Copepods of the Great Meteor Seamount. (a) *Dorsiceratus ursulae* George 2006. (b,c) *Meteorina magnifica* George 2004 (photo courtesy K.H. George). (d) *Pseudechinopsyllus sindemarkae* George 2006.

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