



Seismic evidence for the presence of Jurassic oceanic crust in the Gulf of Cádiz (SW Iberia)

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We investigate here the crustal structure of the SW Iberian margin along a 340 km-long refraction and wide-angle reflection seismic profile crossing from the deep oceanic domain of the central Gulf of Cadiz to the Variscan continental margin in Southern Portugal. It was acquired during an OBS survey made in the framework of the EU-funded "Nearest" project. The seismic velocity and crustal geometry model obtained by joint refraction and reflection travel-time inversion reveals three distinct crustal domains: the 28-30 km-thick Variscan crust in the north, a 50 km-wide transition zone offshore, where the crust abruptly thins ~20 km, and finally a ~7 km-thick and ~150 km-wide crustal segment that clearly appears to be oceanic in nature. The oceanic crust is overlain by a 1-3 km-thick section of Mesozoic sediments, with an additional 3-4 km of low-velocity, unconsolidated sediments on top belonging to the Gulf of Cadiz sedimentary wedge. The sharp transition between continental and oceanic crust is best explained by an initial rifting setting as a transform margin in the early Jurassic (the eastern prolongation of the southern Grand Banks transform fault) that followed the continental break-up in the Central Atlantic. The narrow segment of oceanic crust would have formed during an episode of seafloor spreading between Iberia and Africa that initiated shortly thereafter (Bajocian) and lasted up to the initiation of oceanic spreading in the North Atlantic at the Tithonian (late Jurassic-earliest Cretaceous). We propose that this oceanic plate segment is the remnant of a Jurassic oceanic corridor that once connected the Alpine-Tethys with the Atlantic ocean and, therefore, it is one of the oldest oceanic crustal fragments currently preserved on Earth. The evidence for the presence of Jurassic oceanic crust in the central Gulf of Cadiz will surely help to better understand the geodynamic and tectonic evolution of the Westernmost Mediterranean. Concretely, our observations are consistent with geodynamic models suggesting the presence of a narrow, E-W-oriented, fast retreating, oceanic slab beneath the Gibraltar arc - Alboran basin system.