



## Kinematics of mantle flow beneath a fossil Overlapping Spreading Center: The Wuqbah massif case, Oman ophiolite

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[1] The Wuqbah massif (central Oman Ophiolite) comprises a well preserved <2 km thick crustal unit over a 6–8 km thick mantle sequence. The mantle comprises harzburgites and few dunites cut by various types of dykes. With the exception of basal and late fault zones, peridotites display granoblastic and porphyroclastic textures, acquired by high-temperature plastic deformation. They locally suffered important recrystallization as shown by neoblastic shapes and arrangements. Macroscopically, the peridotites have well-defined foliations and lineations, whose features allow the massif to divide into three structural domains. It comprises a N110° trending central zone that suffered an anticlockwise rotation, with an upwelling zone in its southwestern part, bound between two NS areas sheared in right-lateral conditions. This peculiar geometry is thought to reflect an overlapping spreading center (OSC) where the east and west bordering zones would define the trace, in the mantle, of two ridge segment terminations and the oblique N110° central zone the axial part of the overlap area. It is proposed that the northward migration of the southwest branch and its concomitant EW spreading caused the deformation and rotation of the overlap zone. In our OSC model, flow in the mantle would be continuous from one spreading center branch to the other, being curved in the overlap area to accommodate the offset. The mantle flow would therefore be more and more decoupled with the brittle crust when approaching the overlap zone, where extensional tectonics can occur. We consider that some mantle upwelling is possible due to its specific location, in between two ridge segments and over the main mantle flow. The distance between the two ridge axes is ~15 km, which means that this paleo-OSC can be ranked in the class of intermediate OSCs, illustrating a third-order ridge segmentation. At the scale of the ophiolite, the Wuqbah OSC is located northwest of a major domain marked by the presence of a NW-SE trending propagating ridge responsible for the formation of a new oceanic crust. It is suggested that the Wuqbah OSC formed earlier and underlines the trace of a ridge that had later migrated to the East.

**Components:** 8405 words, 12 figures,

**Keywords:** Structural data; Oman ophiolite; mantle dynamics; overlapping spreading center; propagating ridge.

**Index Terms:** 0930 Exploration Geophysics: Oceanic structures; 3035 Marine Geology and Geophysics: Midocean ridge processes; 8030 Structural Geology: Microstructures; 8120 Tectonophysics: Dynamics of lithosphere and mantle—general.

**Received** 14 September 2001; **Revised** 8 February 2002; **Accepted** 15 March 2002; **Published** 31 July 2002.

Girardeau, J., C. Monnier, P. Launeau, and F. Quatrevaux, Kinematics of mantle flow beneath a fossil Overlapping Spreading Center: The Wuqbah massif case, Oman ophiolite, *Geochem. Geophys. Geosyst.*, 3(7), 10.1029/2001GC000228, 2002.