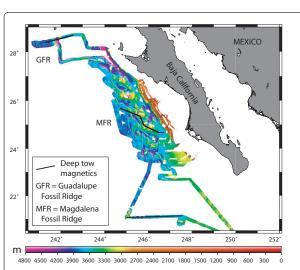
CONTRASTED FOSSIL SPREADING CENTERS OFF BAJA CALIFORNIA

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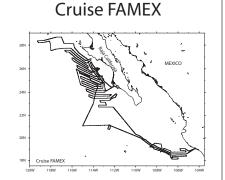


Bathymetry and location of deep tow magnetic profiles

In April 2002, during cruise Famex of R/V L'Atalante collected swath-bathymetry, surface and deep tow magnetic, gravity and seismic data in order to investigate the existence, characteristics and age of the Guadalupe and Magdalena fossil spreading centers that were postulated off Baja California (eastern Pacific Ocean).

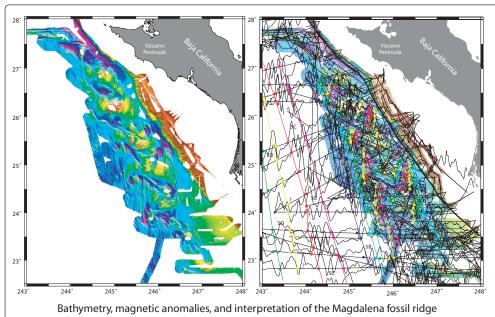
The new data confirm the existence of these extinct spreading centers and better define the location and orientation of the Magdalena Ridge segments.

The two fossil ridges exhibit very different morphological and structural characters.



Routes of cruise Famex of R/V L'Atalante

Magdalena Fossil Ridge

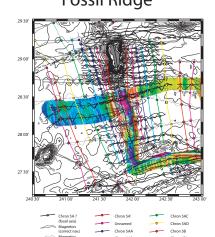


The Magdalena fossil spreading system exhibits a complex bathymetric structure, with a series of ridge segments and conjugate fan-shaped abyssal hills, troughs and volcanic highs, and spreading discontinuities with various orientation.

The surface and deep-tow magnetics indicate an age younger than or equal to 12 Ma, 5A being the youngest unambiguously identified magnetic anomaly.

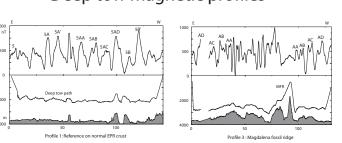
We interpret the fan-shaped abyssal hills and the various structural direction of the Magdalena spreading system as the result of a continuous clockwise change in spreading direction of about 18°/Ma, for a total of 45° between anomalies 5B and 5A. Spreading finally ceased when the seafloor spreading direction became parallel to the margin. At that time, a new strike-slip plate boundary may have initiated along the western margin of Baja California.

Guadalupe Fossil Ridge



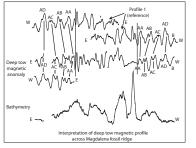
The Guadalupe fossil axis displays a deep N-S axial valley with a 2D geometry, and regular abyssal hills and magnetic anomalies on its flanks. According to surface and deep tow magnetics, seafloor spreading stopped at 12 Ma (anomaly 5A). The Guadalupe ridge gradually slowed down with a minor 10deg. reorientation prior to extinction at chron 5A.

Deep tow magnetic profiles



Three deep tow magnetic profiles have been acquired:

- a reference profile across anomalies 5B to 5 reversed on normal EPR crust;
- a profile across the Guadalupe fossil ridge; and

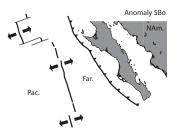


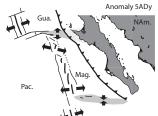
Bathymetry

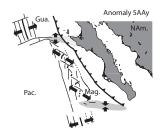
Interpretation of deep tow magnetic profile across Guadalupe fossil ridge

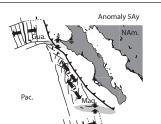
- a profile across the complex Magdalena fossil spreading center.

The identification of the magnetic anomalies is greatly helped by comparisons with the reference profile - distorted and anamorphosed - and the congugate profile, as iindicated above on the preliminary interpretation.









Evolution of the Guadalupe and Magdalena spreading centers

This observation suggests that a Magdalena plate and a Guadalupe plate started to behave independently at about 14.5 Ma, with the Shirley FZ (27.6N) acting as a plate boundary. Whether there were time enough for a slow spreading center to establish on the now-subducted part of the Shirley FZ is unknown. Either such a subducted fossil spreading center or the subducted broken fracture zone could create an asthenospheric windows which would be at the origin of the peculiar volcanic rocks observed on land in Baja California.

