



Seafloor spreading and crustal ages of the Central and Northern Lau Basin from magnetic data

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The Lau Basin is a young extensional backarc basin in the SW Pacific. It formed in the last 5 to 6 Million years in a setting behind the Tonga subduction zone which is characterized by the subduction of old oceanic crust and is assumed to be of erosive type. The opening of the backarc basin was accompanied by a complicated pattern of seafloor spreading, crustal extension, and volcanism, which results in an equally complicated pattern of magnetic anomalies.

During the recent research cruise SO-267 ARCHIMEDES, more than 2500 km of magnetic data were acquired with state-of-the-art towed magnetometers in the Central and Northern Lau Basin along six long geophysical survey lines and additional profiles during bathymetric seafloor mapping. These data complement existing older magnetic data from various sources which were reprocessed and compiled into one homogenous data set.

Earlier research had shown already that over large parts of the Lau Basin no clear pattern of magnetic seafloor spreading lineations can be found. However, in the newly compiled dataset we find sections of profiles and in some cases even complete profiles which can be correlated with magnetic seafloor spreading anomalies from a forward model in an age range from 0 to ~ 5.2 m.y. With these tie points it is possible to correlate magnetic anomalies across profiles even where the magnetic record has been heavily overprinted by crustal rifting and later volcanism. It turns out, that in the Central Lau Basin in addition to the known Central Lau Spreading Center a southward propagating spreading center was active at the eastern side of the basin just behind the volcanic arc until recent times. At this spreading axis, much of the present crust of the Central Lau Basin was formed likely in a highly asymmetric fashion with crustal accretion almost entirely on its western flank. We speculate that the volcanic arc moved in western direction over time in response to the erosion of the upper plate at the subduction zone and shut down this spreading in relatively recent times. Since then, a new spreading system has formed at the Fonualai Rift which is propagating on southern direction.