

Seafloor spreading history of the Cosmonauts Sea, off East Antarctica

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The initial break-up of Gondwana was one of the most significant geological events to have affected the southern hemisphere in the past 200 Myr. The evolution of seafloor spreading in the Southern Ocean is key to understanding the break-up process of Gondwana. The Cosmonauts Sea in the western Enderby Basin, off East Antarctica, is considered to be formed as a result of opening between Antarctica and Sri Lanka/India/Madagascar. The seafloor spreading history of this region is still poorly understood because of sparse marine geophysical data. To reveal detailed break-up process of Gondwana, a systematic vector geomagnetic survey of SE–NW oriented four track lines was carried out in the Cosmonauts Sea using the icebreaker *Shirase* during the 54th Japanese Antarctic Research Expedition (JARE). Data acquired during other JARE marine geophysical surveys were also used.

The isochrons M10N–M3n with an almost WNW–ESE spreading direction in the south of the Cosmonauts Sea were newly identified with several smaller segments. The half spreading rate was calculated as 27–31 km/Myr. The seafloor spreading occurred at about chron M10N. The transition of seafloor spreading around the 65°S likely occurred during chron M3n–M0r. Then, the NNE–SSW oriented seafloor spreading started since chron M0 in the north of the Cosmonauts Sea. Moreover, distribution of the thinned continental crust, which was also suggested by the previous study, was derived from the results from vector geomagnetic anomalies, as well as satellite gravity data. We also propose that the Kainan-Maru Seamount, just in the north of the Gunnerus Ridge, is the continental crust and drifted from the Antarctic continent to the north of the Gunnerus Ridge by the WNW–ESE continental extension and seafloor spreading.

The previous Gondwana reconstruction models assumed N–S seafloor spreading for the Cosmonauts Sea. However, our results show WNW–ESE-oriented seafloor spreading in the Cosmonauts Sea and provide new constrain the Gondwana break-up process as well as the formation processes of conjugate areas such as south of Sri Lanka and the Bay of Bengal. We will present the formation process of the Cosmonauts Sea, and discuss the initial break-up process of Gondwana in this region.

Keywords: vector geomagnetic anomalies, western Enderby Basin, break-up of Gondwana