

SUPPLEMENTAL INFORMATION

Late Miocene to recent tectonic evolution of the Macquarie Triple Junction

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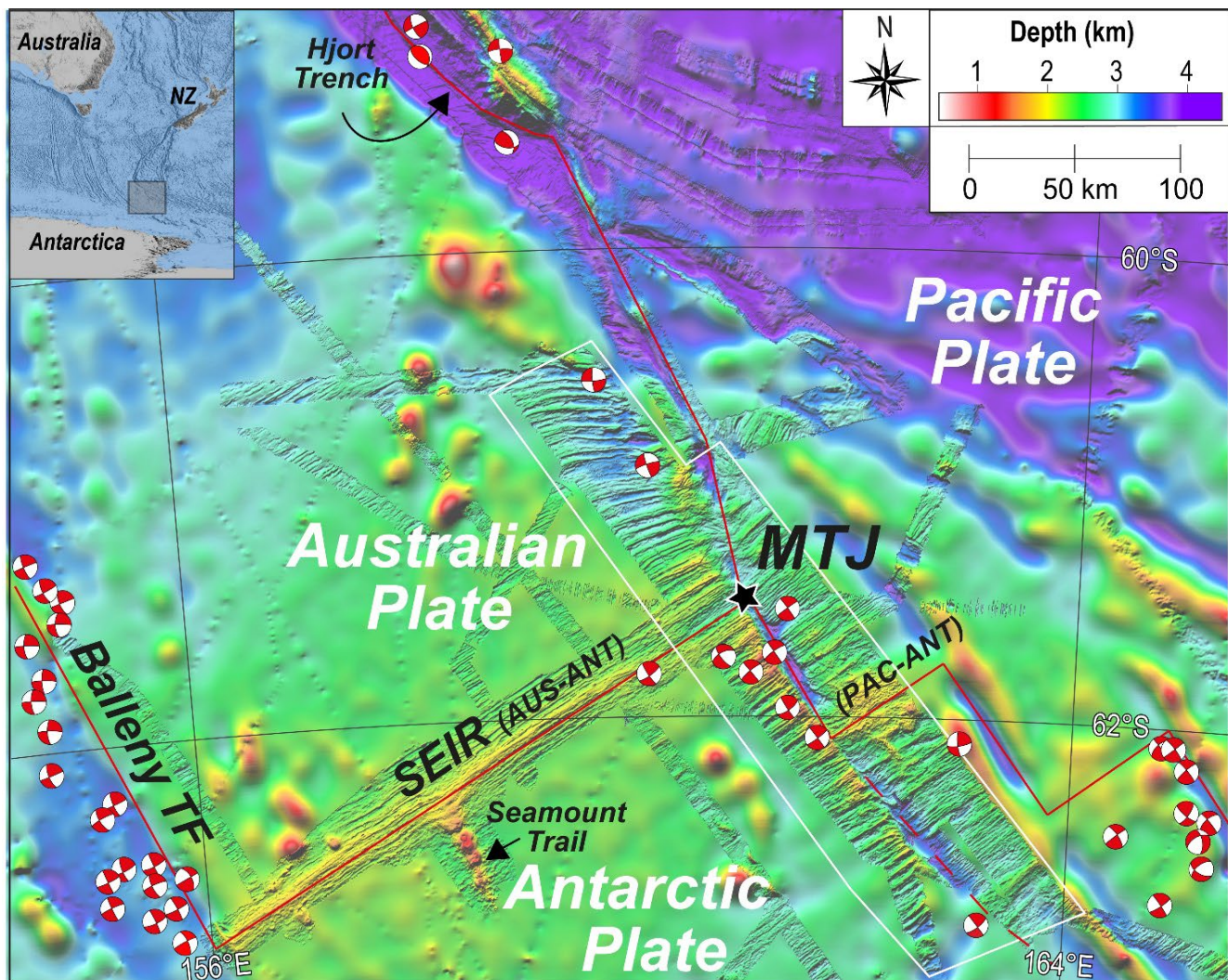
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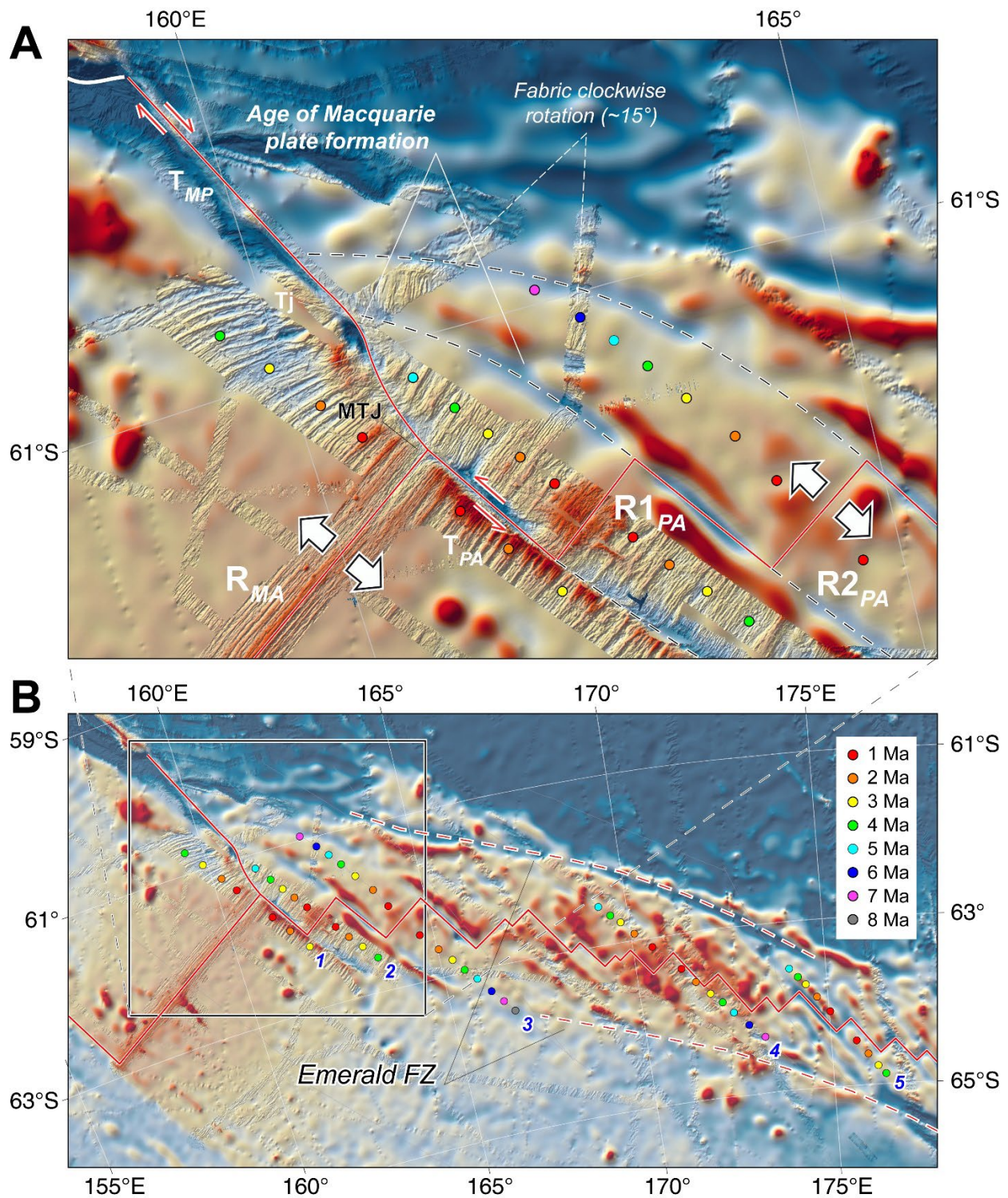
Figures from S1 to S3

References

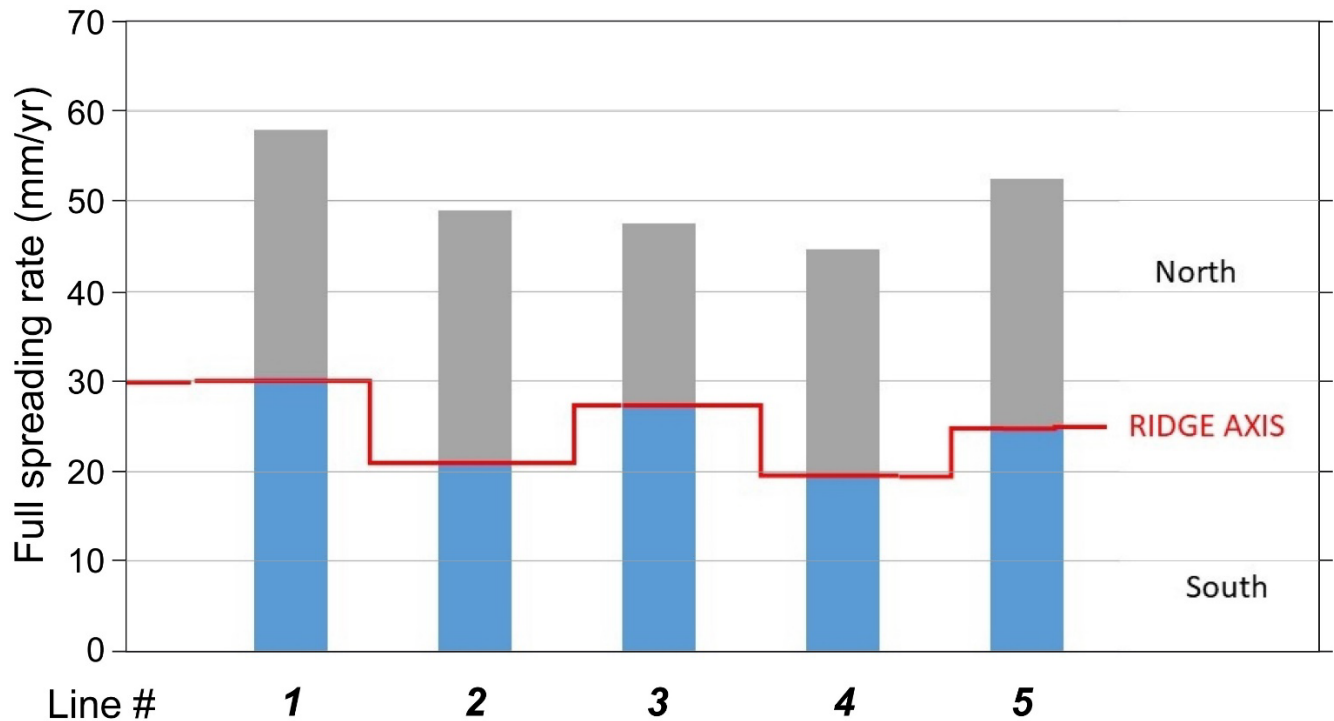
Table S1



Supplementary Figure S1. Geographical setting of the Macquarie Triple Junction. Regional bathymetry obtained by merging the 15 arc-seconds GEBCO-2021 grid (<https://download.gebco.net/>) with our own swath bathymetry data and those of Crowley et al. (2015) and from the NGDC database (<https://www.ncei.noaa.gov/maps/bathymetry/>). Spatial analysis and mapping performed with the open source software GMT (Wessel and Smith, 1998). Datum and projection used are WGS84 and Polar Stereographic, respectively (Longitude Pole: 161°E; True Scale Latitude: 61.5°S). Black star indicates the present-day location of the MTJ. Fault plane solutions of earthquakes with magnitude >5 from the Harvard Centroid Moment Tensor Catalog (<http://www.globalcmt.org/>; Dziewonski et al., 1981; Ekström et al., 2012).



Supplementary Figure S2. (A) Tectonic setting of the Macquarie triple junction: morphology, plate boundaries and crustal ages. T_j indicates a former position of the MTJ at the time of the Macquarie plate formation. (B) Crustal ages of seafloor accreted at the Pacific-Antarctic ridge after Emerald transform fragmentation (12-10 Ma), based on the magnetic profiles available across the accretionary plate boundaries next to the triple junction (blue numbers). Spatial analysis with PLOTMAP software (Ligi and Bortoluzzi, 1988). Datum: WGS84; Lambert conformal conical projection: Central meridian: 180°E; latitude origin: 62°S; standard parallels: 60°S and 64°S).



Supplementary Figure S3. Spreading rates across the Pacific-Antarctic plate boundary averaged over the last 0.78 Ma (chron 10). Half spreading rates of Pacific and Antarctic plate are indicated by gray and blue bars, respectively. Note, strong asymmetric accretion characterizes spreading segments of the Pacific Antarctic Ridge, implying highly-variable transform offsets.

References

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- Ligi, M., and Bortoluzzi, G., 1989, PLOTMAP: geophysical and geological applications of good standard quality cartographic software: *Computers and Geosciences*, v. 15, p. 519–585, [https://doi.org/10.1016/0098-3004\(89\)90023-X](https://doi.org/10.1016/0098-3004(89)90023-X)
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Supplementary Table S1. Model parameters used for magnetic forward modeling from NW to SE.

Profile name	Magnetic anomaly	Age (Ma)	Distance		Half spreading rates		Full spreading rates		Spreading direction	Azimuth of the profile (degrees)	Thickness of the layer (km)	Magnetization of the blocks (A/m)		Declination (degrees)	Inclination (degrees)
			From chron (km)	From ridge axis (km)	Chron (mm/yr)	Average (mm/yr)	Chron (mm/yr)	Average (mm/yr)				On-Axis	Off-Axis		
Line 1	2Ao	3,58	28,99	101,85	28,99	28,45			329°N	323°N	0,5	19	6	53,7	-82,5
	2Ay	2,58	18,52	72,86	29,39	28,24									
	2o	1,95	4,65	54,34	25,85	27,87									
	2y	1,77	19,78	49,69	28,26	28,07									
	Jo	1,07	3,59	29,91	44,84	27,95									
	Jy	0,99	4,75	26,32	22,62	26,59									
	1o	0,78	21,57	21,57	27,66	27,66									
	1o	0,78	24,14	24,14	30,95	30,95	58,61	58,61							
	Jy	0,99	6,49	30,63	30,90	30,94	53,53	57,53							
	Jo	1,07	2,57	33,20	32,09	31,02	76,93	58,98							
	2y	1,77	21,11	54,31	30,16	30,68	58,41	58,75							
	2o	1,95	4,78	59,08	26,54	30,30	52,40	58,17							
	2Ay	2,58	20,54	79,62	32,60	30,86	62,00	59,10							
	2Ao	3,58	32,88	112,50	32,88	31,42	61,87	59,87							
Line 2	3o	5,23	27,00	116,50	25,71	22,28			326°N	320°N	0,5	19	6	55,3	-82,3
	3y	4,18	14,68	89,50	24,47	21,41									
	2Ao	3,58	18,44	74,82	18,44	20,90									
	2Ay	2,58	13,09	56,38	20,78	21,85									
	2o	1,95	3,39	43,29	18,85	22,20									
	2y	1,77	13,38	39,90	19,11	22,54									
	Jo	1,07	1,65	26,52	20,60	24,78									
	Jy	0,99	4,17	24,87	19,85	25,12									
	1o	0,78	20,70	20,70	26,54	26,54									
	1o	0,78	17,50	17,50	22,44	22,44	48,97	48,97							
	Jy	0,99	4,84	22,34	23,04	22,56	42,90	47,69							
	Jo	1,07	1,76	24,10	21,96	22,52	42,56	47,30							
	2y	1,77	16,90	41,00	24,15	23,16	43,26	45,70							
	2o	1,95	4,06	45,06	22,57	23,11	41,42	45,31							
	2Ay	2,58	13,39	58,46	21,26	22,66	42,03	44,51							
	2Ao	3,58	22,59	81,04	22,59	22,64	41,02	43,54							
	3y	4,18	13,46	94,50	22,43	22,61	46,91	44,02							