



## **New constraints on the structure and evolution of the eastern margin of Gondwana from ambient noise Rayleigh wave anisotropic tomography**

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The Tasmanides of Australia represent the eastern third of the Australian continent that formed along the eastern margin of Gondwana through tectonic events that took place from early Palaeozoic to Cretaceous. In southeast Australia, where the Tasmanides are represented by the Delamerian and Lachlan orogens, most of the complex geological structure inherited from those events lies below Cenozoic basins and Quaternary volcanic deposits, and is therefore not accessible via direct observation. In this work, we exploit the ambient noise wavefield recorded by the largest transportable seismic array experiment in the southern hemisphere, which has operated in eastern Australia from 1998 to present and involves the deployment of over 700 temporary stations with an average inter-station distance of about 50 km. We analyze Rayleigh wave phase dispersion curves obtained in a previous study on more than 8,200 cross-correlograms using data from 450 sites, and we perform an anisotropic tomography inversion for periods ranging from 1 to 20 s in order to account for the apparent dependence of Rayleigh wavespeed on azimuthal propagation direction. While the isotropic velocity maps are in good agreement with previous tomographic studies, the anisotropic component of the velocity field brings new constraints on the crustal structure and Phanerozoic evolution of the Tasmanides in southeast Australia. One of the most remarkable results of our study is to show a fast axis of anisotropy almost mimicking the magnetic lineations which appear to wrap around a region now referred to as the Hay-Boooligal Zone. That region, recently identified on the basis of high resolution aeromagnetic maps, has been interpreted as a remnant fragment of Precambrian lithosphere embedded within the Lachlan Orogen, possibly originating from the break-up of Rodinia.