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Overview of West Antarctic tectonic evolution from ~500 Ma to the present

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West Antarctica developed as the tectonically active margin separating East Antarctica and the Pacific Ocean for almost half a billion years. Its dynamic history of magmatism, continental growth and fragmentation are recorded in sparse outcrops, and revealed by regional geophysical patterns. Compared with East Antarctica, West Antarctica is younger, more tectonically active and has a lower average elevation. We identify three broad physiographic provinces within West Antarctica and present their overlapping and interconnected tectonic and geological history as a framework for future study: 1/ The Weddell Sea region, which lay furthest from the subducting margin, but was most impacted by the Jurassic initiation of Gondwana break-up. 2/ Marie Byrd Land and the West Antarctic rift system which developed as a broad Cretaceous to Cenozoic continental rift system, reworking a former convergent margin. 3/ The Antarctic Peninsula and Thurston Island which preserve an almost complete magmatic arc system. We conclude by briefly discussing the evolution of the West Antarctic system as a whole, and the key questions which need to be addressed in future. One such question is whether West Antarctica is best conceived as an accreted collection of rigid microcontinental blocks (as commonly depicted) or as a plastically deforming and constantly growing melange of continental fragments and juvenile magmatic regions. This distinction is fundamental to understanding the tectonic evolution of young continental lithosphere. Defining the underlying geological template of West Antarctica and constraining its linkages to the dynamics of the overlying ice sheet, which is vulnerable to change due to human activity, is of critical importance.