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Prologue
Andrew Hynes Series: Tectonic Processes

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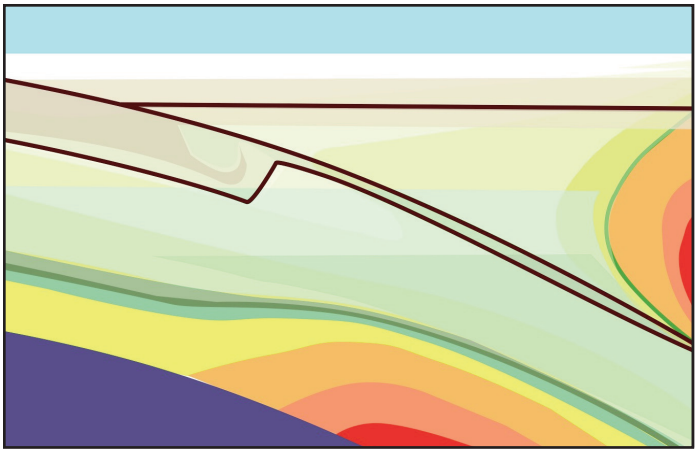

PROLOGUE: ANDREW HYNES SERIES: TECTONIC PROCESSES

For nearly 40 years, Andrew Hynes of McGill University has contributed to our understanding of fundamental concepts in geosciences, ranging through time from the Archean to the present, and across disciplines from mineralogy and petrology, to structural geology, tectonics, geodynamics and geophysics. Andrew's research deals with fundamental processes that penetrate to the core of our science. In addition to providing comprehensive interpretations, Andrew has been careful to devise critical tests of his models, producing novel and plausible insights. He quantifies the quantifiable without embellishment, clearly states his assumptions and inferences, and provides testable models.

Born in Liverpool, U.K., Andrew emigrated as a teenager to Canada, completing his undergraduate degree at the University of Toronto and a PhD at Cambridge University in 1972. In 1975, he joined McGill as a (very) young professor. He officially retired in 2014, but remains an active researcher. His research was funded by a variety of sources, including continuous funding from N.S.E.R.C. for nearly 40 years. He has had a profound impact on the careers of generations of graduate and undergraduate students, not only at McGill but also in the broader geoscience community, a commitment that earned him the 2013 Canadian Federation of Earth Sciences Mentorship Medal in 2013. Andrew also has contributed to the wider community, including serving two terms as department chair at McGill, as Technical Program Chairman (twice) for annual GAC–MAC meetings, as a member of the editorial boards of several prestigious journals and as a member and Chair of the NSERC Grants Committee for the Solid Earth Sciences.

His publications have a remarkable shelf-life. His PhD research in Greece was one of the first to apply plate tectonic principles to complexly deformed ophiolitic terrains and he discussed the importance of micro-continents in the tectonic evolution of the Mediterranean before they became fashionable in the Cordillera. In the late 1970's, he documented and modeled the mobility of 'immobile' elements in metabasaltic rocks. In the 1980's, his work with Don Francis and students in the Cape Smith Fold Belt contributed to the understanding of komatiitic magmatism, thereby providing major new insights into Early Proterozoic tectonics. He studied amphibole and garnet–muscovite assemblages as indicators of metamorphic grade and style of orogeny, and at the same time pro-

Andrew receiving the 2013 Canadian Federation Earth Sciences Mentorship Medal, at the GAC–MAC annual meeting in Winnipeg, May 2013.

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posed provocative models for the stability of the Proterozoic tectosphere, for the initiation of subduction and back-arc spreading in both the modern and Proterozoic worlds, and for the fragmentation of Pangea.

In the 1990's Andrew produced several papers linking geology and geophysics in a seamless fashion. He launched and supervised several student research projects in the Labrador Trough, thereby providing insights into the expression of the Trans-Hudson orogen in that region. He was a driving force behind the Abitibi-Grenville LITHOPROBE Project, and showed that arcuate structures along the Grenville Front are related to flexing of the lithosphere due to loading of pre-existing, Trans-Hudson thrust sheets. About the same time, he demonstrated that basalt geochemistry could be used as a probe for crustal thickness in the Hudson Bay arc, and provided theoretical constraints on the onset of hydrothermal cooling of Earth and the origin of its first continental lithosphere some 4.0 Ga. In a paper (co-authored with David Eaton) that won the 1999 Dave Elliott award for best paper in Canadian Structure and Tectonics, Andrew proposed that lateral ramps to orogenic wedges facilitate rapid unroofing of deep crustal rocks.

Andrew's ongoing interest in geodynamic processes led him to publish papers on the extrusion of deep-crustal rocks in collisional zones, and the relationship between continental growth, crustal thickness change and Earth's thermal efficiency. More recently, Andrew tackled the fundamental problem of subduction initiation and the role of negative buoyancy of oceanic lithosphere, providing evidence that initiation occurs along leaky fracture zones, where flooding of oceanic plates by magma is most likely. And by modeling the effect of extension on an Archean mantle, Andrew provided an explanation for the scarcity of Archean passive margin sediments, and showed that subduction is geodynamically permissible in the Late Archean.

By conducting independent, process-oriented, rigorous research on first-order issues, Andrew has been an outstanding mentor and role model for generations of students. Through his own research and his mentorship of students, his contributions to the geosciences have been immense. We are honoured to dedicate this series of papers on Tectonic Processes to him.

Brendan Murphy, Stephen Johnston, and Boswell (Boz) Wing,
Guest Editors