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Introducing the OZCZO - Australian Critical Zone Network: What can we learn from the soils 'down under' about the near-surface biogeochemical cycles and pedogenesis

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The Australian continent contains extremely diverse and also one of the oldest and most intensively weathered and nutrient-deficient soils on our planet, which is mostly due to a general lack of geological rejuvenation of the Australian continent linked to its tectonically stable or 'passive' setting and little impact of Quaternary glacial/mechanical erosion that in contrast shaped most soils in Europe, Asia and America. In addition, being the driest inhabited continent on Earth, the land 'down under' and its unique regolith can thus also provide important lessons and insights into what might happen to soils and associated biogeochemical cycles on our planet in the near future that is expected to be dominated by progressively warmer temperatures and extreme weather events, leading to increased erosion, enhanced element/nutrient leaching, and/or soil salinisation.

This contribution will introduce a new research infrastructure – The newly established OZCZO or Australian Critical Zone network – consisting of multiple CZOs (Critical Zone Observatories) across the Australian continent that are designed for advanced studies of biogeochemical processes and elemental/isotope cycles within near-surface reservoirs, including vegetation, soils, vadose zone and groundwater. We will briefly present details of specific OZCZO sites and their geological/hydrological/climatic settings, and planned research infrastructure consisting of state-of-the-art and automated monitoring systems, such as VMS – Vadose Zone Monitoring Systems and associated sampling ports for the collection of fluids and gases, for geochemical/isotope investigations, pedogenesis problems and modelling studies. Finally, we will outline possible future research directions that could be done collaboratively using the OZCZO network in Australia, which geological/climatic uniqueness and ancient deeply weathered soils complement the more established CZO networks in the Northern Hemisphere (Europe, USA) on more recent soils and glacially weathered terrains.