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COLLOQUIUM

Why does South Africa need coupled Earth System and Integrated Assessment Models?

Prof Pedro Monteiro (School for Climate Studies, Stellenbosch University)

DATE: Monday, 9 March 2026 | 16h00–17h00 SAST

- VENUES:**
- **Stellenbosch University:** NITheCS Seminar Room, Merensky Building
 - **University of the Witwatersrand:** Room P215, 2nd Floor, Physics Building
 - **North-West University:** Seminar Room K310, Physics Building G5
 - **Online**

--- A recording of the talk will be published on the NITheCS YouTube channel afterwards ---

ABSTRACT

Over the past decade, South Africa has built strong capabilities in atmospheric, ocean and land system sciences. However, these efforts remain fragmented across domains and institutions, limiting progress in understanding coupled carbon–climate–human feedbacks that shape 21st-century risks. At the same time, the global community is advancing toward high-resolution Earth System Models (ESMs), generating unprecedented data volumes and requiring new analytical, engineering and AI-enabled modelling skills—areas where local capacity remains vulnerable.

In South Africa, geophysical constraints such as water scarcity, climate variability and land degradation are not external pressures but active determinants of development pathways. Addressing this reality demands a shift from one-way impact assessments and least-cost optimisation models toward fully coupled Earth System and regional Integrated Assessment Models (rIAMs) that represent bidirectional feedbacks between climate and socio-economic systems.

In this talk, we will discuss our proposal for a coordinated South African ESM-rIAM platform to strengthen national capability, support Carbon Dioxide Removal research, and build African partnerships for globally relevant, policy-responsive science.

BIOGRAPHY

Prof Pedro Monteiro is based at the School for Climate Studies, Stellenbosch University, where he leads the emerging research area of ocean Carbon Dioxide Removal, a key global and regional science and governance policy challenge towards and beyond net-zero emissions. This reflects his interests in building a better understanding of how regional and global natural carbon sinks and ecosystems and carbon-climate-ecosystem feedbacks are linked and help impact the efficacy and sound policy development for the necessary negative emissions in the 21st century. It builds on his longer-term focus on the role of fine scale ocean physics on carbon fluxes in the Southern Ocean and its impact on the uncertainties in the carbon budget and long-term carbon-climate projections. He was co-coordinating lead author for Chapter 5, 'Carbon and Biogeochemical Feedbacks,' of the IPCC AR6 – WG1 and Chief Oceanographer and Head of the SOCCO programme at the CSIR.



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