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# On the consistency between Andean dynamics and mantle flow in the South Atlantic

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The predictions of global mantle flow models, when explored at more regional scales, shed light on the relationships between mantle convection and plate tectonics. Underneath the lithosphere in the South Atlantic, the flow pattern has a maximum divergence above the so-called African superswell. Maximum convergence naturally occurs above the Nazca subducting slab. It forms a counterpart of the superswell and a convection cell develops underneath the South American plate. The resulting shear traction exerts a torque on the South American plate whose Euler pole is located at high latitudes in the Indian Ocean. Integrated along the corresponding small circles, the shear traction force drags the South American plate towards the Nazca trench, with a magnitude that is large enough to balance the eastward-directed buoyancy force exerted by the Andes. Even more interestingly, the integrated drag force varies along the Nazca trench and remarkably matches the latitudinal variations of the Andean buoyancy force: it reaches a maximum in the Central Andes and decreases both to the north and south. It also conformably matches the distribution of the mass anomalies at depth as revealed by seismic tomography. In light of these results, we re-interpret the dynamic evolution of the South Atlantic as follows. The tectonic and volcanic burst in Africa at $\sim$30 Ma reveals the intense activity of the sub-African superplume -or plume cluster- that fostered an increase in the vigor of the convection cell, thereby more efficiently dragging the South American plate westward. The Nazca slab, which is well anchored into the lower mantle, precludes a fast motion of South America, particularly in the Central Andes. This simple circular relationship explains the relationship between Andean buoyancy (and elevation), trench motion, sublithospheric mantle drag and mantle convection.