

South Pacific Split Jet, ITCZ shifts, and atmospheric North- South linkages during abrupt climate changes of the last glacial period

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A number of key paleoclimate records in the Southern Hemisphere midlatitudes exhibit climate changes synchronous with canonical North Atlantic abrupt climate changes associated with Heinrich events. Here we advance a hypothesis that attributes interhemispheric linkages of these abrupt changes to modulation in the strength of the South Pacific Split Jet, a pronounced zonally asymmetric feature of the wintertime Southern Hemisphere westerlies. A weaker Split Jet - characterized by weaker South Pacific subtropical and subpolar jets and a strengthened midlatitude jet – leads to climate impacts over regions with known paleoclimate changes timed to the North Atlantic. These circulations changes are envisioned to operate in addition to the climate impacts resulting from the oceanic bipolar seesaw.

A global atmospheric teleconnection is advanced to explain the connection between the Southern Hemisphere climate changes coincident with North Atlantic cooling. North Atlantic cooling induces a southward shift of the marine Intertropical Convergence Zone and weakening of the Asian monsoon. The resulting Hadley circulation change weakens the wintertime South Pacific subtropical jet, and which in turn leads to a weaker South Pacific Split Jet. A weaker Split Jet leads to a southward shift of the zero wind-stress curl line, implying a shift in the same sense for the South Pacific subtropical front. Over land, it leads to winter warming over New Zealand, winter cooling over subtropical South America, drying over Western Patagonia, and winter warming and wetting of southernmost Patagonia. Our hypothesis also predicts reduced storminess over West Antarctica. Changes in the opposite sense occur in the Northern Hemisphere, where a stronger wintertime North Pacific subtropical jet increases precipitation over the Western United States.