The continental assembly of SW Gondwana (Ediacaran to Cambrian): a synthesis

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SW Gondwana resulted from complex interplay between continental amalgamation and dispersal between ~ 650 and 490 Ma. The main cratons involved were Laurentia, Amazonia–MARA (Proterozoic Maz–Arequipa–Rio Apa, Casquet et al., 2012), Kalahari, Rio de la Plata (RPC), Congo and East Antarctica (Mawson block). Several collisional orogenic belts resulted, notably the East Africa–Antarctica, Brasiliano–Panafrican, Pampean–Saldania, and Ross–Delamerian orogens.

East-Antarctica broke away from the western margin of Laurentia in Rodinia. After a long drift and counter-clockwise rotation (Dalziel, 2013) it collided with Congo and Kalahari to produce the southern part of the left-lateral transpressional East Africa–Antarctica orogen between 580 and 550 Ma, completing the amalgamation of East Gondwana. The Trans-Antarctic margin became an active one in the Ediacaran and subduction of the Pacific Ocean lithosphere occurred throughout the Paleozoic, forming a tract of the Terra Australis orogen. NW–SE directed compression in Late Cryogenian and Early Ediacaran times promoted closure of the Adamastor Ocean, resulting in the left-lateral transpressional Brasiliano–Pan African orogeny between 650 and 570 Ma.

The Pampean orogenic belt to the west of the RPC resulted from right-lateral collision between Laurentia and its eastern extension MARA on the one hand and Kalahari–RPC on the other. Ocean opening started at ~ 630 Ma and subduction and further collision took place between 540 and 520 Ma, coeval with the northward drift of Laurentia (~ 540 Ma) away from MARA and the consequent formation of the proto-Andean margin of Gondwana. The margins of the intervening Puncoviscana ocean were covered by Laurentia-derived siliciclastic sediments and carbonates on the MARA side between 630 and ~ 540 Ma (Rapela et al, 2014; this symposium), and by the marine siliciclastic Puncoviscana Formation on the other. The latter formation, deposited between a 570 and ~530 Ma, received input from large alluvial fans descending from juvenile Mesoproterozoic and Neproterozoic sources (new Hf isotope evidence) largely located in the southern East Africa–Antarctica orogen. The Pampean orogen extended into the Saldania–Gariep orogen of southern South Africa (545–520 Ma) and was apparently discordant to the earlier Brasiliano–Pan African orogen. In late-Early to late Cambrian times the Pampean–Saldania realm evolved into a passive margin with siliciclastic platform sedimentation. The Pampean-Saldania realm was separated from the active Trans-Antarctic margin of East Antarctica by an inferred transform fault in Ediacaran to Cambrian times. Regional NW–SW shortening in the Ediacaran became N–S directed in the Cambrian, suggesting a major plate reorganization at this time.

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