Revisiting the circulation of the East Australian Current: its path, separation, and eddy field

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The traditional view of the East Australian Current (EAC), as depicted in many schematics, is of a continuous boundary current that flows along the shelf off eastern Australia, between ~18S and about 32.5S, where it separates from the coast and continues either towards New Zealand, along the Tasman Front; or around Tasmania, as the EAC extension. Additionally, it is widely recognised that eddies are prevalent in the EAC region—particularly south of the EAC separation. We revisit this long-standing paradigm and suggest that the EAC is perhaps better viewed as a continuous, meandering stream, flowing adjacent to the continental shelf that “feeds” a field of mesoscale eddies. Observations show that EAC eddies are prevalent over a broad region of the western Tasman Sea, as far north as 25S, typically with maximum intensity between 30-35S. At any instant in time the EAC jet is usually evident as a continuous, poleward, meandering stream flowing adjacent to the coast. Other commonly accepted features of the EAC system, including the Tasman Front and EAC extension, are rarely seen as distinct, identifiable features. Rather, these features are evident only in time-mean fields when the eddy-variability is filtered out. It is also common for the EAC to be spatially discontinuous, due to the presence of eddies, often with multiple short streams that sometimes separate and re-attach to the coast. Evidence for this refined view of the EAC system will be presented, with reference to historical and recent studies.