The South Indian Ocean is home to a number of remarkable circulations. These include: 1) shallow eastward currents extending across the basin from 10−25°S, with westward flow at greater depths; the eastward currents are similar to the subtropical countercurrents present in the other oceans but are even stronger; and 2) the Leeuwin Current system, particularly noteworthy because the Leeuwin Current flows poleward, opposite to the direction of eastern-boundary currents elsewhere. In addition, these interior currents are influenced by significant flows into the basin: 3) from the north via the predominantly shallow, Indonesian Throughflow, and 4) from the south via subsurface currents south of Australia. These circulations are reviewed with a focus on identifying the dynamical linkages among them. Existing ideas about their causes are reviewed, and results from ongoing theoretical and modeling studies are reported.