



## **Long-Term Temperature Trend of Two Choke Points in the Antarctic Circumpolar Circulation**

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The long-term temperature variations of the two choke points in the Antarctic Circumpolar Circulation (ACC), Drake Passage and south of Tasmania, are compared using the combined historical observations from World Ocean Database 2005 (WOD05), WOCE, Southern Ocean Database (SODB), and recent ARGO profiles. The annual mean temperature of upper 700m in these two choke points is analyzed using the empirical mode decomposition method (EMD). The results show that in the Drake Passage, the temperature records in the upper 700m during 1980s are systematically cooler than that in 1970s and 1990s, respectively, suggesting the cooling trend between 1970s and 1980s, and the warming trend between 1980s and 1990s. However, in the south of Tasmania, no obvious cooling trend is found between 1970s and 1980s. The linear trend of the annual mean temperature of upper 700m ocean in the south of Tasmania is about  $0.05^{\circ}\text{C}/\text{yr}$  during 1965 to 1995, which is faster than that of the global ocean. An interesting difference between the two choke points is that during 1965 to 1995, the standard deviation (std) of the mean temperature of upper 700m in the Drake Passage,  $0.73^{\circ}\text{C}$ , is weaker than that in the south of Tasmania,  $1.72^{\circ}\text{C}$ , but this relationship is reversed in the last 10 years. From 1995 to 2005, the std of mean temperature of upper 700m in the south of Tasmania drops to  $0.15^{\circ}\text{C}$ , becomes weaker than that in the Drake Passage,  $0.38^{\circ}\text{C}$ . The results of these comparisons imply that there exist the significant different decadal variations of the heat transportation from Indian Ocean to Pacific with that from Pacific to Atlantic.