

# **Interannual Variability of the South Indian Countercurrent**

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\*\*\*\* Supplementary Information \*\*\*\*

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**Table 1.** Tide Gauges (TG) data analysed in the present work.

TG Station	PMSL ID	latitude	longitude	Time Span	% missing data
Reunion Island	1501	20.93°S	55.28°E	Jan-1997 Dec-2014	12.9
Mauritius Island	1673	20.15°S	57.50°E	Aug-1986 Dec-2014	1.5
Rodrigues Island	1672	19.67°S	63.42°E	Dec-1986 Dec-2014	7.1
Port Hedland	189	20.32°S	118.57°E	Jan-1966 Nov-2013	8.5
Fremantle	11	32.06°S	115.79°E	Jan-1897 Dec-2013	8.0

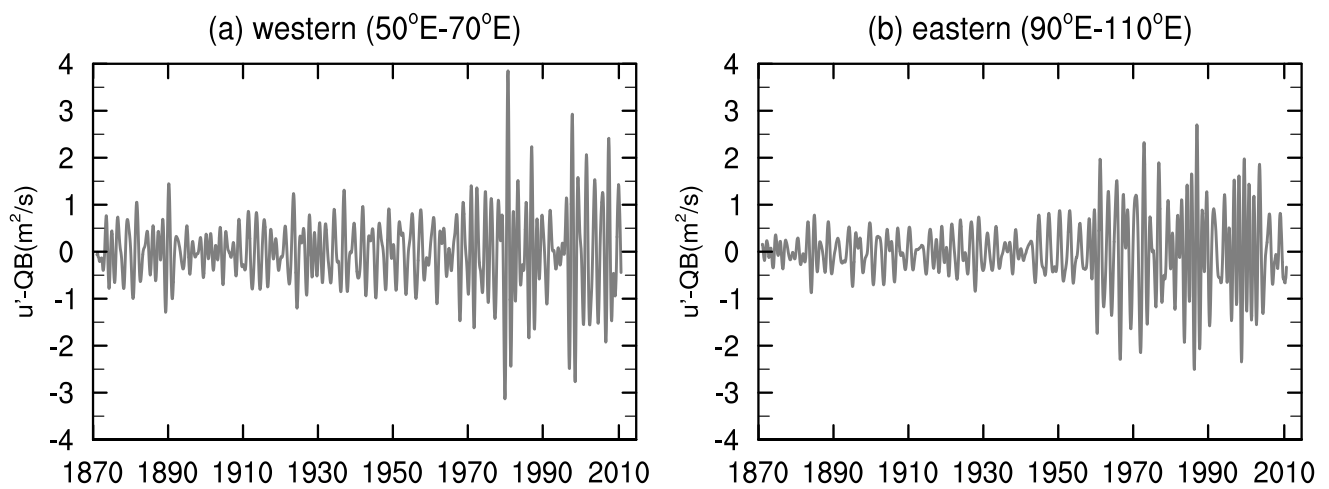
**Table 2.** Local variances (%) explained by the low-frequency band ( $T \geq 1.2$  years) in the SICC domain. Second (third) column is the average  $\mu$  (standard deviation  $\sigma$ ) of the variances in the region 20°S-30°S; 50°E-110°E. In brackets, variances from the SODA subset (1960-2010).

	$\mu$	$\sigma$
altimeter	24.51	1.55
GLORYS	24.55	1.27
OFAM3	26.52	2.58
SODA	37.44 [35.91]	2.19 [1.6]

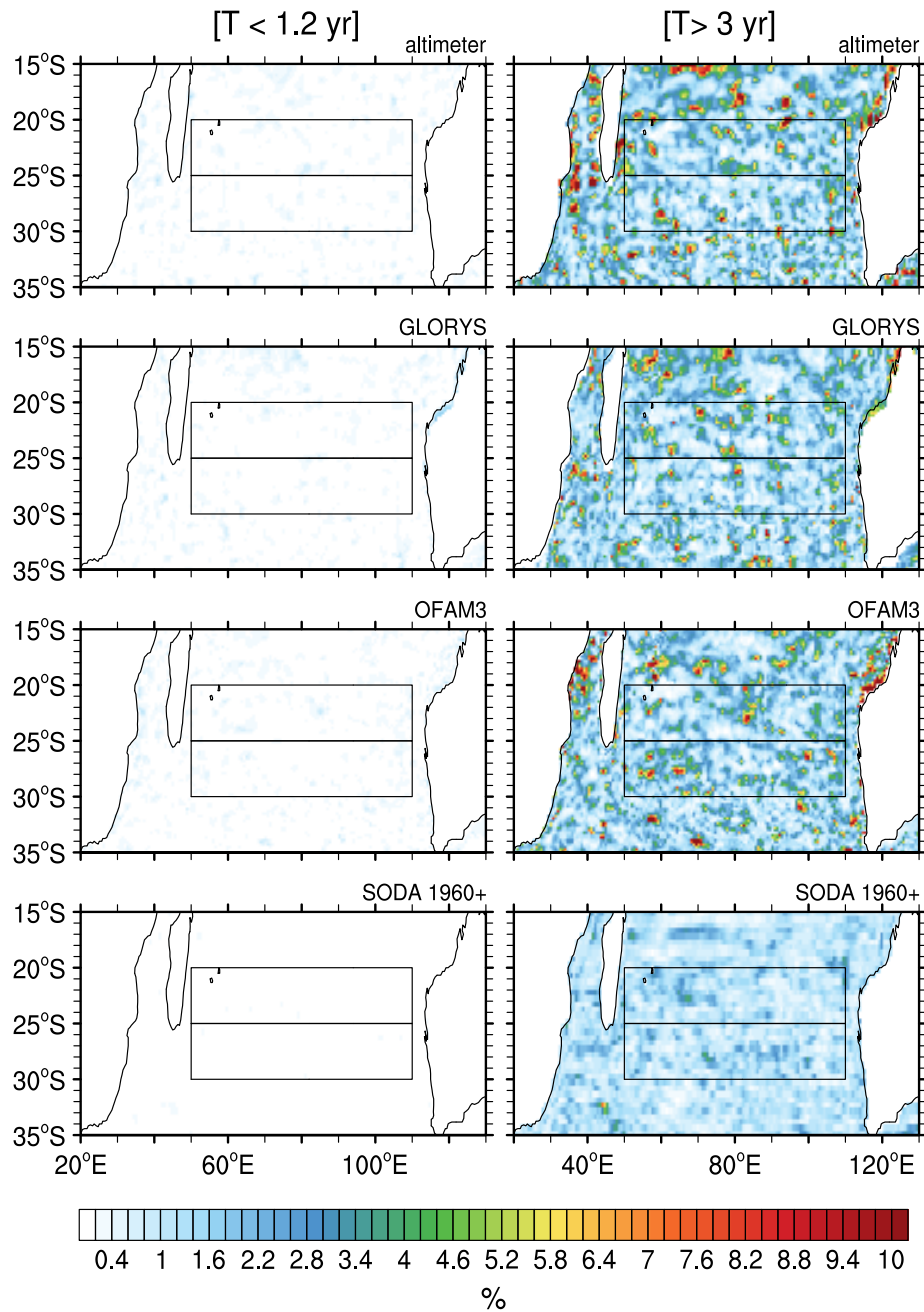
**Table 3.** Global variance (%) explained by the band-limited datasets. Total variance (last row) is the sum of the band-limited datasets variances. In brackets, global variance from the SODA subset (1960-2010).

	Period (years)	Gridded Data				Tide Gauge				
		altimeter	GLORYS	OFAM3	SODA	REU	MAU	ROD	HED	FRE
up to annual	$T < 1.2$	76.7	74.8	75.1	69.2 [68.9]	67.6	76.7	70.2	62.4	46.1
QB	$1.2 \leq T < 3.0$	13.4	14.1	13.9	13.1 [16.0]	9.4	5.7	10.3	7.8	9.5
ENSO	$3.0 \leq T < 7.0$	5.1	5.6	5.6	6.2 [7.0]	3.0	2.5	2.5	8.2	11.5
QD	$7.0 \leq T < 10.0$	1.3	1.7	1.2	2.0 [1.7]	0.02	0.01	1.3	0.49	1.8
TREND	$T \geq 10.0$	2.5	2.9	3.2	9.0 [5.3]	19.8	15.0	15.6	20.3	31.0
total var		99.0	99.1	99.0	98.8 [98.9]	99.9	99.9	99.9	99.3	99.9

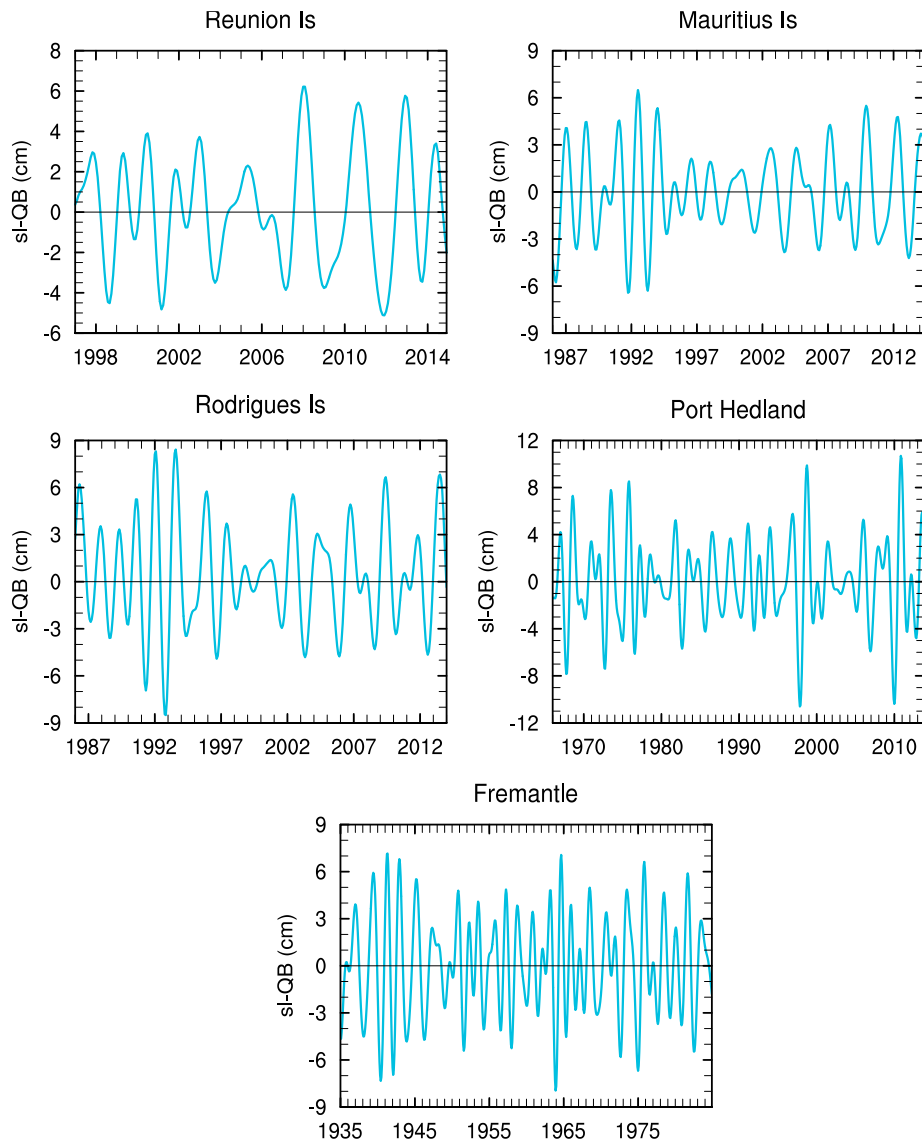




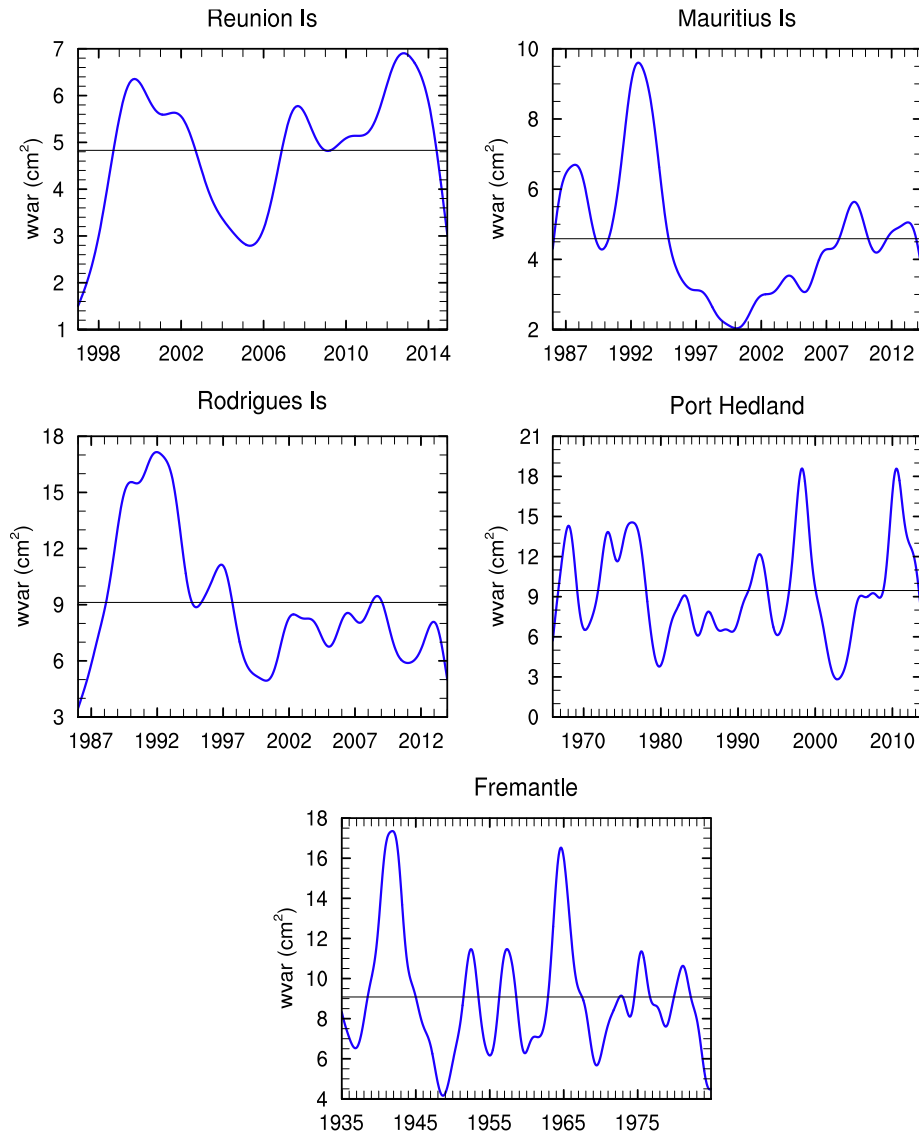
**Figure S 1.** Quasi-biennial band-limited time series of the zonal transports  $0/200$  m averaged in the SICC region ( $25^{\circ}S-30^{\circ}S$ ) from SODA. (a): western sub-basin (averaged between  $50^{\circ}E-70^{\circ}E$ ). (b) eastern sub-basin (averaged between  $90^{\circ}E-110^{\circ}E$ ).



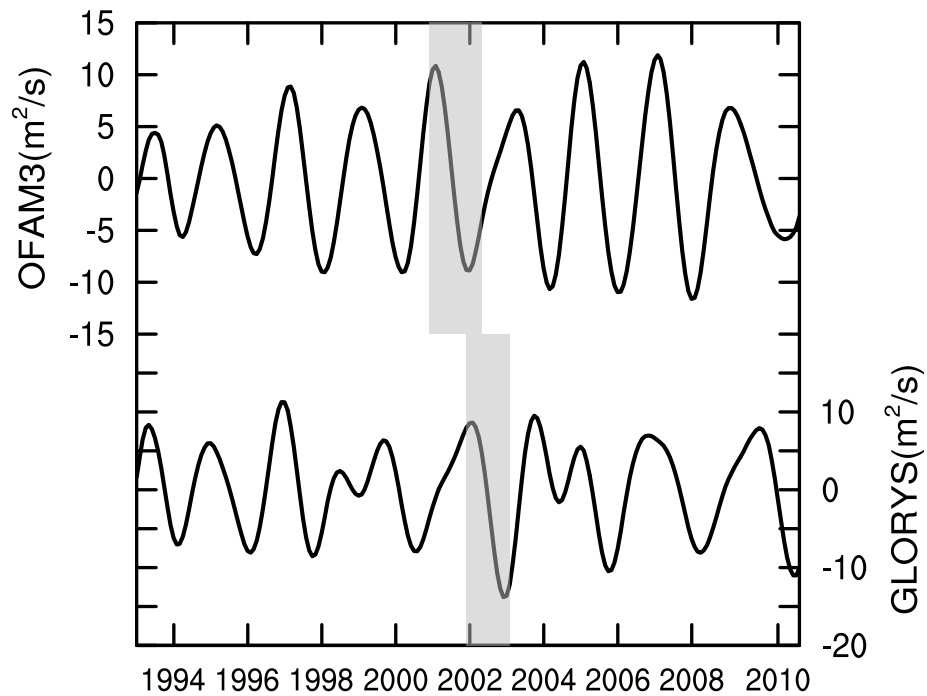
**Figure S 2.** Energy in the QB band explained by periods less than 1.2 yr (left maps) and by periods larger than 3 years (right maps). Percentages are relative to the local dominant QB spectral peak power. See text for details. Rectangular boxes show the regions studied by the wavelet method.



**Figure S 3.**  $sl$ -QB band from five Tide Gauges (TG): three in the western basin (Reunion, Mauritius and Rodrigues Islands) and two in the eastern basin (Port Hedland and Fremantle). Note the time span of each plot is different. Data from Fremantle shown here covers the period 1935-1985. Complete time series from Fremantle is shown in Figure 11 of the manuscript.

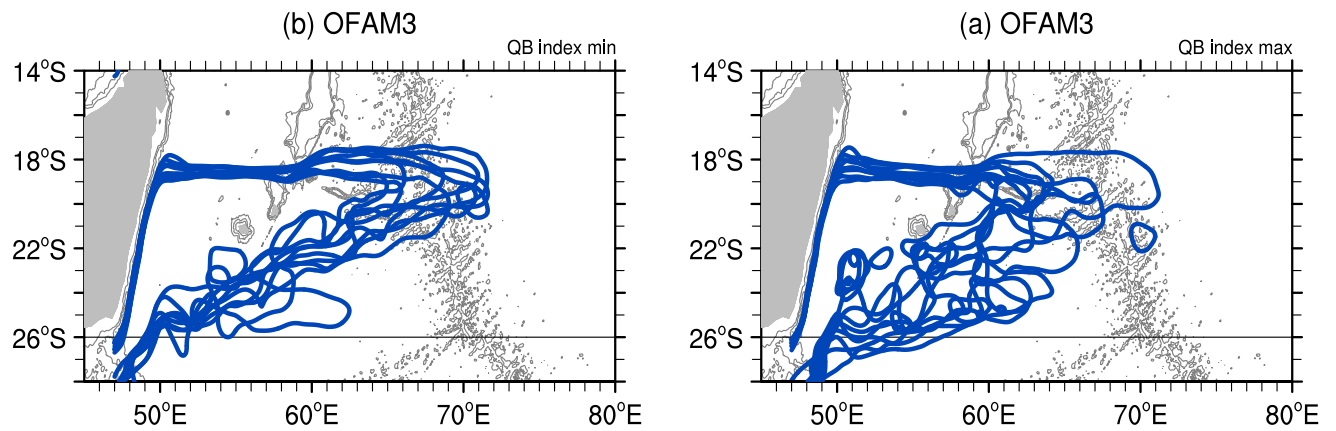


**Figure S 4.** Scale-average wavelet variance of the  $sl'$ -QB band from Reunion, Mauritius, Rodrigues, Port Hedland and Fremantle Tide Gauges. Note the time span of each plot is different. Black lines indicate the respective time-average variances. Data from Fremantle shown here covers the period 1935-1985. Complete time series from Fremantle is shown in Figure 11 of the manuscript.



**Figure S 5.** QB band-limited time series of the zonal transports 0/200 m average between 70°E-80°E and 23°S-25°S from OFAM3 (upper) and GLORYS (lower). Grey shading indicates the time of the maximum and minimum plotted in Figure 9.





**Figure S 6.** Extent of the northern cell of the subtropical gyre from OFAM3 at the times of minima (a) and maxima (b) in the QB index. Blue contours are the 62 cm of the QB band SSH reconstructed fields. Gray contours are the 1000 m, 2000 m and 3000 m isobaths from Smith-Sandwell 2-minute bathymetry.