

Table S4. The heat flux calculated by the observed velocity and temperature from the current meters and the nearby temperature loggers (unit is $^{\circ}\text{C cm s}^{-1}$). STD denotes the Standard Deviation.					
PMB1	RCM8-10867 at 367 m depth/microCAT-315 at 368 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.06	-0.82	1.84	4.03
	meridional	0.02	-0.49	1.37	3.9
	RCM-10919 at 459 m depth/microCAT-316 at 460 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.02	-0.51	1.6	2.9
	meridional	0.02	-0.51	0.98	3.17
	RCM-10282 at 571 m depth/microCAT-317 at 572 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.03	-1.15	1.26	2.7
	meridional	0.01	-0.74	1.29	3.48
	RCM-7837x at 735 m depth/microCAT-318 at 725 m depth (No temperature data)				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	Nan	Nan	Nan	Nan
	meridional	Nan	Nan	Nan	Nan
PMB2	RCM8-10868 at 370 m depth/microCAT-319 at 371 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.09	0.01	2.36	4.44
	meridional	0.11	1.77	1.83	3.73
	RCM8-10993 at 462 m depth/microCAT-320 at 463 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.03	0.61	2.13	5.17
	meridional	-0.08	2.08	1.34	4.17
	RCM8-10917 at 657m depth/microCAT-321 at 647 m depth				

		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.01	1.69	1.8	4.24
	meridional	0.01	1.54	1.48	3.13
PBM3	RCM8-10914 at 347 m depth/SBE39-089 at 324 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.22	-2.53	3.05	5.75
	meridional	0.18	1.82	3.09	4.98
	RCM8-10869 at 439 m depth/microCAT-323 at 440 m depth (No temperature data)				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	Nan	Nan	Nan	Nan
	meridional	Nan	Nan	Nan	Nan
	RCM8-10996 at 551 m depth/microCAT-324 at 552 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.05	-1.74	2.72	5
	meridional	0.08	0.68	2.4	4.11
	RCM8-10311 at 663 m depth/microCAT-325 at 664 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.19	-3.61	2.66	5.27
	meridional	-0.14	1.57	1.83	3.85
	RCM5-8670x at 753 m depth/microCAT-326 at 743 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.03	-1.38	2.54	4.68
	meridional	0.02	-0.96	2.2	4.83
PBM4	RCM8-10915 at 459 m depth/microCAT-328 at 460 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.01	-1.48	1.12	3.87
	meridional	0.01	0.42	1.98	3.99

	RCM8-10768 at 523 m depth/microCAT-329 at 513 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.03	-1.22	1	3.92
	meridional	0.01	0.89	1.71	3.69
PBM5	RCM8-10704 at 457 m depth/microCAT-332 at 447 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.01	-1.42	0.76	5.26
	meridional	-0.01	-3.54	2.46	4.77
PBM6	RCM8-10916 at 457 m depth/microCAT-908 at 458 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.01	-3.24	1.23	5.95
	meridional	0.01	-0.07	1.81	5.24
	RCM8-10701 at 681 m depth/SBE39-111 at 682 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.01	-4.07	1.01	6
	meridional	0.01	0.31	1.79	4.99
	RCM8-10703 at 771 m depth /microCAT-911 at 761 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.01	-3.23	1.66	6.21
	meridional	0.01	1.11	2.1	5.3
PBM7	RCM8-10918 at 470 m depth/microCAT-913 at 471 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.01	9.22	2.29	6.22
	meridional	0.03	4.86	2.16	4.87
	RCM8-7838x at 582 m depth/microCAT-914 at 583 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport

	zonal	-0.03	8.02	2.64	5.62
	meridional	-0.01	3.69	1.89	3.98
	RCM8-10998 at 694 m depth/microCAT-119 at 695 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.05	6.68	2.89	5.5
	meridional	-0.06	2.17	1.64	3.69
	RCM8-10702 at 906 m depth/microCAT-120 at 907 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	0.05	6.15	3.06	5.88
	meridional	0.01	0.85	1.35	3.19
	RCM9-597_9 at 1120 m depth/microCAT-121 at 1110 m depth				
		tidal heat transport	residual heat transport	STD of tidal heat transport	STD of residual heat transport
	zonal	-0.03	2.9	2.76	4.6
	meridional	0.01	-0.34	0.87	2.7