

## **1 Supplemental figures**

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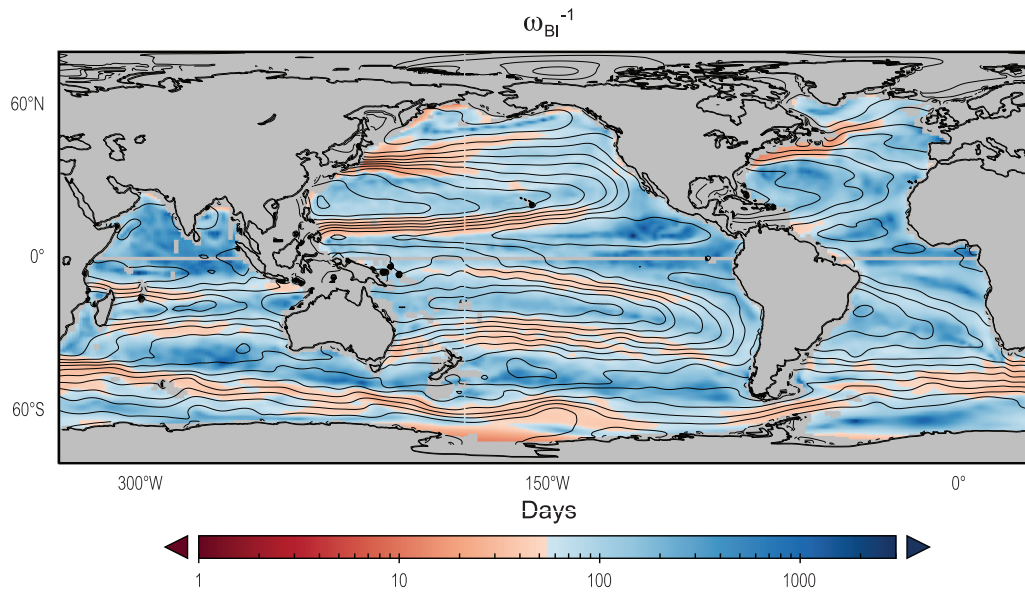
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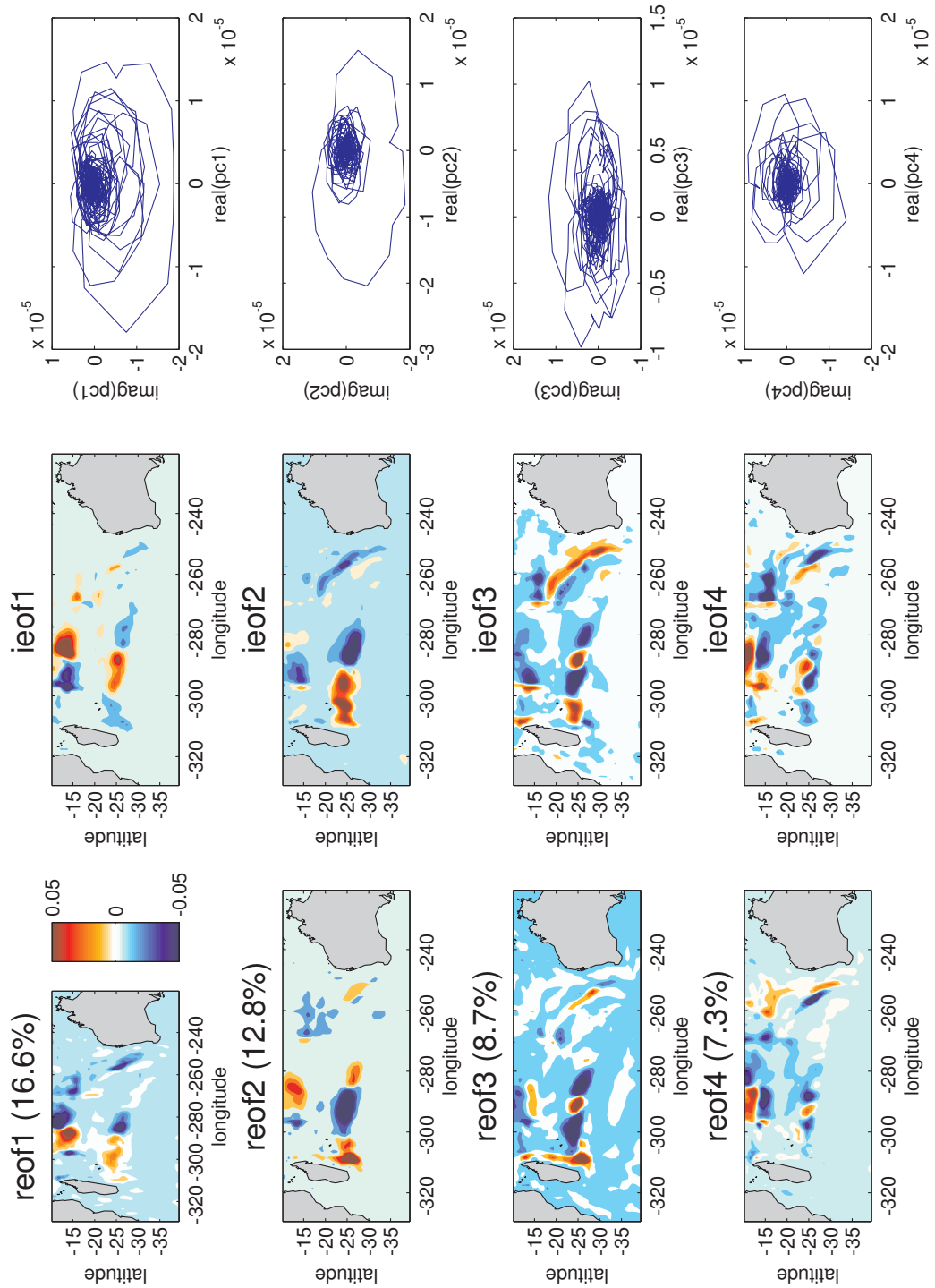
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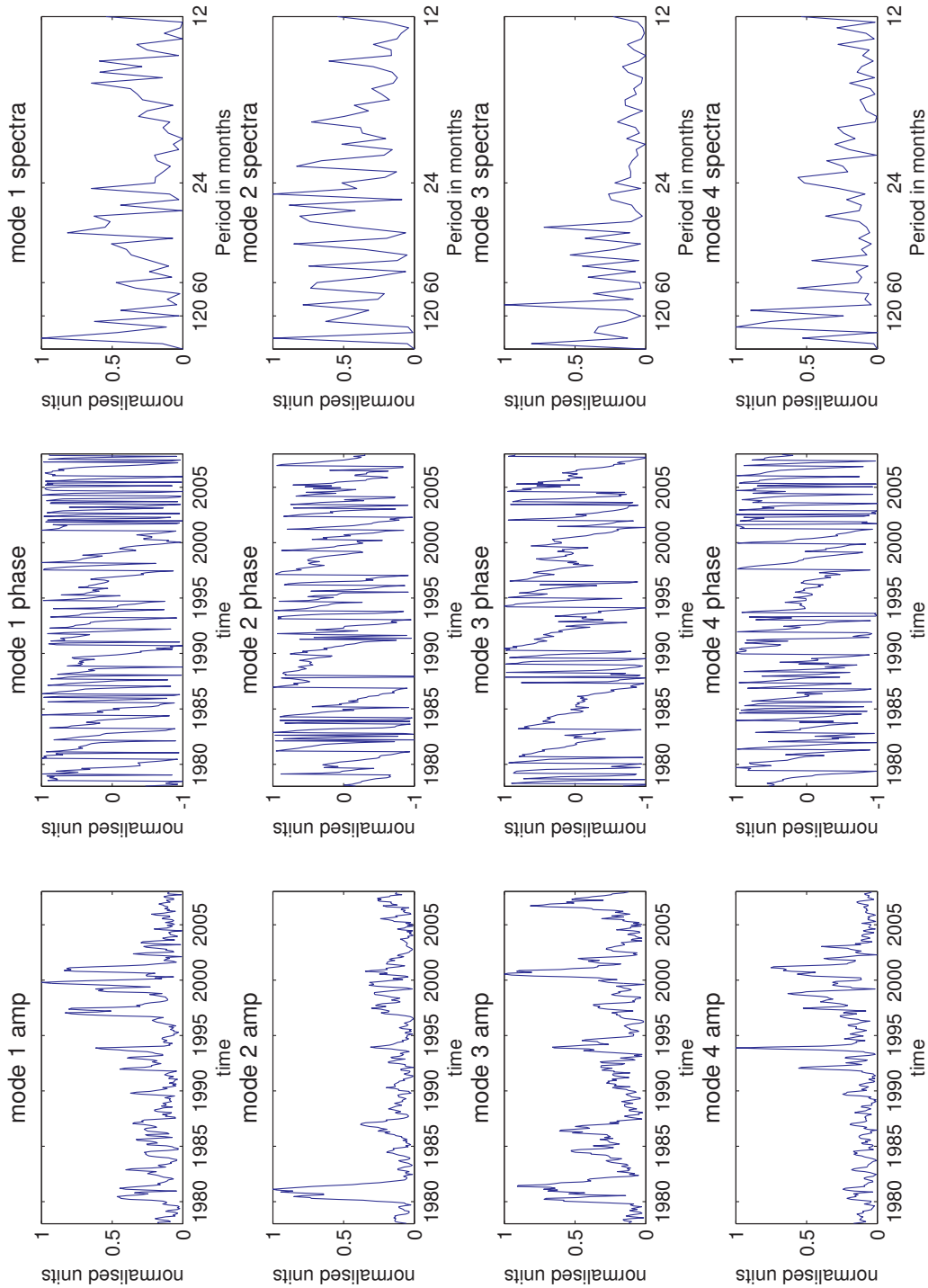
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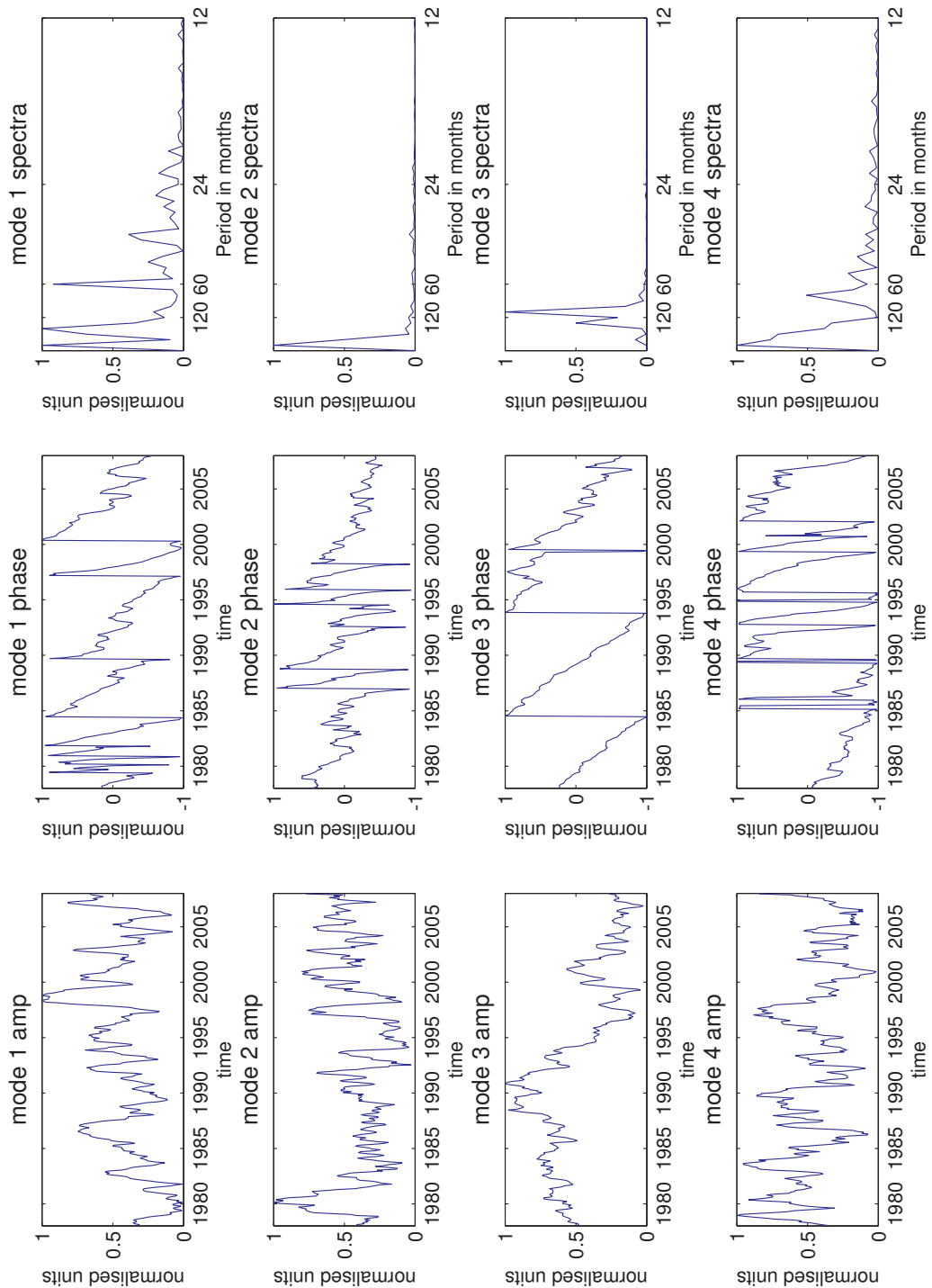
**Figure 1.** Observational estimate of the Eady growth period ( $1^\circ \times 1^\circ$  resolution) calculated using monthly T and S fields from the World Ocean Atlas (WOA09) and monthly velocity and monthly climatological density estimates based on Argo data gathered over the period December 2004 to November 2010.



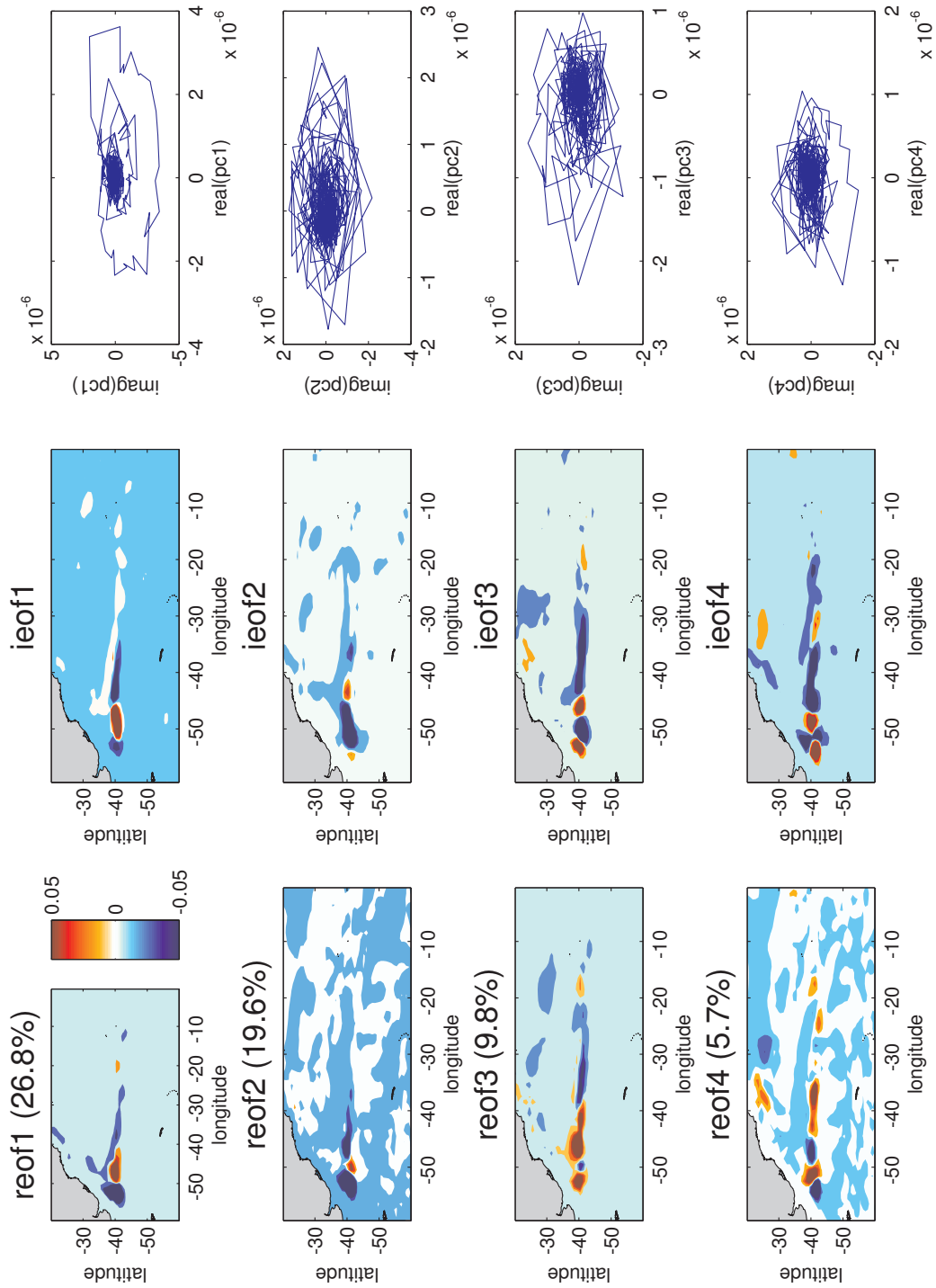
**Figure 2.** The leading 4 CEOFs of  $\Phi'$  for the South Indian Ocean. Spatial patterns are shown for the real (left), imaginary (middle) parts as well as the phase portraits (right). The explained variance for each CEOF is indicated in the left column. Latitudes and longitudes are in degrees with negative values corresponding to  $^{\circ}$  South and  $^{\circ}$  West respectively.



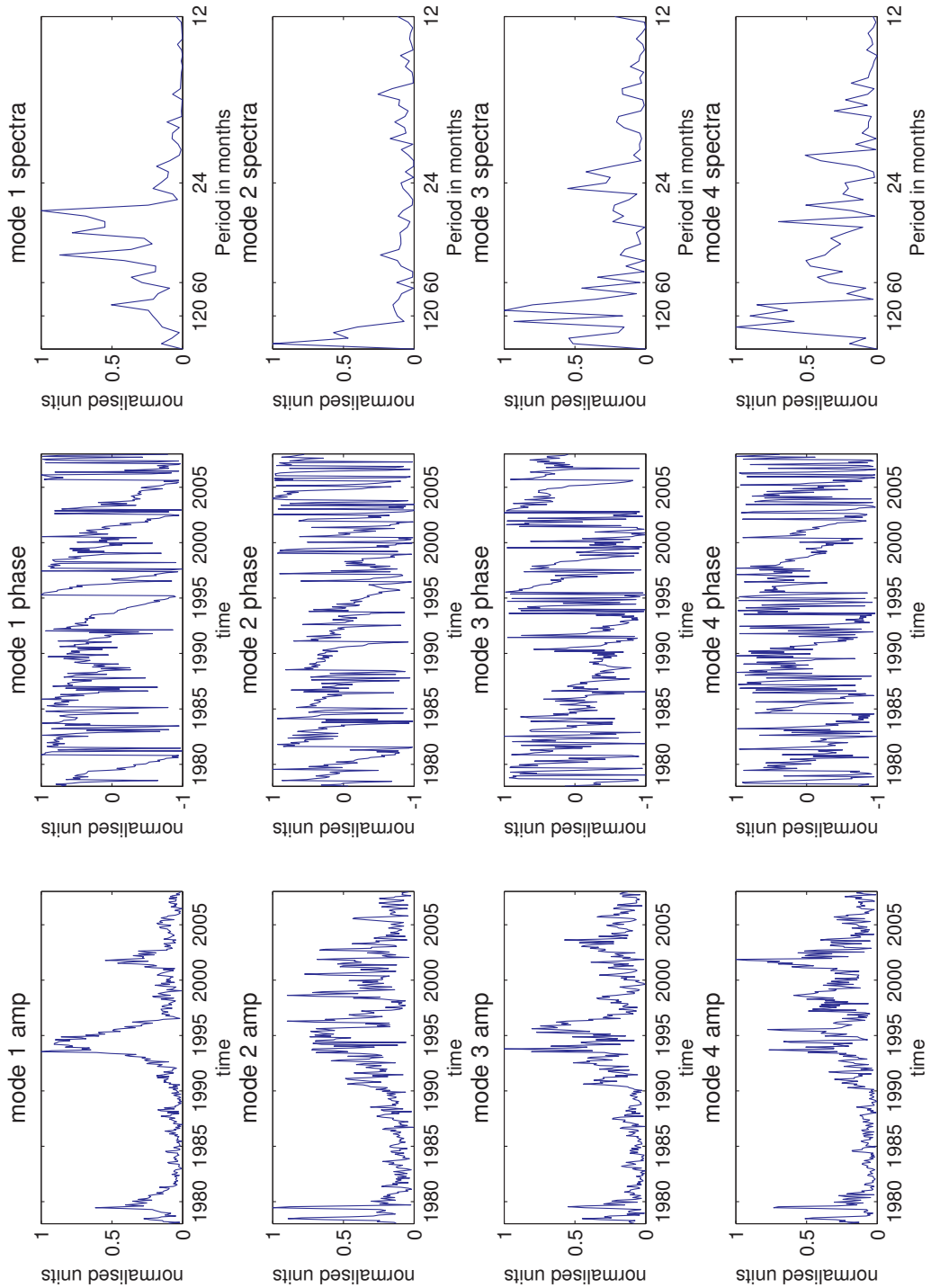
**Figure 3.** The leading 4 CEOF temporal amplitudes, phases and spectra of  $\Phi'$  for the South Indian Ocean. For clarity amplitudes and phases are only shown for the last 30 year period 1978-2007.



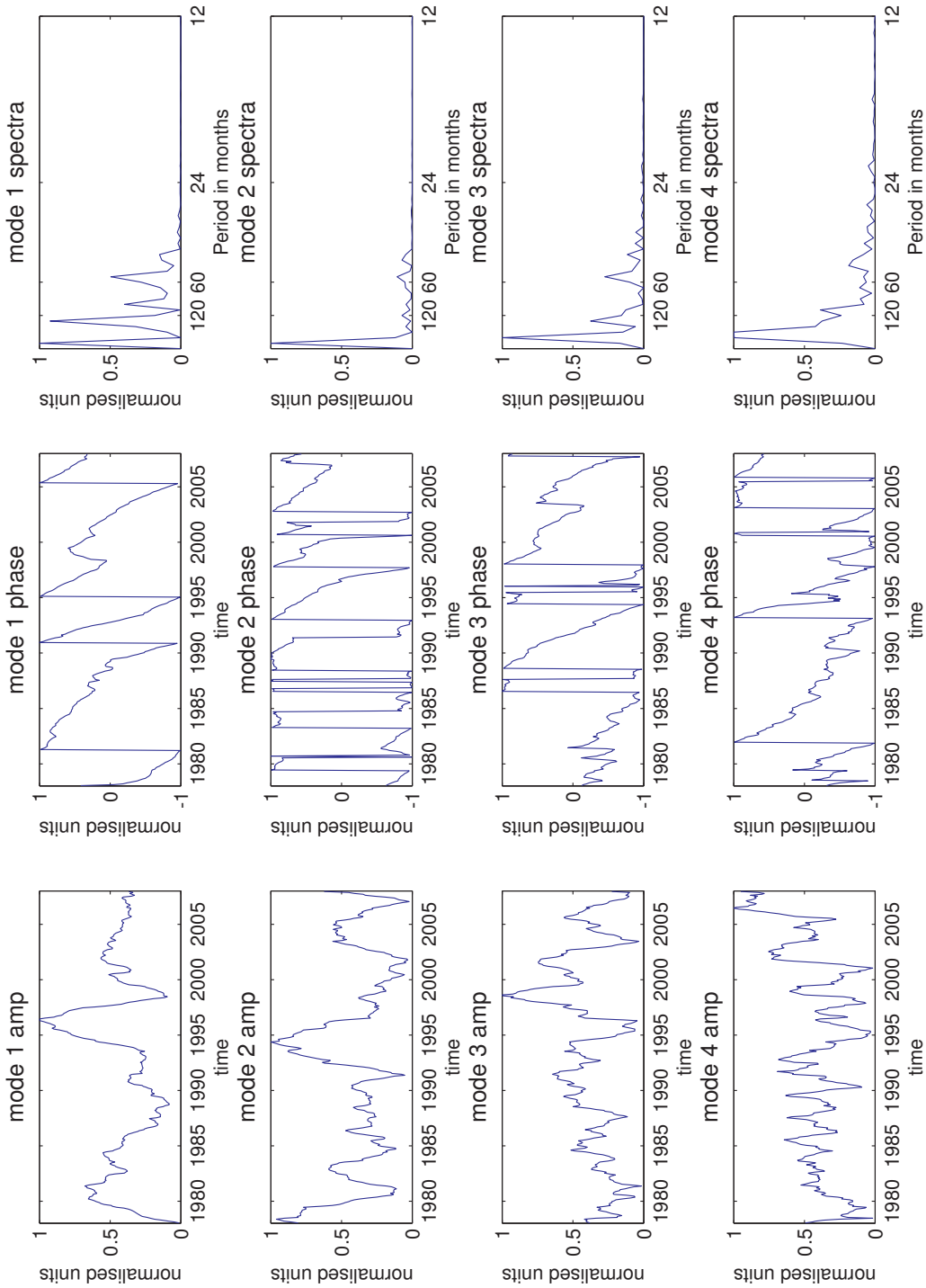
**Figure 4.** The leading 4 CEOF temporal amplitudes, phases and spectra of temperature for the South Indian Ocean. For clarity amplitudes and phases are only shown for the last 30 year period 1978-2007.



**Figure 5.** The leading 4 CEOfs of  $\Phi'$  for the South Atlantic Ocean. Spatial patterns are shown for the real (left), imaginary (middle) parts as well as the phase portraits (right). The explained variance for each CEOf is indicated in the left column. Latitudes and longitudes are in degrees with negative values corresponding to  $^{\circ}$  South and  $^{\circ}$  West respectively.

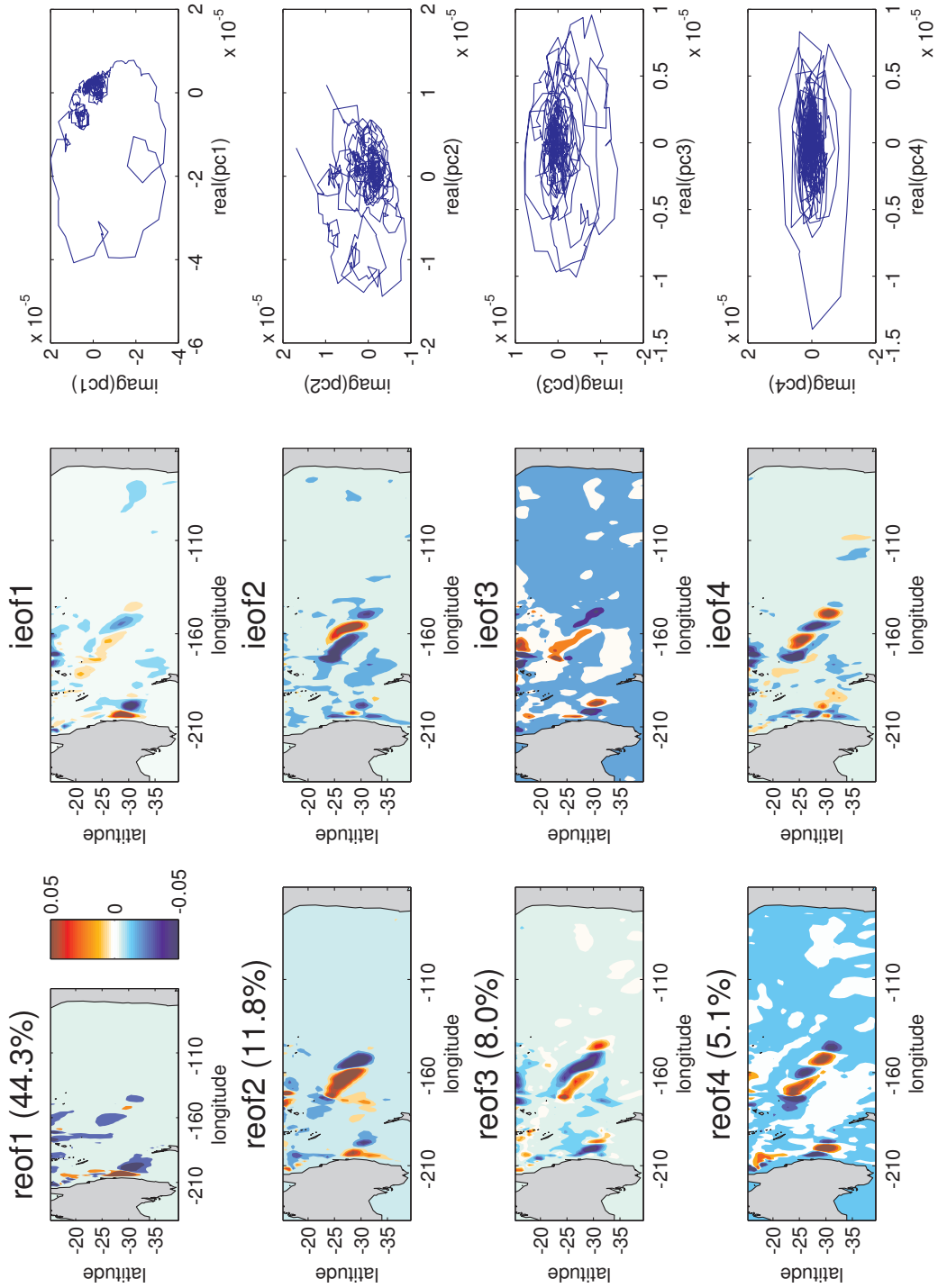


**Figure 6.** The leading 4 CEOF temporal amplitudes, phases and spectra of  $\Phi'$  for the South Atlantic Ocean. For clarity amplitudes and phases are only shown for the last 30 year period 1978-2007.

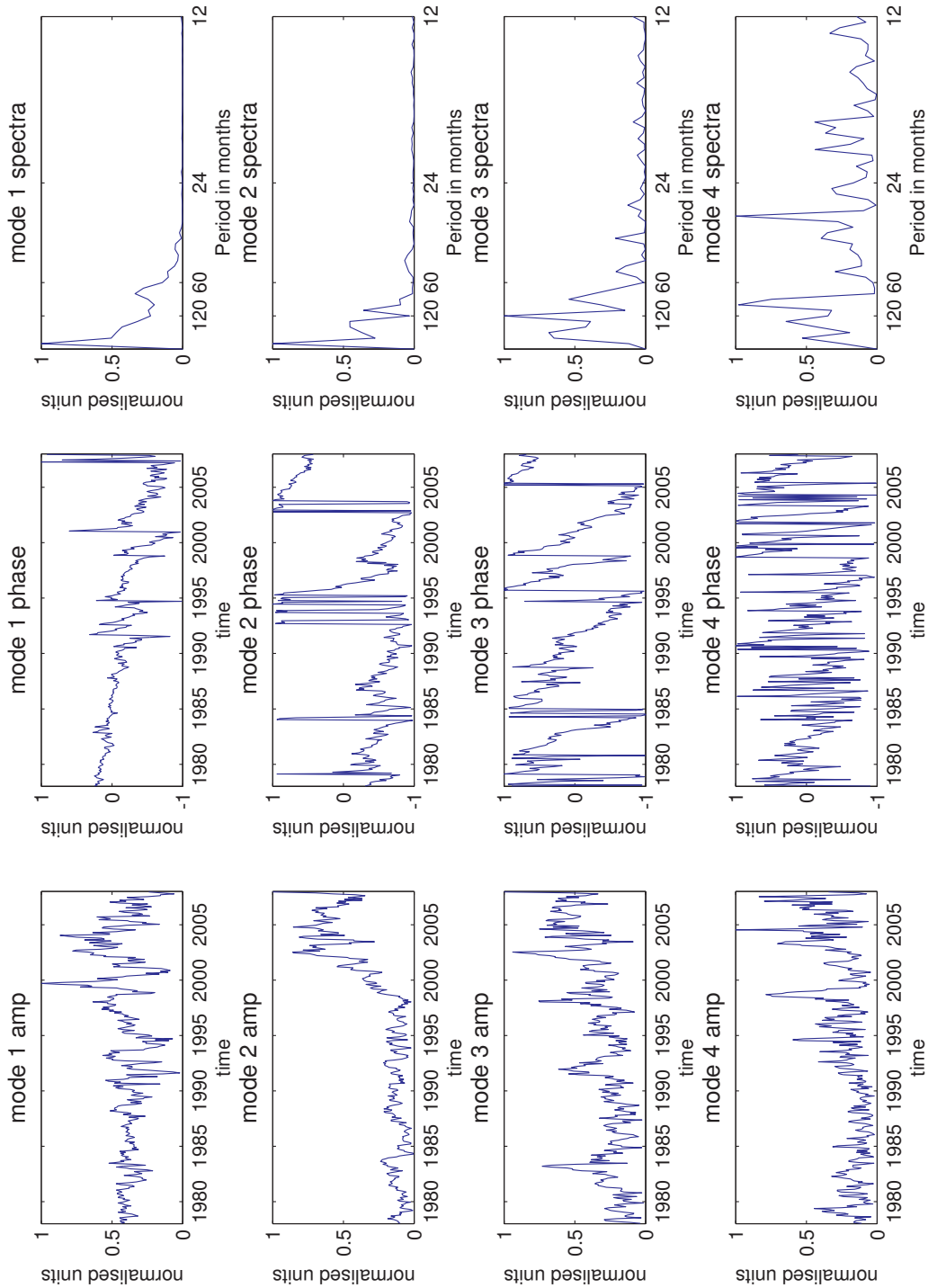


**Figure 7.** The leading 4 CEOF temporal amplitudes, phases and spectra of temperature for the South Atlantic Ocean. For clarity amplitudes and phases are only shown for the last 30 year period 1978-2007.





**Figure 8.** The leading 4 CEOFs of  $\Phi'$  for the South Pacific Ocean. Spatial patterns are shown for the real (left), imaginary (middle) parts as well as the phase portraits (right). The explained variance for each CEOF is indicated in the left column. Latitudes and longitudes are in degrees with negative values corresponding to  $^{\circ}$  South and  $^{\circ}$  West respectively.



**Figure 9.** The leading 4 CEOF temporal amplitudes, phases and spectra of  $\Phi'$  for the South Pacific Ocean. For clarity amplitudes and phases are only shown for the last 30 year period 1978-2007.