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MOC Transports at the Agulhas Leakage: measured *in situ* versus remotely sensed

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The Agulhas leakage is a significant pathway in the Atlantic MOC. Waters from the Indian and Southern Oceans enter the South Atlantic at this highly energetic interface west of the Agulhas Retroflection. As the Indian Ocean waters are warmer and saltier than their Drake Passage counterparts, this pathway has been dubbed the "warm water route". While it is likely that the Agulhas leakage occurs at a number of scales, rings are known to be an important component.

We make two time series measurements of the strength of the warm water route at the Agulhas leakage. The first is from an *in situ* program – the Agulhas-South Atlantic Thermohaline Transport Experiment (ASTTEX) – which deployed a suite of 16 moorings across a $\sim$1000 km span of the Agulhas leakage for over two years. We present here the primary results from the ASTTEX program: the mass and anomalous heat and salt transports into the South Atlantic Ocean due to the Agulhas leakage. The temporal and spatial characteristics of these transports at different density horizons are examined in detail. ASTTEX program provides the first *in situ* time series measurement of the Agulhas leakage which resolves the mesoscale (ring) component.

The second method of measuring the Agulhas leakage is based on remote sensing and uses a version of the Gravest Empirical Mode (GEM-remote sensing, or GEM-RS) to interpret Topex/Poseidon and Jason-1 satellite altimetry. The ASTTEX moorings were deployed along Topex-Jason groundtrack 133 and to make the GEM-RS measurement, altimeter data along the same track are used. The relative accuracy and characterstics of transports measured using GEM-RS are thus able to be evaluated directly against the *in situ* measurements from ASTTEX. While the comparison period is limited to the two-year time span of the mooring deployment, the length of the overlapping altimeter missions allows time series of the Agulhas leakage to be extended to over a decade.

From a measurement of this length we are able to begin to assess the likely sources of interannual-decadal variability at this point in the Atlantic MOC, several of which are considered herein.