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Mutual information between SSH and SST fields

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Mutual information between SST and SSH

Investigations to relate satellite SST and SSH measurements in the Agulhas return current region are presented. In this study, we focus on the use of SSH and SST maps obtained during the year 2004, corresponding to a particularly well-sampled period for altimetry. The SST and SSH anomalies are then obtained as high-pass filtered fields, to analyze scales smaller than approximately 300km. As revealed, we clearly distinguish different regimes. During the winter months, a marked strong correlation between fields of SSH and SST anomalies is clearly revealed. During the summer months, a much lower correlation is found. Further conditioning the analysis to separate the areas of positive and negative SSH anomalies, it is then obtained, for both summer and winter periods, that aeras of negative SSH anomalies always correspond with areas of negative SST anomalies. This high correspondance also applies in winter but only for areas of positive SSH anomalies, which indeed well match with areas of positive SST anomalies. In summer, this high correspondance is lost, and areas with positive SSH anomalies do not necessarily correspond to positive SST anomalies. Accordingly, such an effect affects and weakens the overall SST/SSH correlation during the summer months. Yet, the areas of positive SSH anomalies are not fully disconnected from the areas of positive SST anomalies. For these cases, observations and results demonstrate a systematic spatial shift between them. This suggests the influence of the mixed layer depth and wind speed to control the spatial correspondance between SST and SSH anomalies, especially below regions of positive SSH anomalies. In such cases, the upper layer SST anomalies are certainly advected by the interior flow to also provide means to relate surface observations and interior dynamics.