SELF-CONSISTENT APPROACH TO ESTIMATING LONG-TERM AND INTERANNUAL VARIABILITY WITH COMBINED SPATIAL SCALES IN HISTORICAL DATA SETS

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1. MOTIVATION

All interpolation procedures require the assumption of various a-priori estimates: mean and covariance of the target fields as well as observational error variances. All these procedures are usually performed for individual scales and sometimes not followed. Schneider (2001) proposed an Expectation-Maximization based procedure that allows to achieve posterior consistency of the analysis results with a priori assumptions. The practical implementation of this procedure also requires the appropriate treatment of small scales. For working with small scales one needs to incorporate the dependent spatial and temporal scales in the analysis. This is possible only if the covariance of observational error is also correctly estimated.

2. NEW PROCEDURE

We need to model it adequately

3. EXAMPLE: RS SOLUTION

Spatially non stationary covariance structure:

4. SMALL-SCALE VARIABILITY

There is significant room for improvement, as far as reconstruction of small-scale variability is concerned. We need to model it adequately

6. SMALL-SCALE VARIANCE

Small-Scale Variability Estimates

5. AUTOCORREL. STRUCTURES

Traditional estimates [Friedrich et al. 1993, Kaplan et al., 1997] of the small-scale variability (SSV) for the SST from ship data in the ICOADS data base [Woodruff et al. 1987] gives a noisy pattern with an obvious impact from sampling error in areas with poor coverage. Our recent attempts to compile a better estimate (Kaplan et al., in prep.) use few different sources for estimating the SSV: they combine estimates for the variability on the scales longer than 1' and 1 week from the analysis of Reynolds and Smith [1994], which blends AVHRR and in situ data; variability on scales longer than 0.5' and 1 day taken from the RTG analysis by Thiébaut et al. [2000], which uses various types of satellite data and is only available since 2001; yet shorter scale variability is inferred from Kim et al. [1999]. The resultant field is smoother and in general higher (particularly in high latitudes) than that from ICOADS. Unfortunately, it still underestimates the SSV.

7. SSV CONSISTENCY CHECK

7. REFERENCES