Discussing Sea Surface Temperature Climatology

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Figure of merit: 0.5 K
-- Buoy accuracy
-- RMS of global analyses v. buoy
• What is climatology?
• How long a period is needed to establish it?

• What resolution is needed for SST analysis?
• Does it vary in space?

• Beyond the first moment, what are the statistics of the 2nd, 3rd, and 4th moments of SST?
• What do they tell us?

• Information Theory Intro + Illustration

• n.b.: This consideration is driven by interest in climatology for use in near real time daily SST analysis
Climate is what you expect, weather is what you get. R. A. Heinlein *Notebook of Lazarus Long*

But what is a reasonable expectation?

30 year WMO Standard (from where, exactly?) Continuum approach

Can we ‘expect’ a trend? (?!)

Mean through time, selected points
Resolution Requirements (vs. 30 year mean field!)

arcminutes (latitude) per 0.5 K
Higher Order Statistics – With Seasons

\[ \text{Sqrt(Variance)} \ (K) \]
Harmonic 3 Amplitude
With Seasonal Cycle

\[ \text{Sqrt(Variance)} \ (\text{K}) \]
(Computed w. seasonal cycle present!)
Shannon Information Theory

\[ I = - \sum (p_i \times \log(p_i)) \]

‘Tell me something I don’t know’
Shannon Information – Original Series (0.05 K bins)
Shannon Information – After Removal of mean and seasonal cycle (0.05 K bins)
% Information Explained
% Variance Explained