revisiting ECCO observational constraints

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ECCO2 meeting Nov. 9th 2009

Key algorithmic piece

- MITgcm/pkg/smooth

  Weaver and Courtier 2001, QJRMS,
  Correlation modelling on the sphere using a generalized diffusion equation.

- tentative applications

  Control vector adjustments
  Data constraints
  Map model variables @ different resolution

General approach to data constraints

- Start with point-wise observations
  as opposed to mapped products.
- Compare with point-wise model values.
- Then Smooth/Average point-wise misfits
  to constrain the large scales specifically.

⇒ no inconsistency between model and obs.
implied by the smoothing/averaging.
⇒ practical approach to error covariances.

- GRACE … altimetry … SST …
  … scatterometer winds … in situ.

Mean Dynamic Topography (MDT)

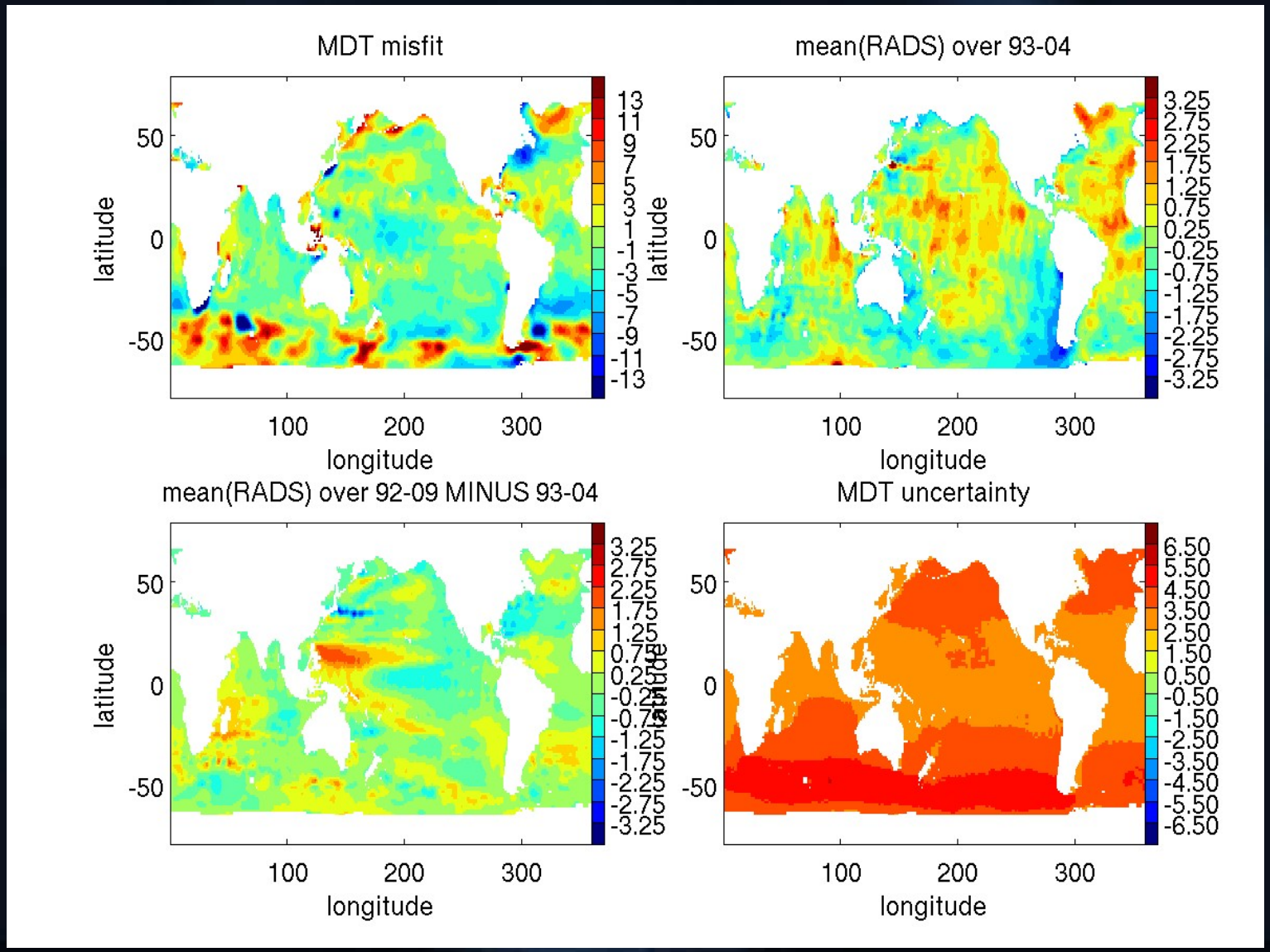
- Rio MDT, 1993-2004 average
- Model SSH, between T1 and T2
  (e.g. 1992-2009 or 2004-2005)

⇒ cross-reference using SLA_{RADS} data

- MDT misfit=

$$\langle SSH_{model} - SLA_{RADS} \rangle_{T1-T2} - [MDT_{Rio} - \langle SLA_{RADS} \rangle_{93-04}]$$

Mean Dynamic Topography (MDT)



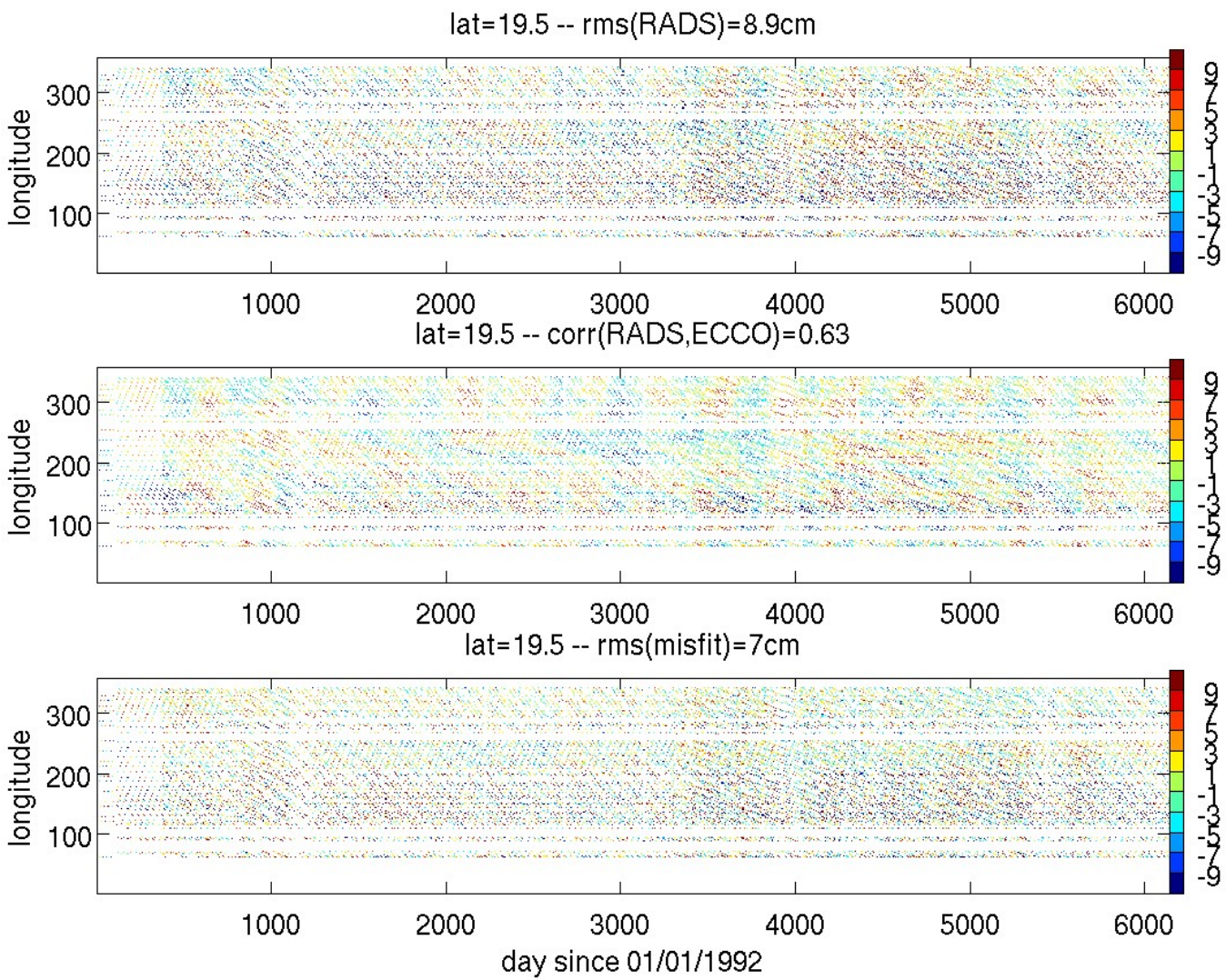
Sea Level Anomalies (SLA)

- Absolute Model SSH, over T1-T2
- Observed SSH Anomaly @ T3 in T1-T2

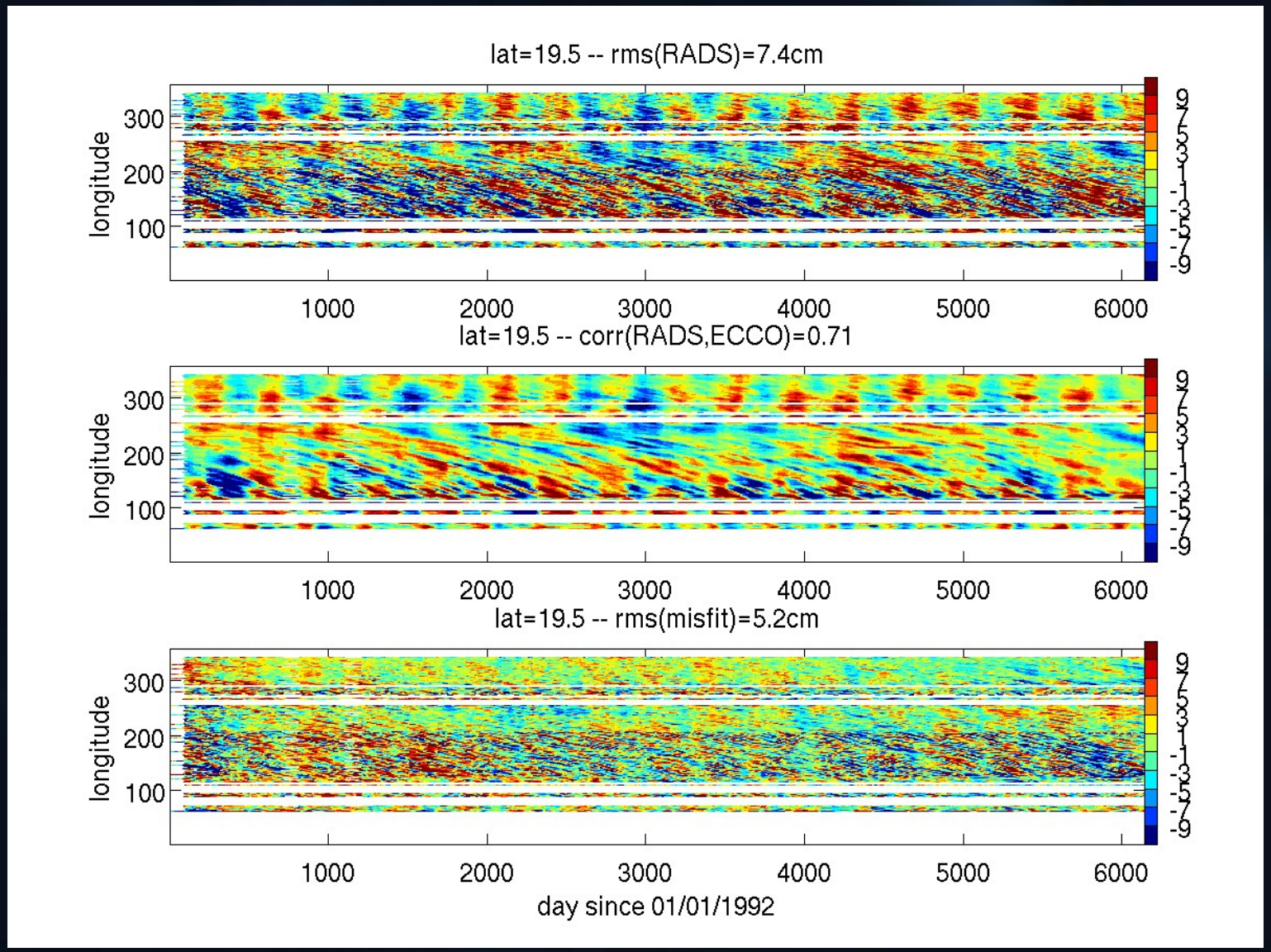
- SLA misfit=

$$SSH_{model}(T3) - SLA_{RADS}(T3) - \langle SSH_{model} - SLA_{RADS} \rangle_{T1-T2}$$

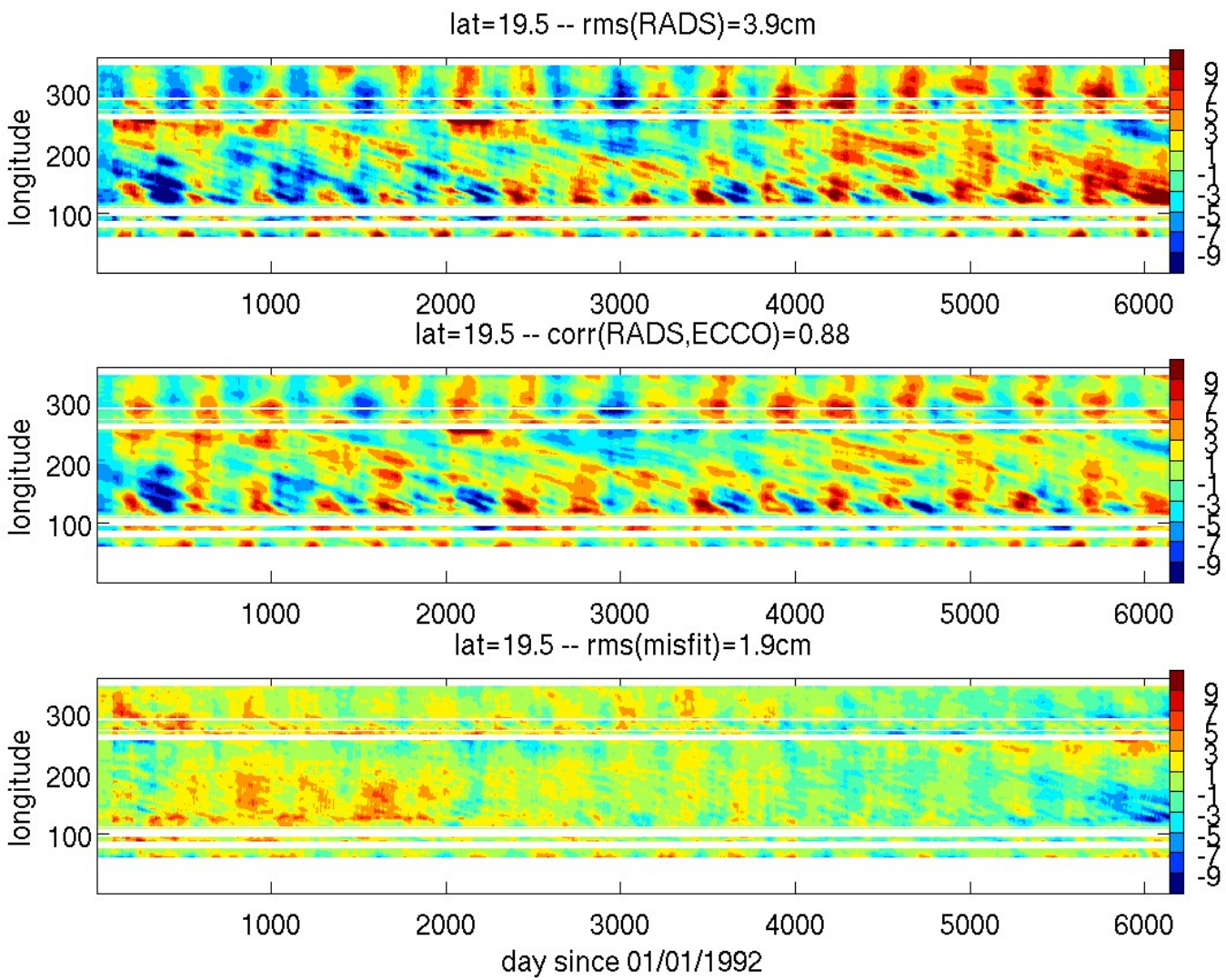
ECCO-RADS SLA misfits raw



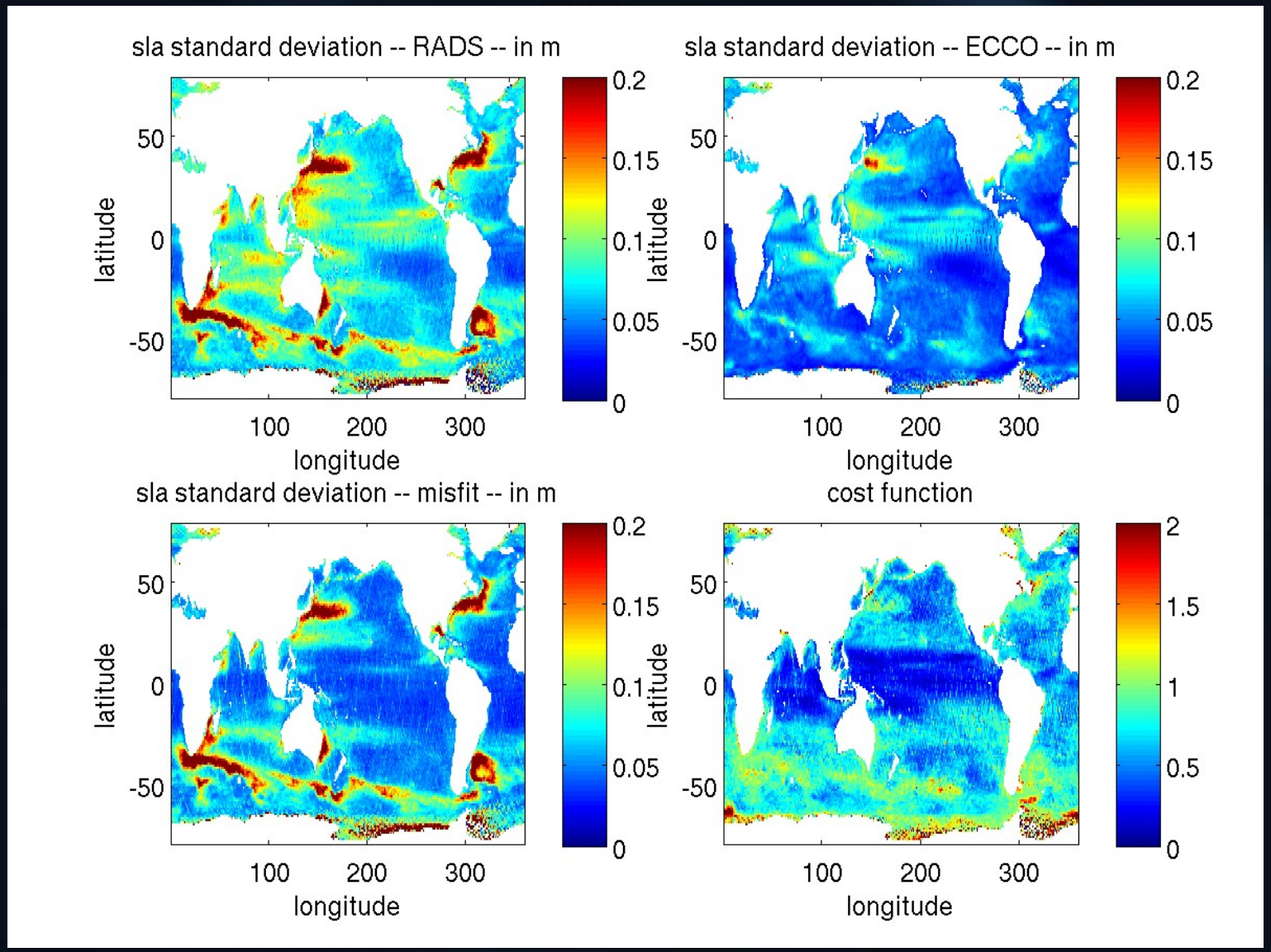
ECCO-RADS SLA misfits @ > 35-days



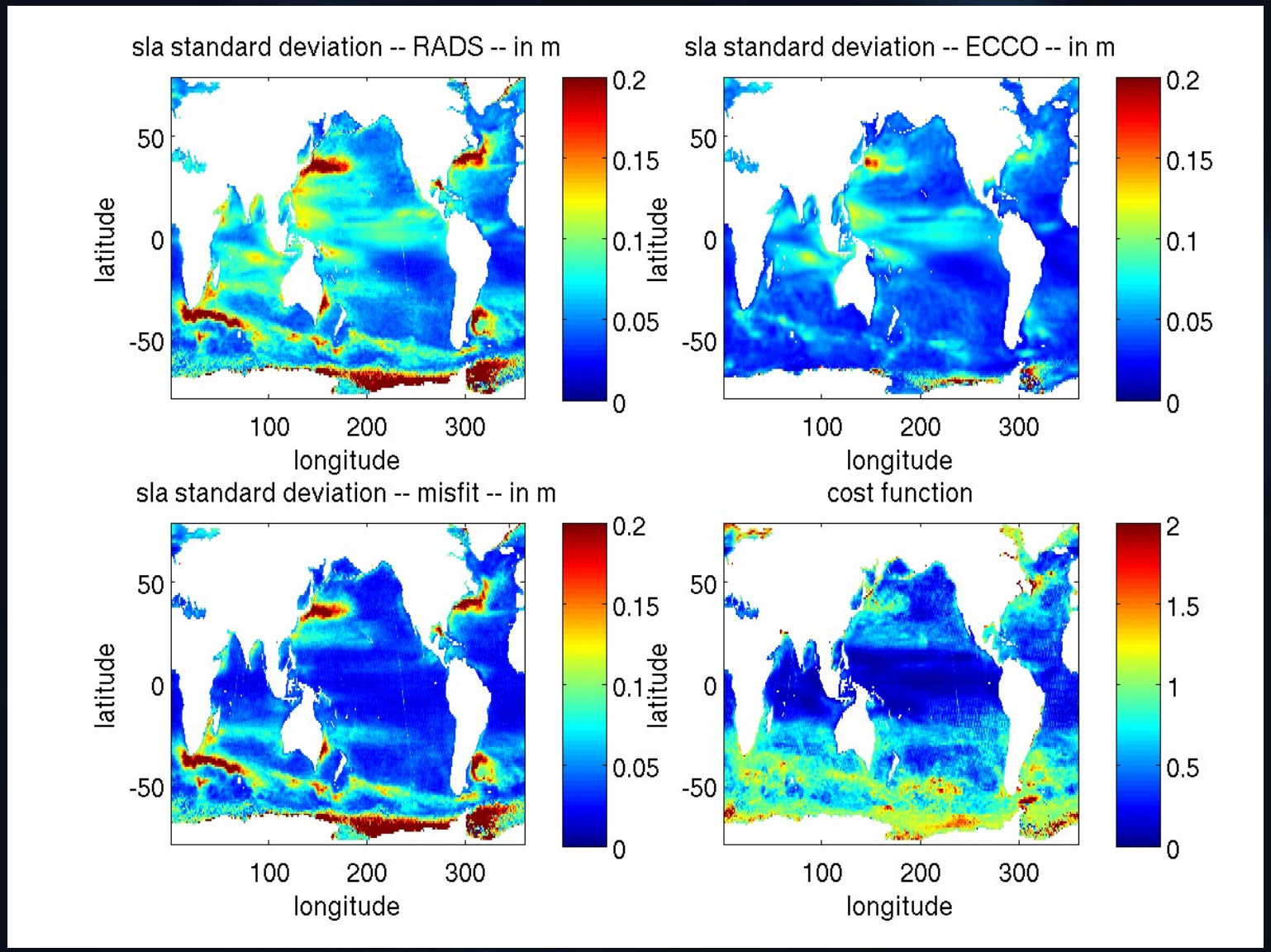
ECCO-RADS SLA misfits and @ > 300km



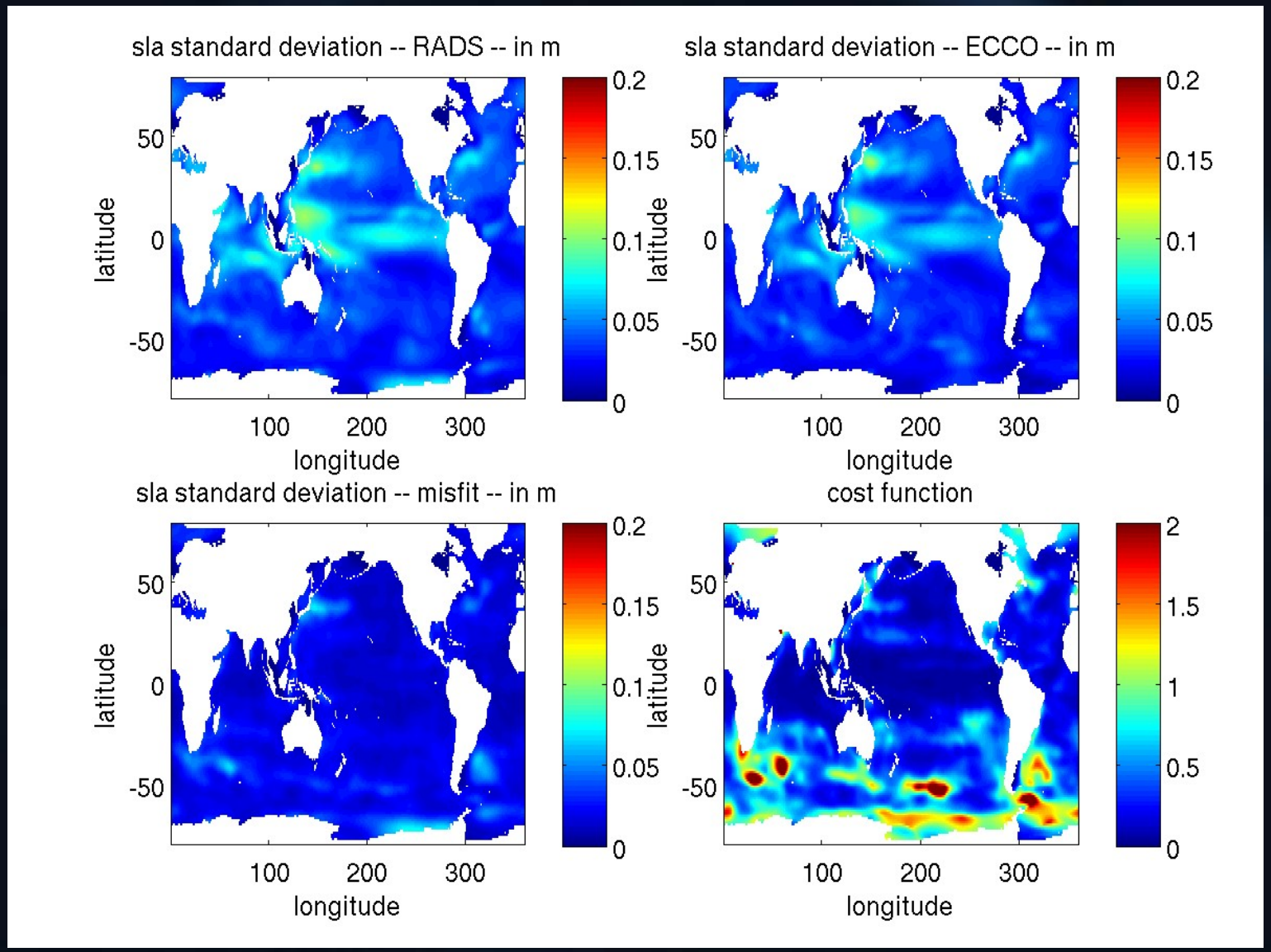
Signal/Noise amplitudes raw



Signal/Noise amplitudes @ > 35-days



Signal/Noise amplitudes and @ > 300km



ending notes

- MITgcm/pkg/smooth

  Weaver and Courtier 2001, QJRMS,
  Correlation modelling on the sphere using a generalized diffusion equation.

- cost_bp.F, cost_sshv4.F

- … cost_sstv4.F …