

Seminar on the Southern Ocean State Estimate

SIO219 Winter quarter, 2014

Thursday's, 11-noon, Nierenberg Hall 401

Lynne Talley with major assistance from Matt Mazloff

Goal: For participants to learn more about SOSE, its architecture, input data, uncertainties, and applications. In a 1-unit seminar, we cannot approach the depth of understanding of state estimates that a proper 4-unit course would provide, but this seminar should provide useful information and framework for your own more intensive exploration of state estimation and its uses.

Format: student/staff presentation each week, based on an in-depth paper and/or explore major website, and, if applicable, student/staff personal work/experience with SOSE or other state estimates or data assimilations

Credit and grading option: 1 unit, S/U only. Enrolled students are required to participate each week and to lead one week.

Syllabus

Jan. 8 Introduction to SOSE and state estimation – Matt Mazloff

Reading (skim): Mazloff, M., P. Heimbach, and C. Wunsch, An eddy-permitting Southern Ocean state estimate, *J. Phys. Oc.*, 40, 880-899, 2010. [\[pdf\]](#)

Jan. 15 Continuation of introduction to state estimation. Jessica Millar

Reading: Wunsch, C. and P. Heimbach, Dynamically and kinematically consistent global ocean circulation and ice state estimates. *Ocean Circulation and Climate*, 2nd Edition, Siedler, G., Griffies, S., Gould, J., Church, J. Eds., Elsevier, 553-579, 2013. [\[pdf\]](#)

Jan. 22 Workings of SOSE: the adjoint. Uriel Zajackovski

Reading: [C. Wunsch and P. Heimbach, 2007: "Practical Global Oceanic State Estimation." *Physica D.* \(pdf\)](#)

Jan. 29 Workings of MITgcm and SOSE: KPP parameterization. Veronica Tamsitt

Reading: MITgcm website documentation and Large, McWilliams and Doney, Oceanic vertical mixing: a review and a model with a nonlocal boundary layer parameterization. *Rev. Geophys.*, 32, 363-403. 1994.

Feb 5 State estimation practicum – a practice problem. Jinbo Wang

Feb. 12 State estimation practicum – discussion of results. Jinbo Wang.

Feb. 19 Kalman filtering comparison with state estimation. Aneesh Subramanian.

Feb. 26 (no seminar – Ocean Sciences Meeting)

March 5 SOSE and sea ice. Angelica Gilroy

March 12 SOSE uncertainties and validation. TBA.

Principal website links:

SOSE <http://sose.ucsd.edu>

MITgcm <http://mitgcm.org/>

Initial background papers and resources:

Mazloff, M., P. Heimbach, and C. Wunsch, An eddy-permitting Southern Ocean state estimate, J. Phys. Oc., 40, 880-899, 2010. [\[pdf\]](#)

[C. Wunsch and P. Heimbach, 2007: "Practical Global Oceanic State Estimation." Physica D. \(pdf\)](#)

Wunsch, C. and P. Heimbach, Dynamically and kinematically consistent global ocean circulation and ice state estimates. Ocean Circulation and Climate, 2nd Edition, Siedler, G., Griffies, S., Gould, J., Church, J. Eds., Elsevier, 553-579, 2013. [\[pdf\]](#)

Wunsch, C., Discrete Inverse and State Estimation Problems. With Geophysical Fluid Applications, Cambridge Un. Press, Cambridge 371pp., 2006.

Wunsch, C. [Inverse Methods, Inverse Problems, State Estimation, and Data Assimilation: 5 Lectures at Harvard January 2013 \(pdf\)](#)