

## **SIO 209 (Spring 2001)**

### Interannual to interdecadal extratropical coupled atmosphere–ocean variability

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*Time and location:* 12:00-1:20 pm Mondays in 223 Nierenberg Hall

*Synopsis:* Extratropical coupled atmosphere–ocean variability has received much research attention over the past several decades due to its significant biological and societal impacts and the potential for seasonal to interdecadal variability. However, many aspects are still not well understood such as mechanisms for atmosphere–ocean coupling and the role of the tropics on decadal time scales. We will read the foremost papers on the subject to better understand this important category of climate variability.

*Guidelines:* We will read and discuss about two papers per week. Students will take turns leading discussion. I intend this course to be useful for students of all backgrounds and will be available outside of class for extra help.

*Papers:* (available from <http://meteora.ucsd.edu/~jnorris/sio209.sp01.html>)

#### Observed atmosphere-ocean variability

Wallace, J. M., C. Smith, and Q. Jiang, 1990: Spatial patterns of atmosphere-ocean interaction in the northern winter. *J. Climate*, **3**, 990-998.

Deser, C., and M. L. Blackmon, 1993: Surface climate variations over the North Atlantic Ocean during winter: 1900-1989. *J. Climate*, **6**, 1743-1753.

Mantua, N. J., S. R. Hare, Y. Zhang, J. M. Wallace, and R. C. Francis, 1997: A Pacific interdecadal climate oscillation with impacts on salmon production. *Bull. Amer. Meteor. Soc.*, **78**, 1069-1079.

#### Surface flux forcing

Cayan, D. R., 1992: Latent and sensible heat flux anomalies over the northern oceans: driving the sea surface temperature. *J. Phys. Oceanogr.*, **22**, 859-881.

Luksch, U., and H. von Storch, 1992: Modeling the low-frequency sea surface temperature variability in the North Pacific. *J. Climate*, **5**, 893-906.

#### Tropical connections

Alexander, M. A., 1992: Midlatitude atmosphere-ocean interaction during El Nino. Part I: the North Pacific ocean. *J. Climate*, **5**, 944-958.

Zhang, Y., J. M. Wallace, and D. S. Battisti, 1997: ENSO-like interdecadal variability: 1900-93. *J. Climate*, **10**, 1004-1020.

Gu, D., and S. G. H. Philander, 1997: Interdecadal climate fluctuations that depend on exchanges between the Tropics and extratropics. *Science*, **275**, 805-807.

Hoerling, M. P., J. W. Hurrell, and T. Xu, 2001: Tropical origins for recent North Atlantic climate change. *Science*, **292**, 90-92.

### Atmospheric response to midlatitude ocean

Rodwell, M. J., D. P. Rowell, and C. K. Folland, 1999: Oceanic forcing of the wintertime North Atlantic Oscillation and European climate. *Nature*, **398**, 320-323.

Bretherton, C. S., and D. S. Battisti, 2000: An interpretation of the results from atmospheric general circulation models forced by the time history of the observed sea surface temperature distribution. *Geophys. Res. Lett.*, **27**, 767-770.

### Stochastic climate models

Hasselmann, K., 1976: Stochastic climate models. Part I: theory. *Tellus*, **28**, 473-485.

Frankignoul, C., and K. Hasselmann, 1977: Stochastic climate models, Pt. 2, Application to sea surface temperature anomalies and thermocline variability. *Tellus*, Stockholm, **29**: 289-305.

Saravanan, R., and J. C. McWilliams, 1998: Advective ocean-atmosphere interaction: an analytic stochastic model with implications for decadal variability. *J. Climate*, **11**, 165-188.

### Wind stress forcing

Deser, C., M. A. Alexander, and M. S. Timlin, 1999: Evidence for a wind-driven intensification of the Kuroshio Current Extension from the 1970s to the 1980s. *J. Climate*, **12**, 1697-1706.

Junge, M. M., J.-S. von Storch, and J. M. Oberhuber, 2000: Large-scale variability of the main thermocline excited by stochastic wind stress forcing. *J. Climate*, **13**, 2833-2840.

### Atmosphere-ocean gyre coupling

Latif, M., and T. P. Barnett, 1996: Decadal climate variability over the North Pacific and North America: dynamics and predictability. *J. Climate*, **9**, 2407-2423.

Grotzner, A., M. Latif, and T. P. Barnett, 1998: A decadal climate cycle in the North Atlantic Ocean as simulated by the ECHO coupled GCM. *J. Climate*, **11**, 831-847.

### Atmosphere-thermohaline coupling

Delworth, T., S. Manabe, and R. J. Stouffer, 1993: Interdecadal variations of the thermohaline circulation in a coupled ocean-atmosphere model. *J. Climate*, **6**, 1993-2011.

Timmermann, A., M. Latif, R. Voss, and A. Grötzner, 1998: Northern Hemisphere interdecadal variability: a coupled air-sea mode. *J. Climate*, **11**, 1906-1931.

### Summertime variability

Zhang, Y., J. R. Norris, and J. M. Wallace, 1998: Seasonality of large-scale atmosphere-ocean interaction over the North Pacific. *J. Climate*, **11**, 2473-2481.

Norris, J. R., Y. Zhang, and J. M. Wallace, 1998: Role of low clouds in summertime atmosphere-ocean interactions over the North Pacific. *J. Climate*, **11**, 2482-2490.

Norris, J. R., 2000: Interannual and interdecadal variability in the storm track, cloudiness, and sea surface temperature over the summertime North Pacific. *J. Climate*, **13**, 422-430.