



The NAO, the AO, and global warming: How closely related?

J. Cohen (1), M. Barlow (2)

(1) AER, Inc., Lexington, MA (jcohen@aer.com/FAX +1-781-761-2299)

(2) Environmental, Earth, and Atmospheric Sciences, University of Massachusetts Lowell,
Lowell, MA (Mathew_Barlow@uml.edu/FAX: +1- 978-934-3069)

The North Atlantic Oscillation (NAO) and closely related Arctic Oscillation (AO) strongly affect Northern Hemisphere (NH) surface temperatures with patterns reported similar to the global warming trend. The NAO and AO have been in a positive trend for much of the 1970s and 1980s with historic highs in the early 1990s, and it has been suggested that they contribute significantly to the global warming signal. Here we consider this relationship in light of the most recent data, examining the trends in standard indices of the AO, NAO, and NH average surface temperature for Dec-Feb, 1950–2004, as well as the associated patterns in surface temperature anomalies. Also analyzed are factors previously identified as relating to the NAO, AO, and their positive trend: North Atlantic sea surface temperatures (SSTs), Indo-Pacific warm pool SSTs, stratospheric circulation, and Eurasian snow cover. Recently, the NAO and AO indices have been decreasing; when this data is included, the overall trends in these indices for the past thirty years are weak to non-existent, and strongly dependent on the choice of start and end date. In distinct contrast, the global warming trend has been strongly positive throughout the whole period, including the most recent data. With respect to spatial pattern, the warming trend may also be distinguished from the AO and NAO when the full hemispheric variability is considered. Patterns and trends in the other related factors suggest further distinctions between the AO/NAO and global warming influence on air temperatures.