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Synoptic-scale circulation and its role in winter Antarctic Peninsula warming

Presented by Dr. Adam Burnett
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Near-surface temperature records from the Antarctic Peninsula (AP) have shown significant warming in recent decades. Several authors have suggested possible causes for this warming, including changes in regional-scale atmospheric circulation and associated temperature advection. Assessments of atmospheric circulation variability across the AP have focused primarily on monthly averages and have been limited by global reanalysis dataset problems in the high southern latitudes before the 1970s. This study examines the role of atmospheric circulation in AP warming through an analysis of daily synoptic-scale circulation patterns using the ERA40 Reanalysis for winters during 1973-2002. The goals of this research are to define the winter circulation types that are most dominant in the AP region, to explore the influence of these patterns on temperature, and to determine how the frequency of these patterns has varied over time. Mean sea level pressure was used to classify each day into one of eleven circulation types using a principal components analysis, followed by an average linkage cluster analysis of the factor scores. Five circulation types were associated with above average temperatures, whereas three clusters were classified as cold patterns. A trend analysis of each circulation type revealed limited changes that were not entirely consistent with AP warming. An analysis of the combined frequency of all warm and cold patterns showed no significant changes in either type. Using daily temperature data from the ERA40 2-meter reanalysis and the Faraday/Vernadsky record, average winter temperatures were calculated for warm and cold circulation types. These temperatures exhibit an upward trend for both circulation patterns, indicating that each form of circulation is operating against a background temperature increase. These results suggest that AP warming is not related to changes in the frequency of warm and cold circulation patterns but rather to some other warming process upon which the circulation is superimposed.

Adam Burnett received his doctorate in geography from Michigan State University in 1990 and has been teaching at Colgate University since this time. His research specialties include middle latitude climate, jet stream variability, Antarctic Peninsula climate change, and Great Lake-effect snow. Much of this work focuses on climate change as shown within the modern record of meteorological data, as well as the use of lake sediments and tree rings to understand climate change over longer periods. Results of this research have appeared in several professional journals, including *Journal of Climate, Geophysical Research Letters, Climate Dynamics, and Physical Geography*. Professor Burnett's most recent lake-effect research, which addresses the question of why lake-effect snow is increasing, is funded by the National Science Foundation.

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Meeting logistics: The meeting will take place on Thursday, February 22nd at the Ramada Inn, located Buckley Road in Syracuse, New York. A social hour will be held from 5:30 p.m. to 6:30 p.m. and will be followed by a buffet dinner starting at 6:30 p.m. The main presentation by Dr. Burnett will begin at about 7:30 p.m.

The cost of dinner is $20 for members, $22 for non-members and $15 for student members. CNYAPG will sponsor the cost for dinner for the first five students who register for this meeting. People may also attend the presentation only for a nominal fee of $3. Please RSVP by Monday, February 19, 2007 to Bonnie at Parratt-Wolff via e-mail at bolney@pwinc.com or (315) 437-1429.