

Denman Undergraduate Research Forum

The Richard J. and Martha D. Denman Undergraduate Research Forum is an annual event that showcases research projects from the brightest undergraduates at Ohio State. Since 1995, the Denmans have supported this forum and continue to promote Ohio State as alumni.

The Denman Forum provides an opportunity for graduating student researchers to share their research endeavors with the broader community. This is our only competitive poster forum in which winners are recognized in each category as determined by faculty, staff, and Denman alumni reviewers. Students will be reviewed on their ability to communicate their research process and results effectively in both their written poster content and accompanying oral presentation. During the Denman Forum, we celebrate not only the hard work of these students, but also the dedication of their faculty research mentors.

Result: Second Place in the Earth & Beyond Category

“An Evaluation of the Accuracy of Numerical Weather Prediction for a Summer Antarctic Severe Storm”

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An Evaluation of the Accuracy of Numerical Weather Prediction for a Summer Antarctic Severe Storm
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How many days enough time to accurately predict a severe storm passage?

On 1 December 2002, one passage of a severe storm system over the Antarctic Peninsula was observed. The storm system was highly irregular and highly variable in its structure. The storm system was highly irregular and highly variable in its structure. The storm system was highly irregular and highly variable in its structure.

ECMWF & GFS SLP Model Accuracy Forecast Averages (%)

Model	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
ECMWF	100	80	60	40	20	10	5
GFS	100	70	50	30	15	8	4

ECMWF & GFS Lower Temperature Model Accuracy Forecast Averages (%)

Model	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
ECMWF	100	85	65	45	25	12	6
GFS	100	75	55	35	18	9	5

ECMWF & GFS Surface Wind Speed Model Accuracy Forecast Averages (%)

Model	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
ECMWF	100	80	60	40	20	10	5
GFS	100	70	50	30	15	8	4

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Project Abstract

An Evaluation of the Accuracy of Numerical Weather Prediction for a Summer Antarctic Severe Storm

Blake R. Murray, David H. Bromwich, Ph.D.

Modern weather forecasting relies on the Numerical Weather Prediction (NWP) models that have been produced from extensive research and evaluation. Work continues to be done to increase the accuracy of these models all around the world so forecasters can deliver accurate predictions of future weather events. The Antarctic is a much different environment than more populated areas such as North America and Europe. The geography, dynamic effects, and regionally specific phenomena make predicting storms in and around the Antarctic much more difficult. Current models do a much better job than just a few years ago, but knowing how well they currently perform will save lives. The Drake Passage region has become a popular destination for ship-based ecotourism. The purpose of this research is to analyze the accuracy of the ECMWF and GFS operational global models to see how well they can predict a severe storm that resulted in the loss of life. Using data from 26 November – 1 December 2022, these models are evaluated to determine how far in advance they can accurately the storm. We hope to confirm that a five-day lead time is sufficient for this purpose. This information will help forecasters make effective use of model forecasts to warn about potential storms in the future for the Drake Passage region. Results show that the mean sea level pressure was the most accurate variable modeled across the three models. 2-meter temperature was the second most accurate, while 10-meter wind speed was the least accurate. Overall, the GFS model performed slightly less than the ECMWF. Based on the model performance and trends identified through analysis, the ECMWF and GFS global models are indeed accurate to a 5-day lead time for use in the Antarctic Peninsula region.