Could mid-latitude weather forecasts be improved by better knowledge of the polar atmosphere?

Questions
What is the influence of the polar atmosphere on the mid-latitude weather and climate?
What is the influence of a better simulated Arctic / Antarctic atmosphere on the quality of mid-latitude weather forecasts?
How does this compare to the influence of tropical regions?

Experiments
Relaxation experiments with the Integrated Forecast System (IFS) of the European Centre for Medium-Range Weather Forecasts (ECMWF)
Pairs of forecasts with and without relaxation towards reanalysis data north of 75°N and south of 75°S

Arctic influence

RMSE reduction [%] of 500hPa geopotential height forecasts due to the relaxation: (upper) averaged over the whole Northern mid-latitudes between 40°N and 60°N, (lower) averaged over northern Asia (40°N to 60°N, 60°E to 120°E)

Key result: RMSE reduction on average only around 5% but pronounced regional differences: northern Asia!

Antarctic influence

RMSE reduction [%] of the 500 hPa geopotential height forecasts for the Northern Hemisphere north of 20°N due to the relaxation

Key results: RMSE reduction slightly less than for Northern Hemisphere, especially in summer.
No pronounced regional differences; tendency for stronger improvements downstream of southern South America

Discussion and conclusions

• Northern Asia benefits most from better simulated Arctic: key region for Arctic – mid-latitude link confirmed with very different method!
• Continental areas: stronger Arctic influence (climatological troughs!), over sea stronger tropical influence
• Over Southern Hemisphere southern South America important – link to ENSO!
• Large-scale circulation changes in the future → influence of the polar regions may change!
• Quality of mid latitude forecasts may be affected