Parameterization of surface stress direction

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History

- Pressure bias depending on latitude
- Cyclones deepening too much
- Winds too strong at end of forecast
- Bias in wind direction
- All problems interconnected

History (2)

- Solved pressure bias by increasing vertical diffusion -> Destroyes vertical profiles, too strong 10m winds, no low level jets, wind direction bias persists, increase in wind speed bias
- Increasing surface roughness + momentum mixing under stable conditions -> smaller pressure bias, damped model behaviour, stable profiles bad, wind direction and speed bias remain

Idea: turn surface stress

- Problem with wind direction -> large positive bias, especially under stable conditions, too little ageostrophic wind, Ekman pumping, filling of lows
- Adjust surface stress to turn wind in ageostrophic direction, dependent on stability and roughness, turn surface stress in geostrophic direction

Results

- Larger daily cycle of wind direction, more ageostrophic wind under stable conditions, good agreement in 1D with Wangara case
- 3D case studies: extremes are retained better (Danish Dec 3, 1999 storm), better scores for almost all parameters , temp-verification, in longer runs for all seasons

More information

- Hirlam Hexnet: http://hirlam.knmi.nl
- Hirlam newsletter 45, 3 articles by Bent Hansen Sass, Xiaohua Yang, Kalle Eerola(?)