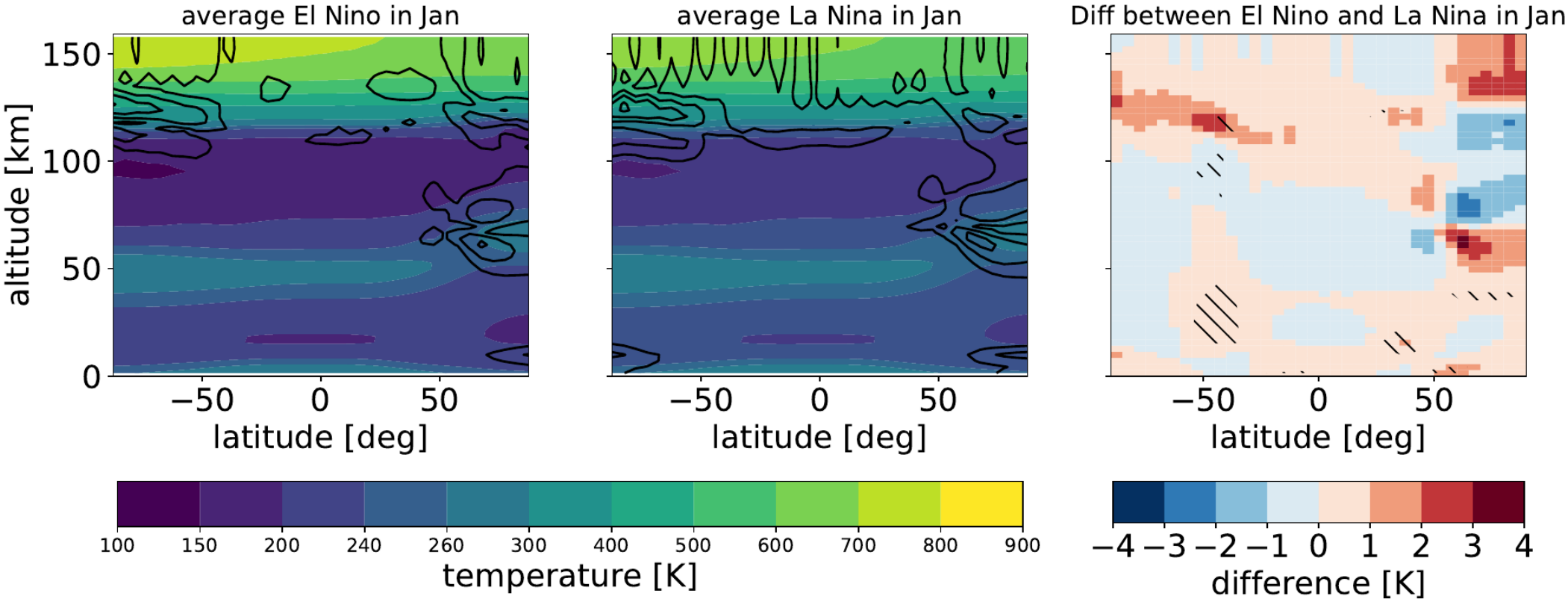
ENSO impact on middle atmosphere in MUAM

M. Stober, A. Kuchar, Ch. Jacobi

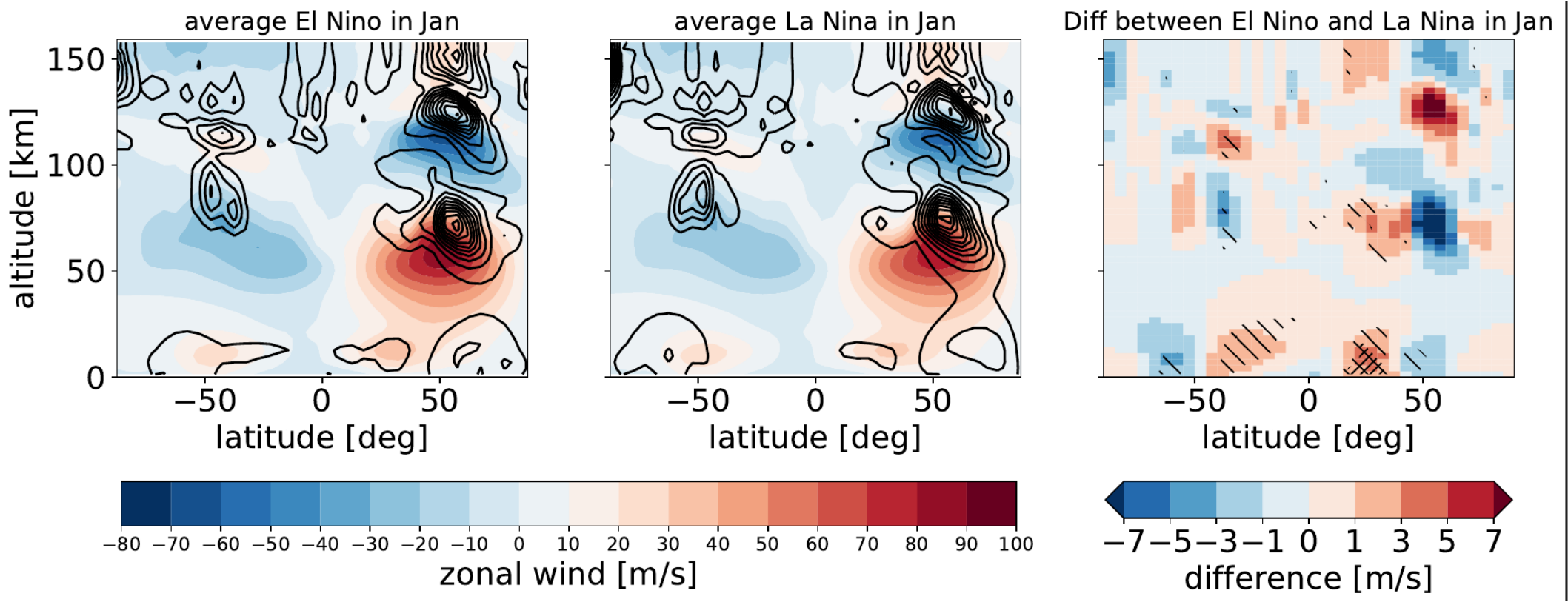
MUAM simulation

- Resolution: 5°x5.625°x2.842 km (36x64x56)
- GW parameterizations: Lindzen for stratosphere/mesosphere and Yigit for thermosphere
- Boundary conditions based on ERA5 during boreal winter months
  - lowermost 10 km, zonal mean temperatures nudged
  - At 1000 hPa forcing of SPWs{1,2,3} extracted from temperature and geopotential height
  - La Nina years: 1989,1999,2000,2008,2013
  - El NiNo years: 1983,1992,1998,2003,2010

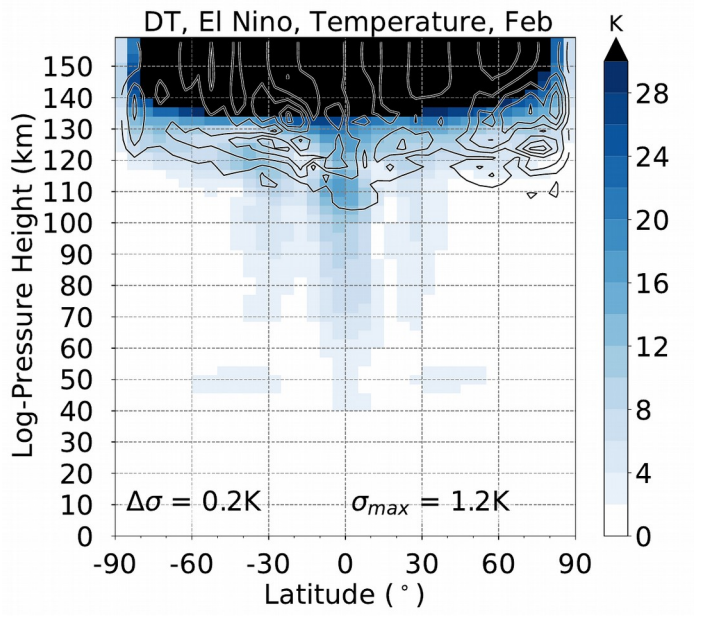
Results - background conditions

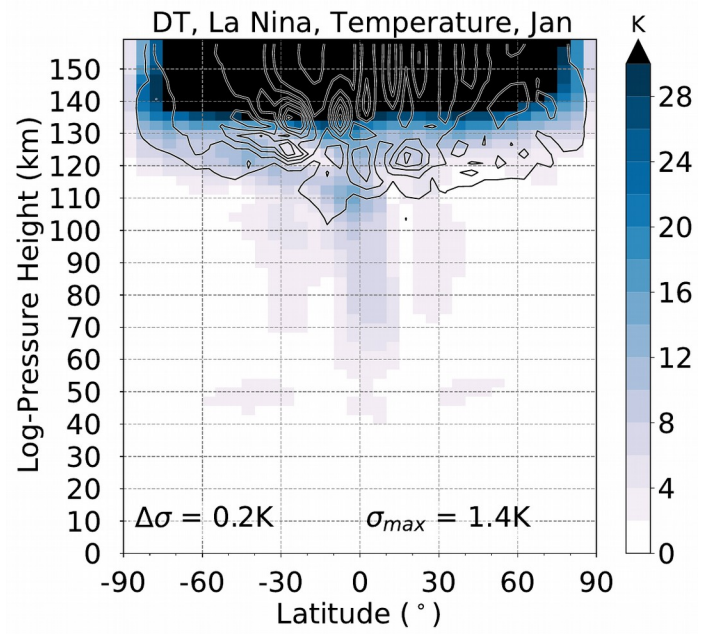


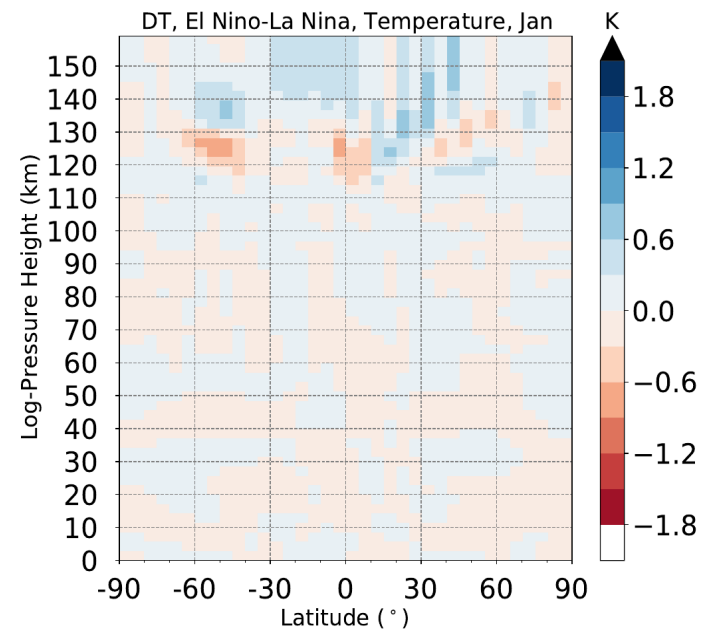
Results - background conditions



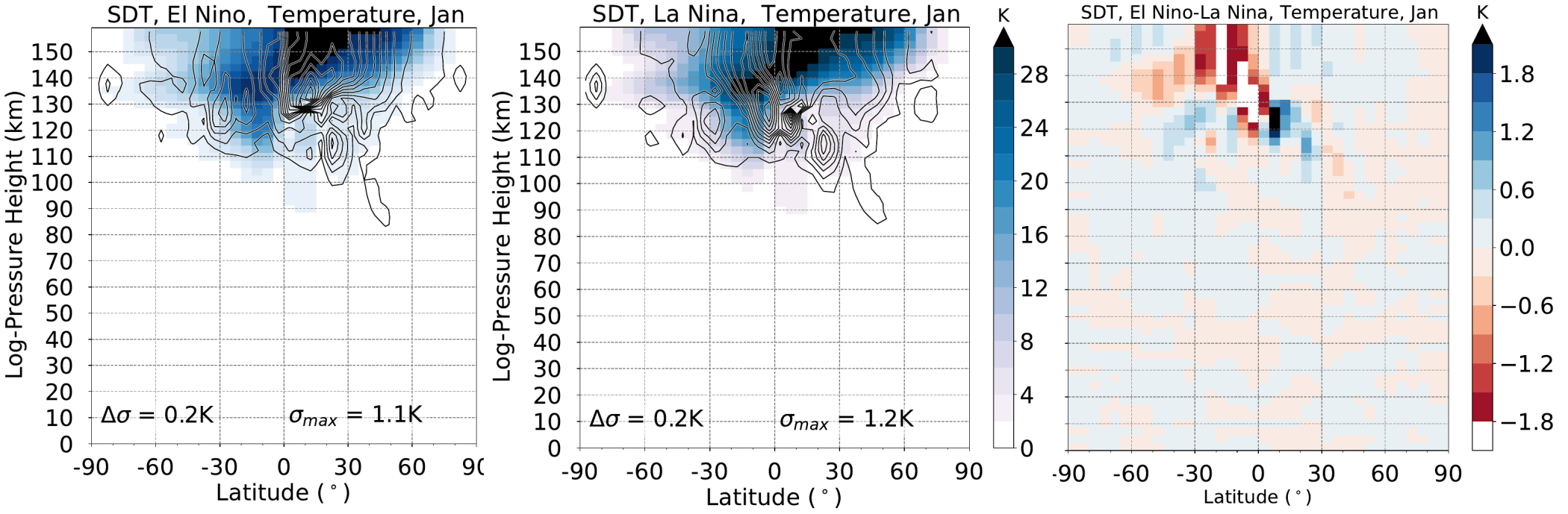
Results – diurnal tide







Results – semidiurnal tide



Future plans?

- Same runs with latent-heating parameterization
  - wave and time (T={24,12} h) harmonics using empirical formula suggested by Hong and Wang (1980)
  - Previously used to calculate the thermal forcing of nonmigrating tides (Forbes et al 1997; Hagan and Forbes, 2002)
- Tides sensitivity to GW parameterization (Lilienthal et al, 2020)
- Extend number of years beyond 1980 horizon (currently limited by ERA5)
- Use centially long reanalysis instead (e.g. ERA-20C) for the past or CMIP simulations for the future climate
- With more samples => (non)linearity impact of moderate vs. strong events (Weineberger et al (2019))

References

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