1. Objective

- 2. Why study stratocumulus MPC over SO?
- climate sensitivity.
- the SO (Trenberth et al., 2010)
- CMIP5 models show the positive mean bias of 2K in annual mean SST over SO (Wang et al., 2014)
- Simulated radiative bias associated with low and mid-level MPC
- (Wood, 2012)

3. Model setup

- ICON-NWP Limited area model with two-way nesting strategy
- Turbulence Prognostic TKE (TKE COSMO) (Raschendorfer, 2001)
- Radiation RRTM (Mlawer et al., 1997; Barker et al., 2003)
- Cloud microphysics and precipitation -
 - Single-moment microphysics scheme; 3-category ice (cloud ice, snow, graupel) (Doms et al., 2011; Seifert, 2008).
 - Double-moment microphysics scheme (Seifert et al., 2006)
- ERA5 Initial conditions; lateral boundary conditions (read at an interval of one hour)
- Time period: 25-03-2016 to 28-03-2016 (72 hours)
- Model top: 80.301 km
- Full vertical levels within boundary layer: 27
- Timestep: 60 seconds

4. Observations

a) CAPRICORN (Mace et al., 2018; CSIRO, IN2016 V02): (Clouds, Aerosols, Precipitation,

- Radiation, and Atmospheric Composition over the Southern Ocean) at SO (south of Tasmania).
- Period: 26 April 2016 to 27 April 2016
- Characterize: Cloud and precipitation properties, boundary layer structure

b) HIMAWARI-8 satellite retrievals: Cloud properties – spatial and temporal resolution of 5 km and 10 min respectively. Data: cloud top height (CTH) and cloud fraction (CF)



Figure: Hovmoller diagram (ICON Simualtion) of incloud a) Liquid water content (g/kg) and b) Ice water content (g/kg). c) Intersimulation comparison of LWP and IWP for different cloud microphysics schemes. Circle: One-moment, Triangle: Two-moment, Asterisk: Two-moment + prognostic immersion freezing tracer (Possner et al., 2017); Blue: 4.9 km resolution, Red: 2.4 km resolution, Black: 1.2 km resolution

Simulating mixed-phase cloud properties with ICON around the CAPRICORN field campaign at the kilometre scale Veeramanikandan Ramadoss, Alain Protat, Steven Siems, Yi Huang, Jay Mace, Anna Possner





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• Eirund et al., Atmos Chem Phys (2019)

• Possner et al., Geophys. Res. Lett (2017)

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