**Clouds and Radiation** 



edRad versus RRTM Clouds over Southern Oceans

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# ecRad versus RRTM

### Impact of ecRad, ice fall speed tuning: Biases vs. CERES-EBAF 2019





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# **Clouds in the Southern Oceans**

## Coupled biases after 10 years (1989)





## SOCRATES region 20180217







CERES on VIIRS (4UTC) true color







#### SOCRATES



#### Jan 11 to Feb 22, 2018 Tasmania to Antarctic (43S to 68S), Macquarie Island (54S)



# Estimated Inversion Strength (EISnew)





Figure 1: The same Fig.1 of WB06 with coloured boxes.

LTS:	Klein, Hartmann (1993)
EIS:	Wood, Bretherton (2006)
EIS <sub>new</sub> :	Marquet, Bechtold (2020)
$EIS_{new} = M$	$ax (S_{700} - S_{950}; S_{950} - S_{surf})$

moist entropy static energy:  $S_m = c_{pd} (1 + 5.87 q_t) T - L_v q_l - L_s q_i + g z$ 



Figure 4: Old (top) and new (bottom) EIS computed with IFS.

### Bias in Southern Ocean: ICON in SOCRATES region 20180217 6UTC



default ICON







too little liquid cloud droplets too low cloud top

too warm cloud top