



Evaluating Southern Ocean clouds and radiation biases - New techniques and results

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Why do we care?



CMIP3 model ensemble mean radiation biases





Why do we care?



CMIP3 model ensemble mean SST bias

Sen Gupta et al., JCL2009



SHCOUD regimes MONASH University Science

K-Means Cluster analysis - 8 clusters







SH CIOUD REGIMES MONASH University Science

0.6

0.6

0.6

0.8

0.8

0.8

K-Means Cluster analysis - 8 clusters







Haynes et al., JCL 2011





The ACCESS model







MONASH





occurence

 10 member ensemble for PJF 2006/07
2006/07
ISCCP simulator to construct model CTP-c histograms
Analysis from 30-65 S

Hybrid model/ obs regimes

0

10

20

30

40

0

10

20

30

40





MONASH







obs regimes

Monday, 6 June 2011







Regime occurrence







within regime

Contribution to shortwave cloud radiative effect







Contribution to shortwave cloud radiative effect



within regime

total contribution





within regime

Contribution to shortwave cloud radiative effect









Putting it together











South of 50 S the lack of mid-level top (and low) clouds is the main problem. This is where the radiation errors are largest!







Putting it together



North of 50 S the lack of thin cirrus is compensated by an overabundance of thick frontal and thin low clouds. The radiation error is smaller, but likely for the wrong reason!



-95.6

U9 U10 U11

U7 U8

U6





The most immediate open questions

What types of clouds are the U7 cloud regime?



blue - obs red - model black - model Is

Under which conditions do they occur?



observed regimes equivalent to U7 vs ω at 500 hPa

Why can't the model make them?





