Improvements to One and Two Moment Ice Cloud Parameterizations

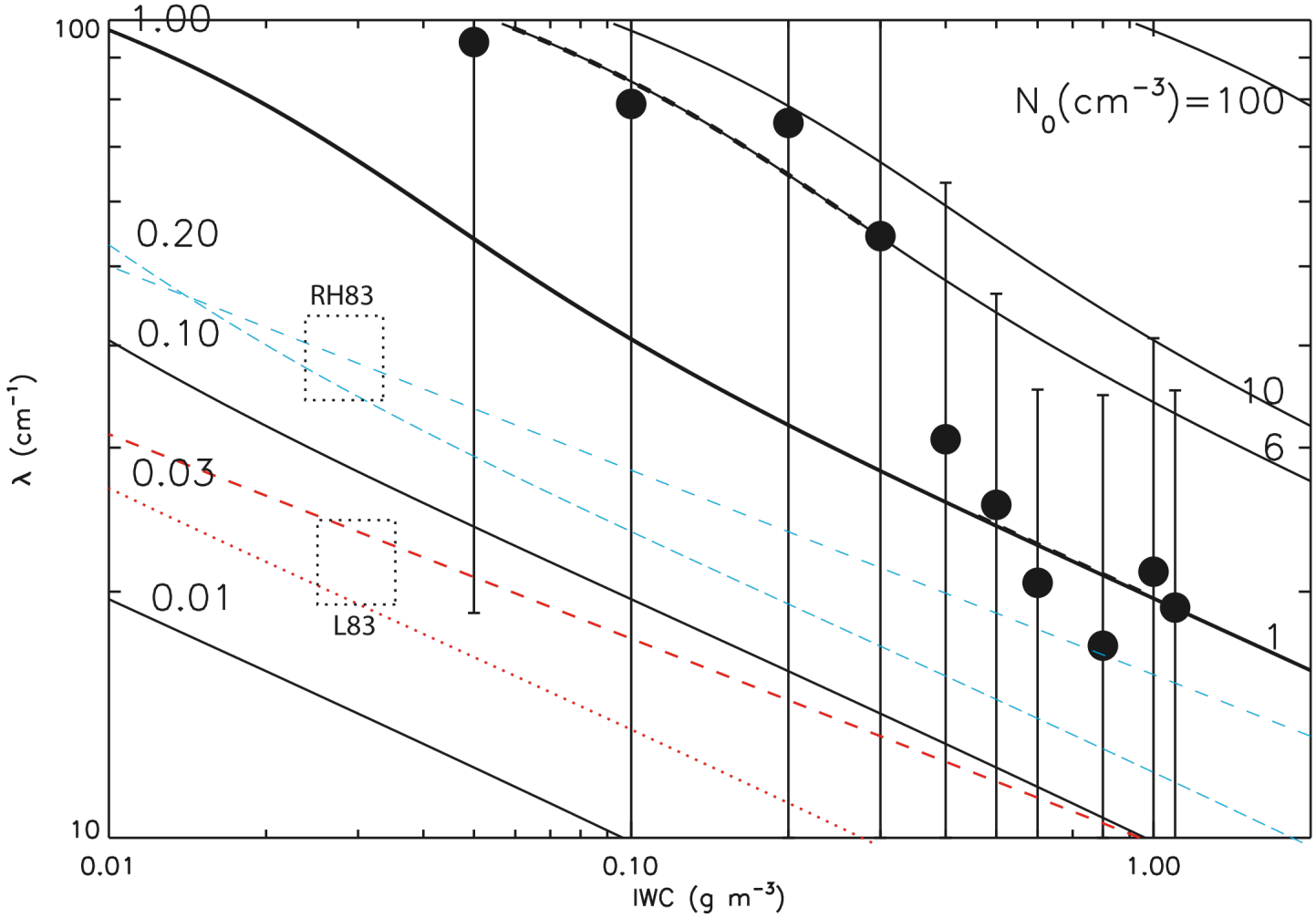
A. Heymsfield

$$m=aD^b,\ N=N_0e^{-\lambda D}$$

$$\rho=0.1\ \text{g cm}^{-3},\ a=(\pi/6)*0.1,\ b=3.0$$

$$N=0.03$$

$$\lambda=[IWC/(N_o a\ \Gamma(b))]^{1/b}$$

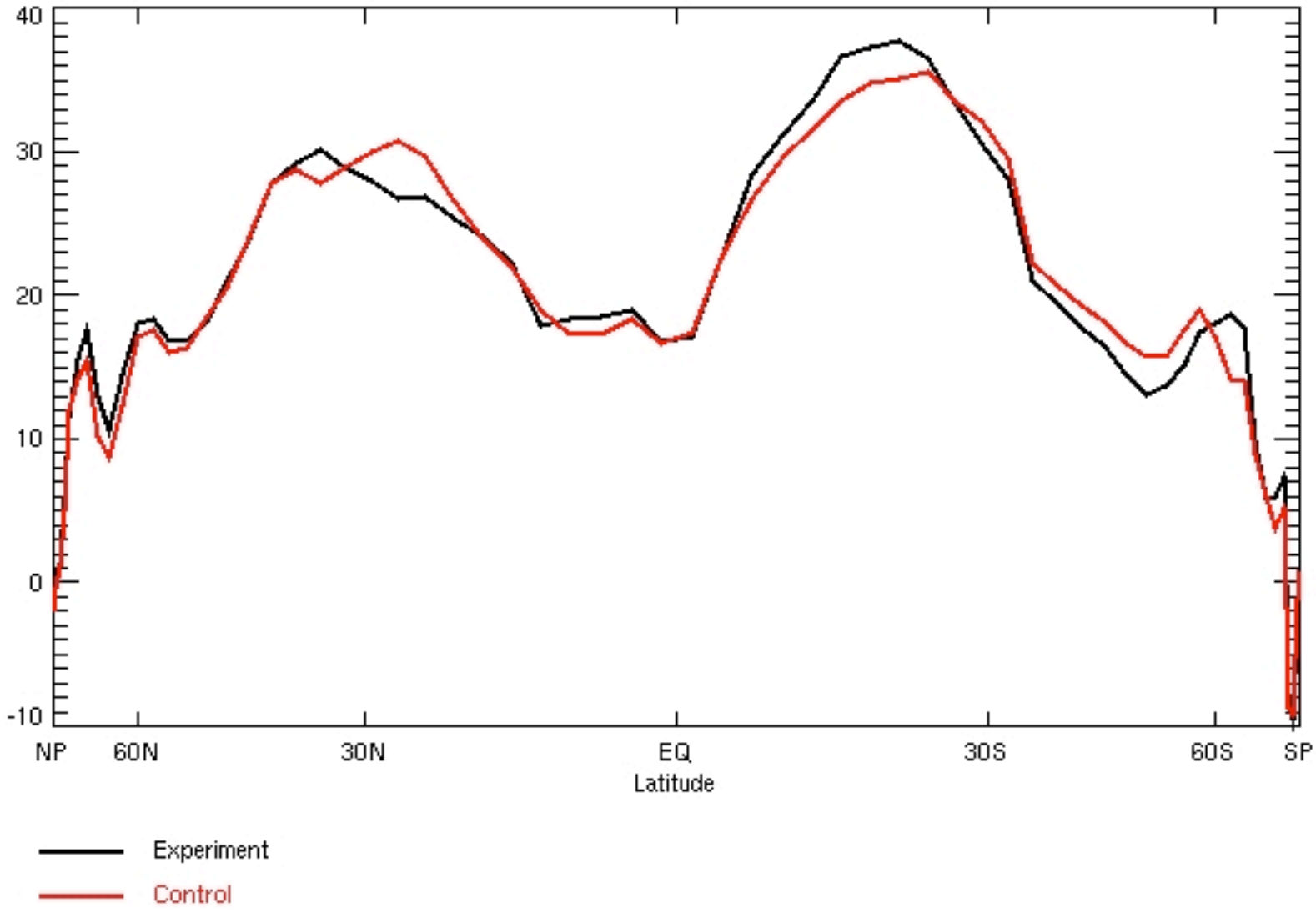

1.00
100
$N_0(cm^{-3})=100$
0.20
RH83
0.10
0.03
0.01
L83
10
6
1
λ (cm^{-1})
10
0.01
0.10
1.00
IWC (g m^{-3})

Two months, Climatological SST's (Mark Branson)

Mark

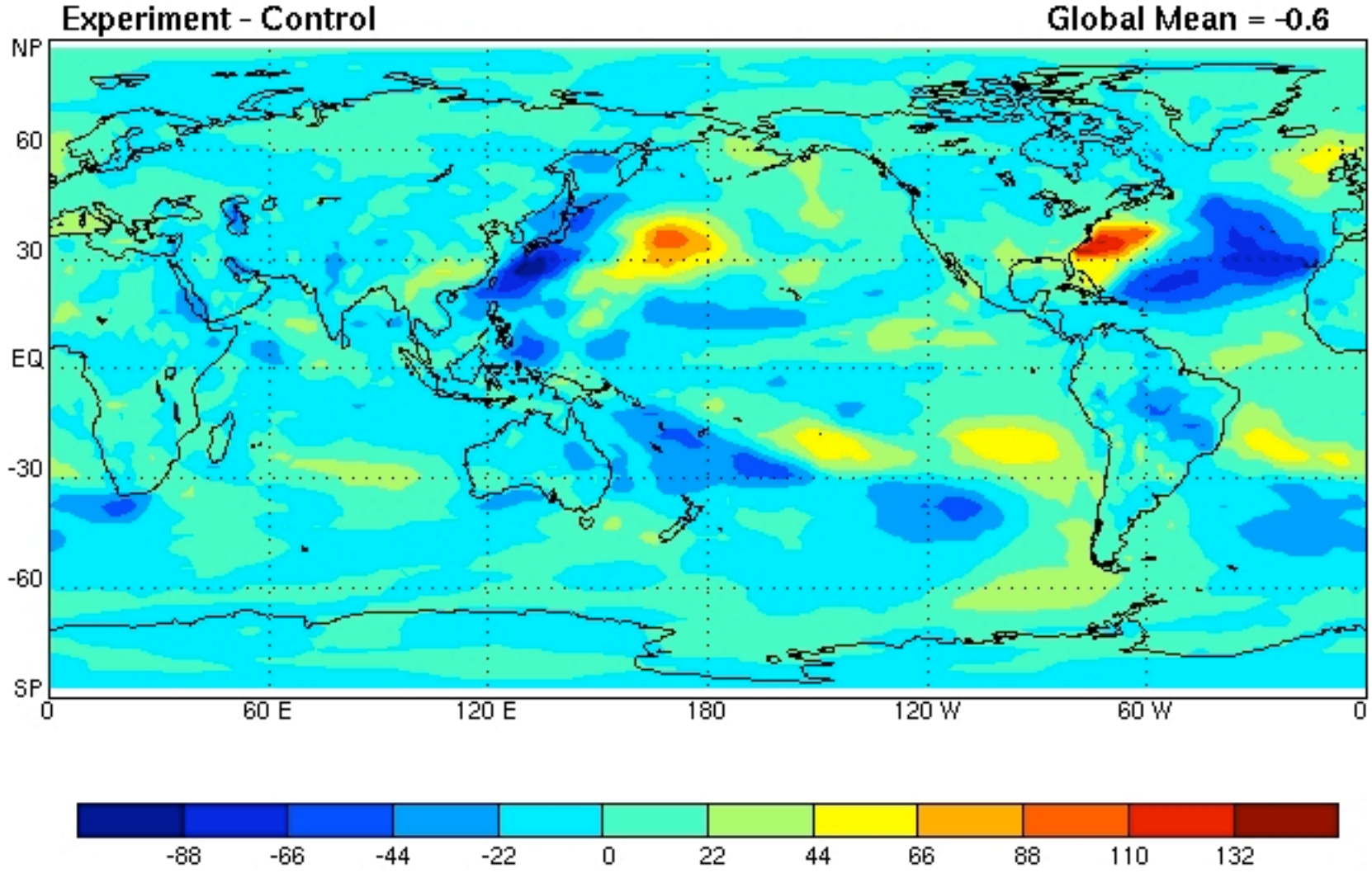
Zonal Mean of Surface sensible heat flux

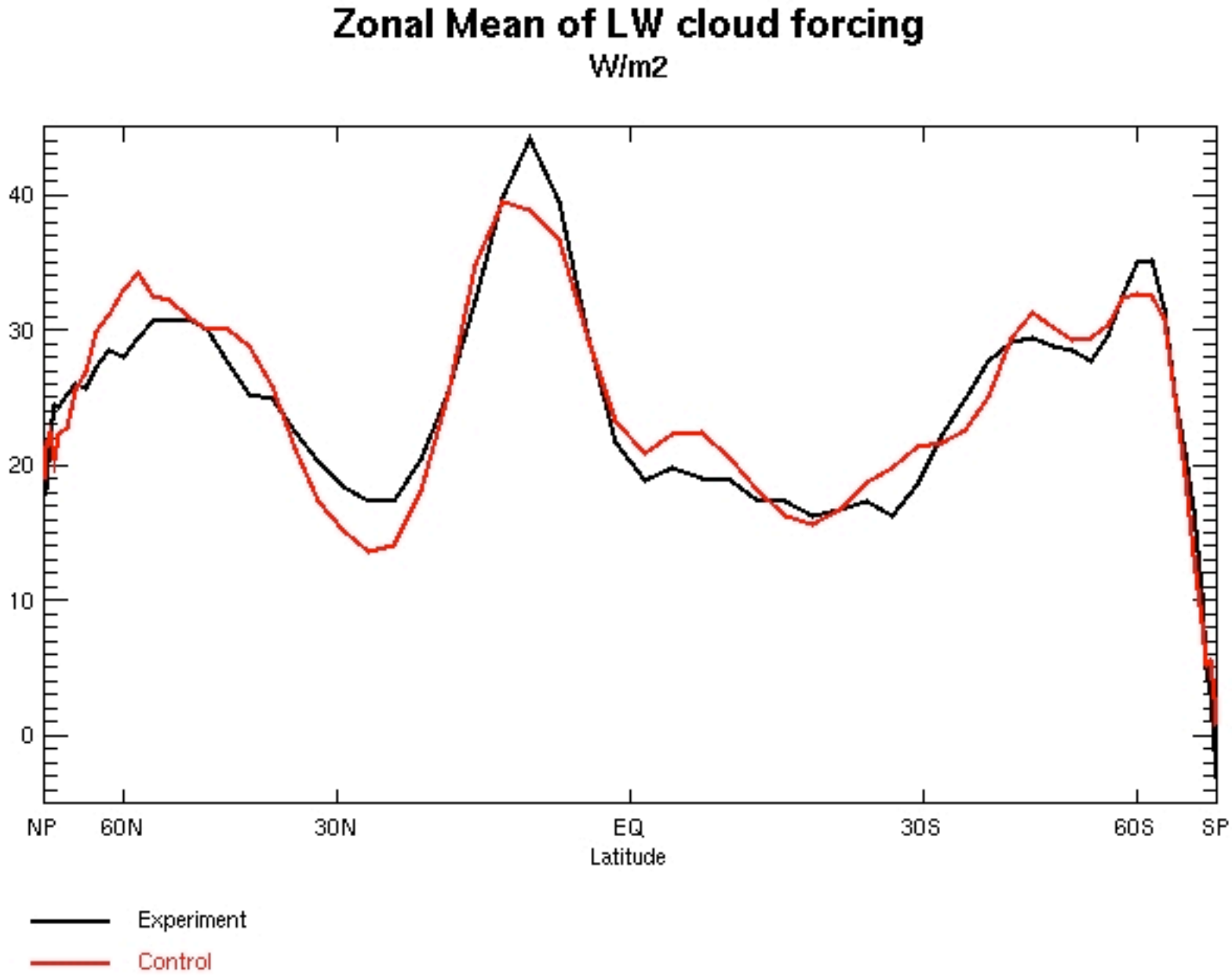
W/m2

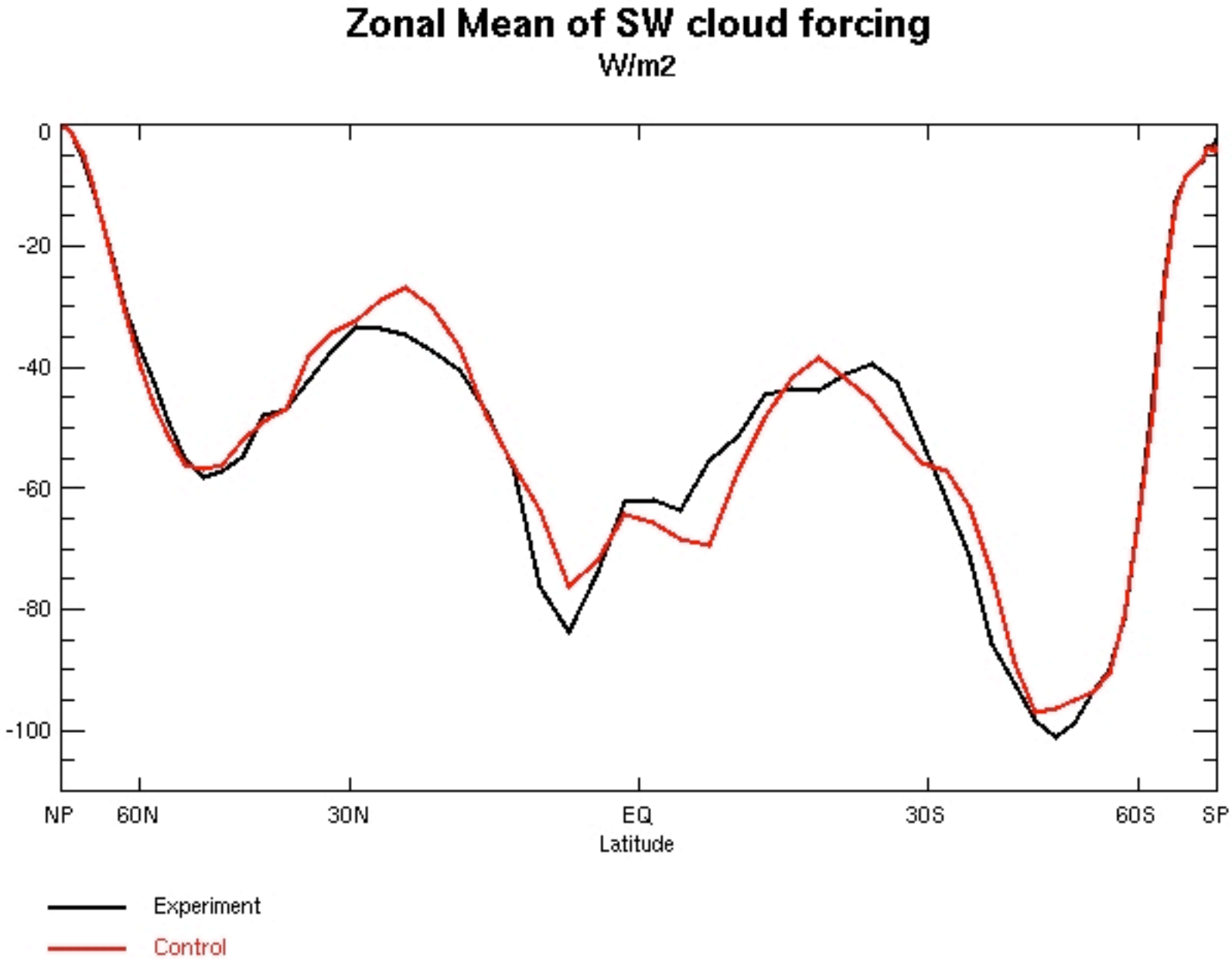


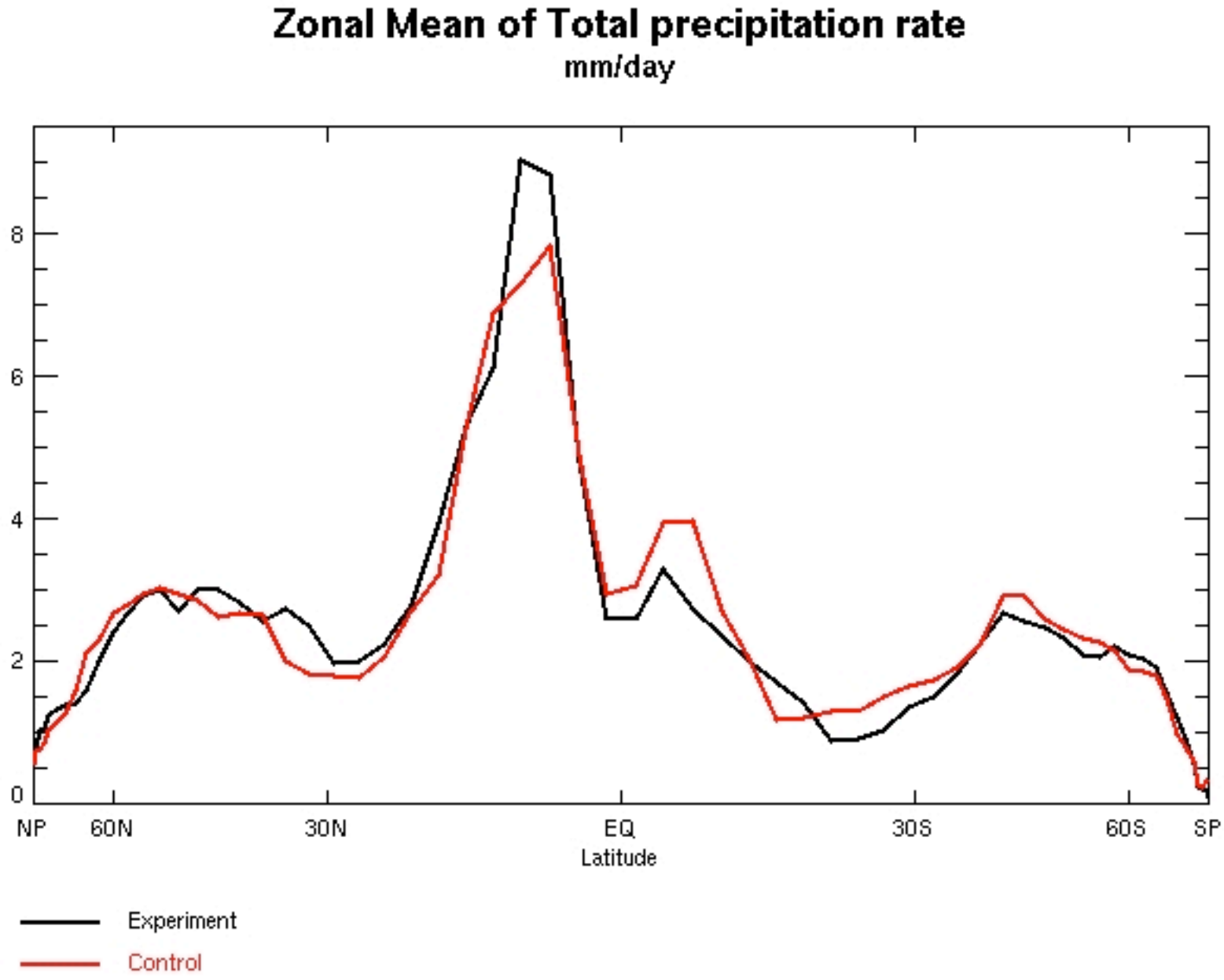
Surface latent heat flux (Difference)

W/m2




Zonal Mean of LW cloud forcing
W/m2
40
30
20
10
0
NP
60N
30N
EQ
30S
60S
SP
Latitude
Experiment
Control

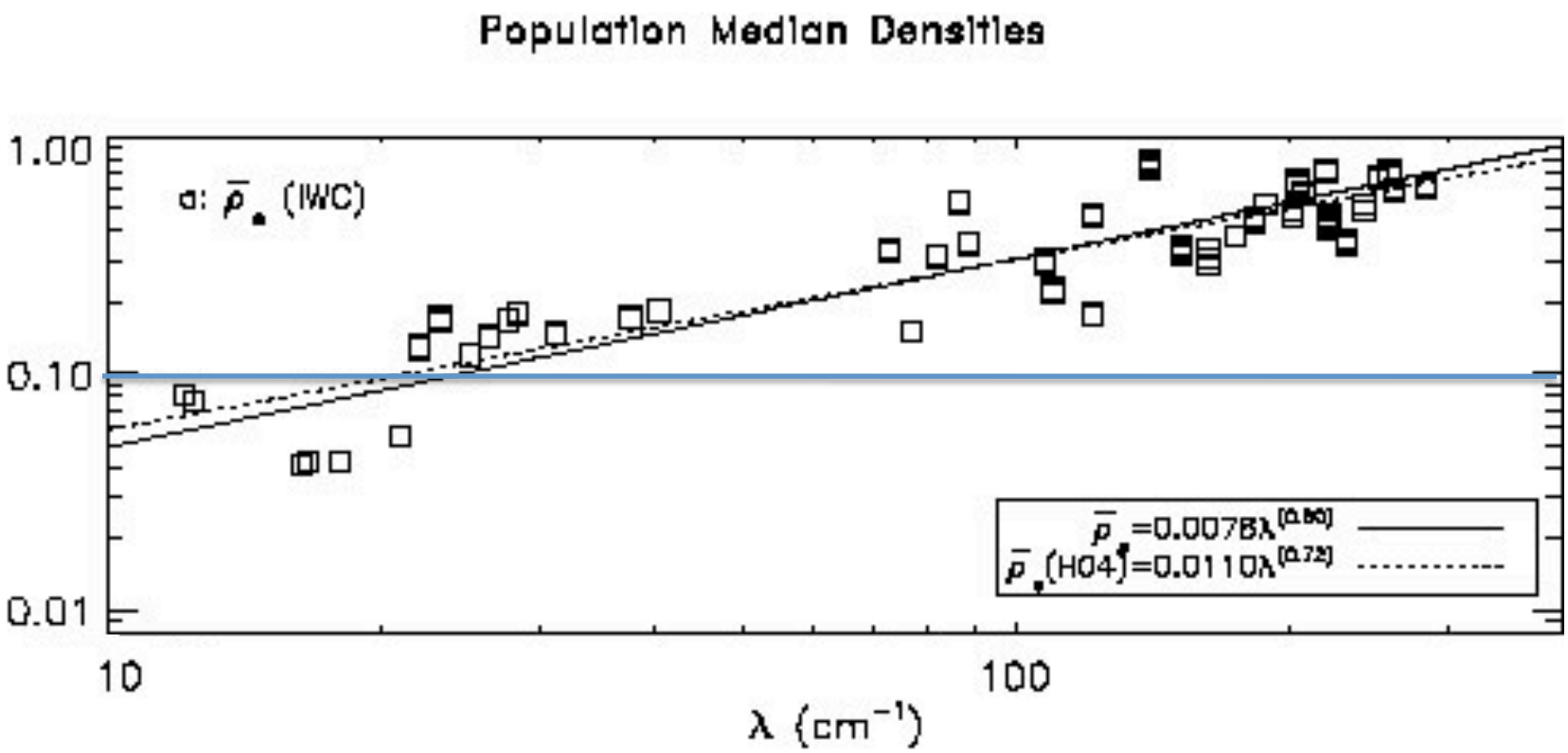

Zonal Mean of SW cloud forcing
W/m2
0
-20
-40
-60
-80
-100
NP
60N
30N
EQ
30S
60S
SP
Latitude
Experiment
Control


Zonal Mean of Total precipitation rate
mm/day
8
6
4
2
0
NP
60N
30N
EQ
30S
60S
SP
Latitude
Experiment
Control

Improvements

Variable Density f(λ)

Fall Velocities


Population Median Densities
1.00
0.10
0.01
10
100
λ (cm⁻¹)
o: $\bar{\rho}_{\bullet}$ (IWC)
$\bar{\rho}_{\bullet}$ =0.007Bλ^(0.86)
$\bar{\rho}_{\bullet}$ (H04)=0.0110λ^(0.72)