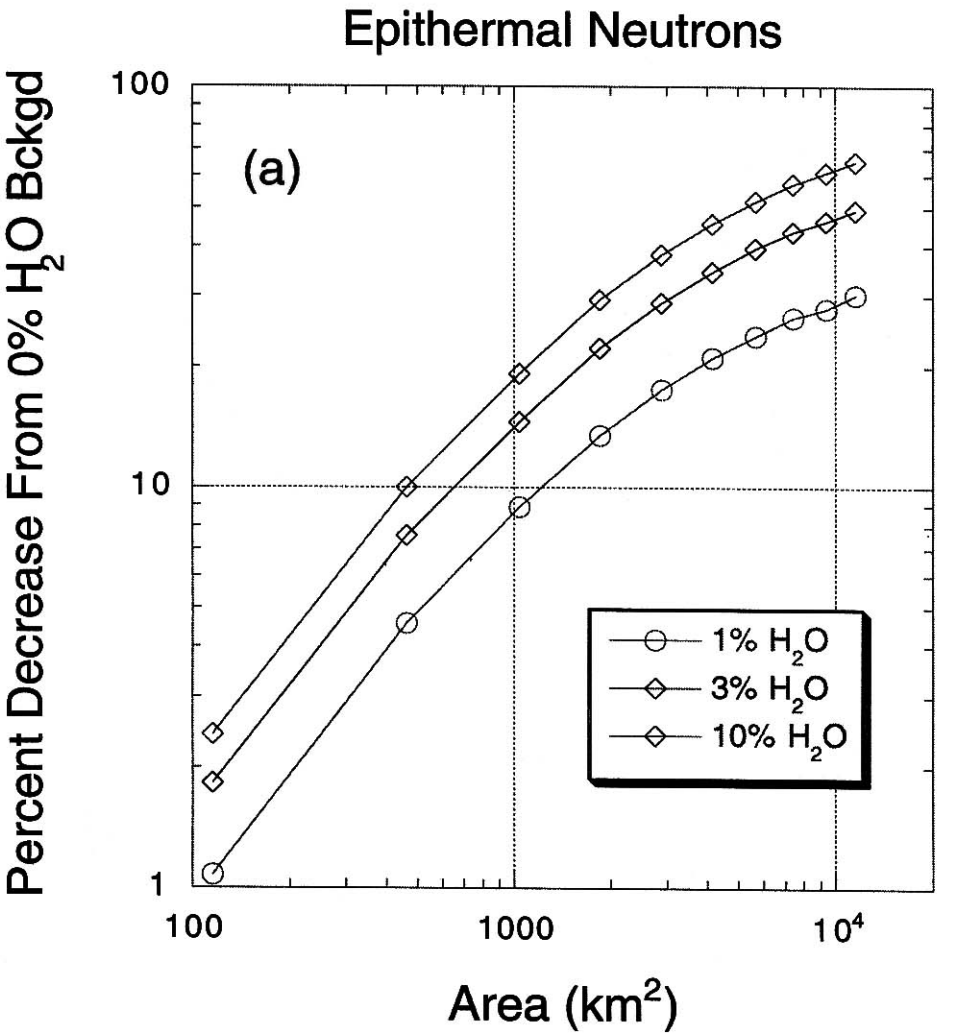
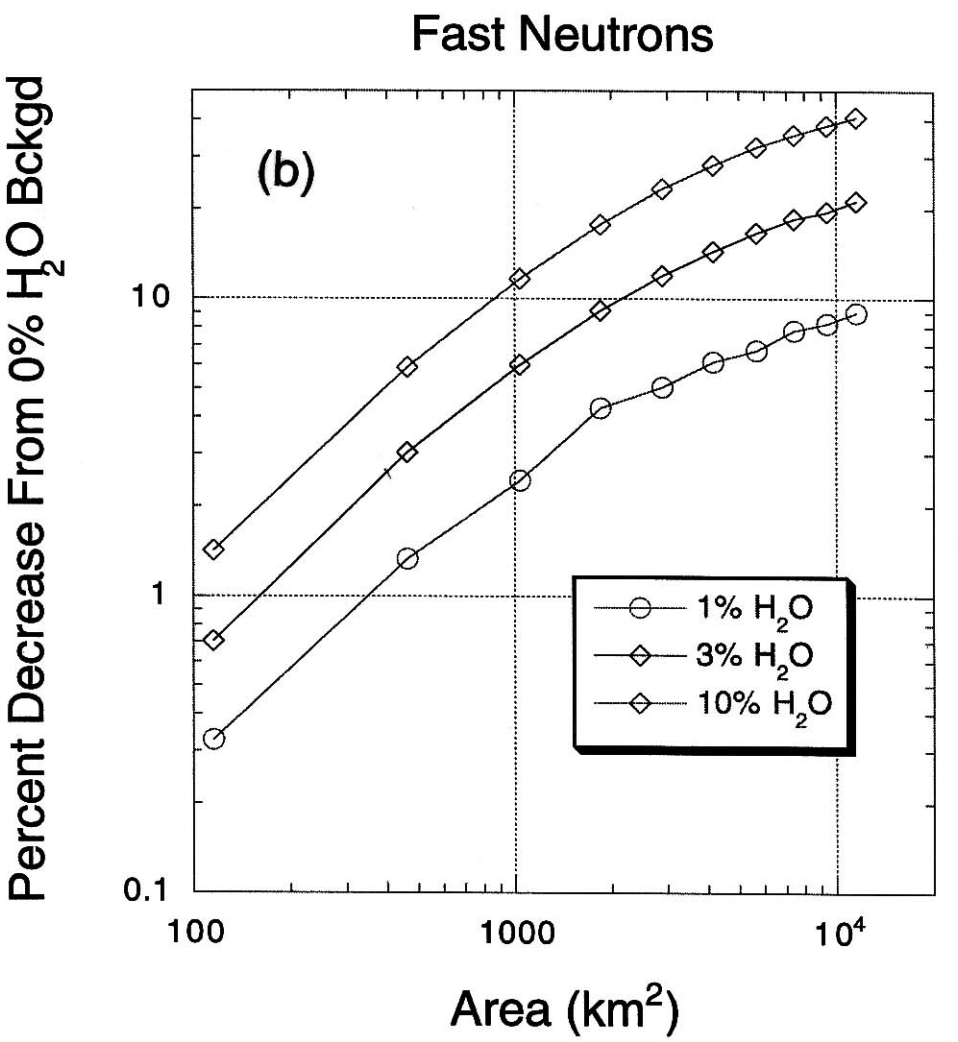
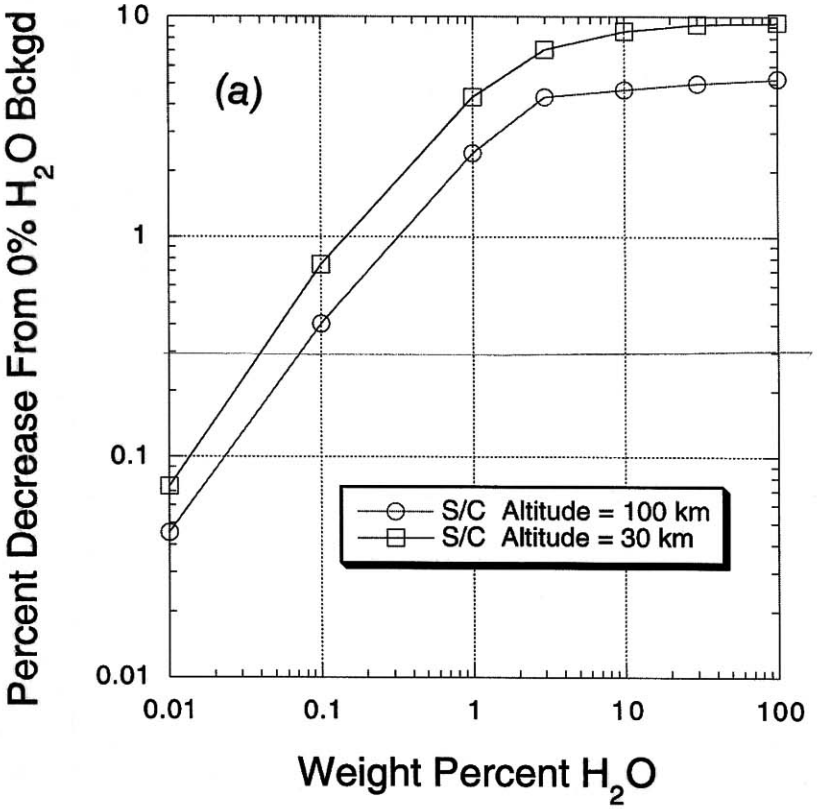
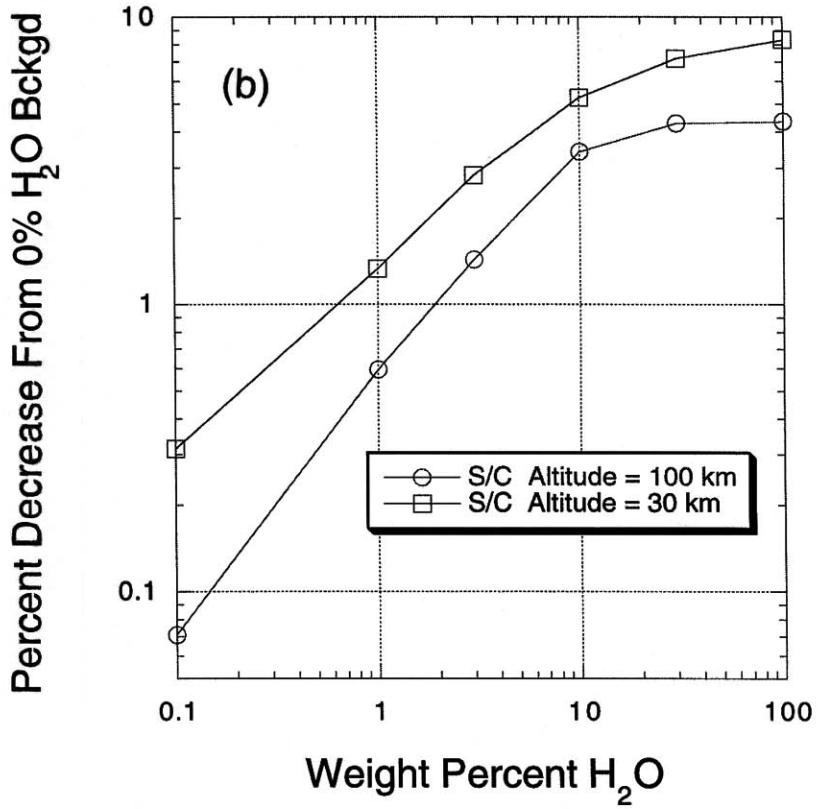

Epithermal Neutrons
(a)
Percent Decrease From 0% H_2O Bckgd
100
10
1
100
1000
10^4
Area (km^2)
1% H_2O
3% H_2O
10% H_2O

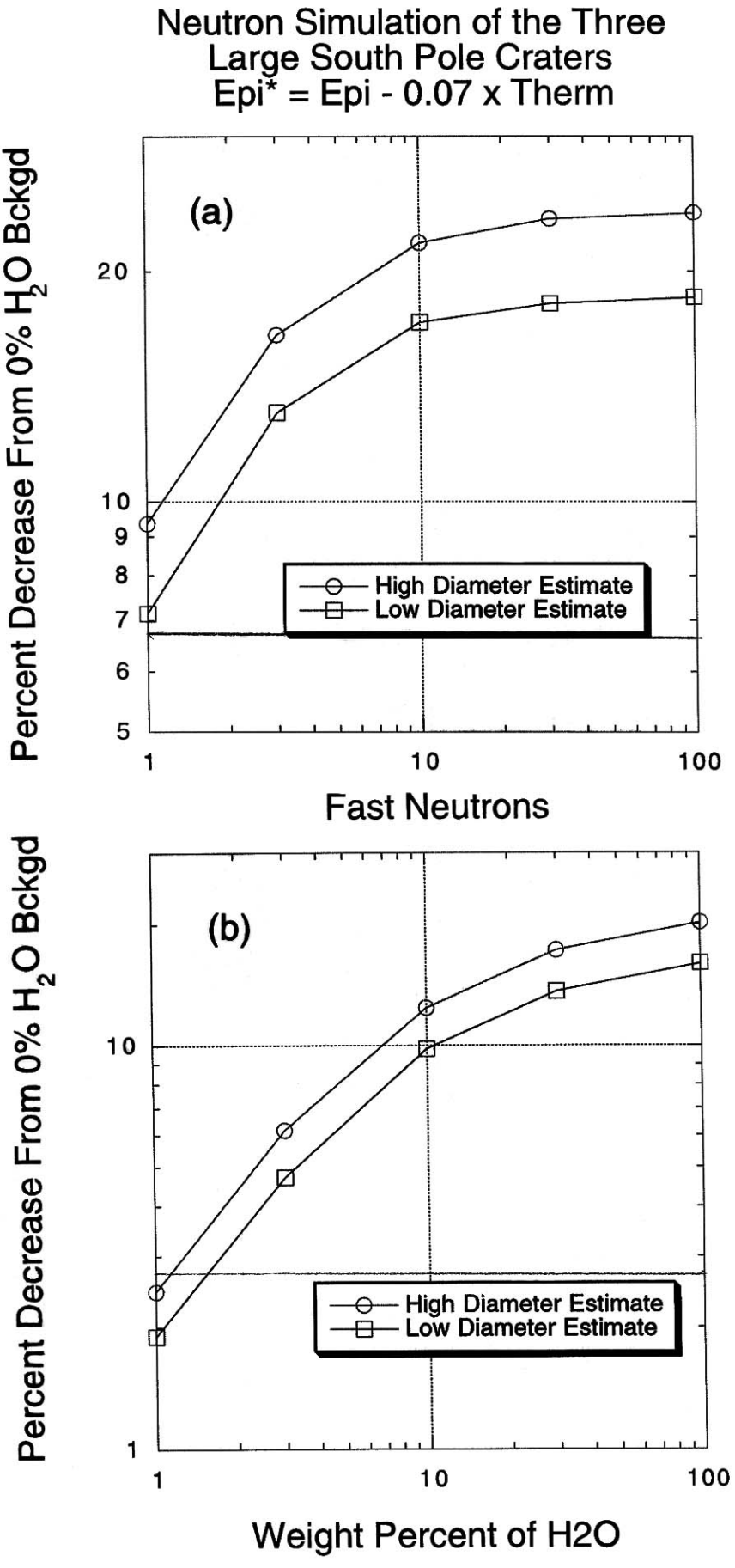

Fast Neutrons
(b)
Percent Decrease From 0% H_2O Bckgd
10
1
0.1
100
1000
10^4
Area (km^2)
1% H_2O
3% H_2O
10% H_2O

Neutron Simulation of the Five
Permanently Shaded South Pole Craters
Epi* = Epi - 0.07 x Therm

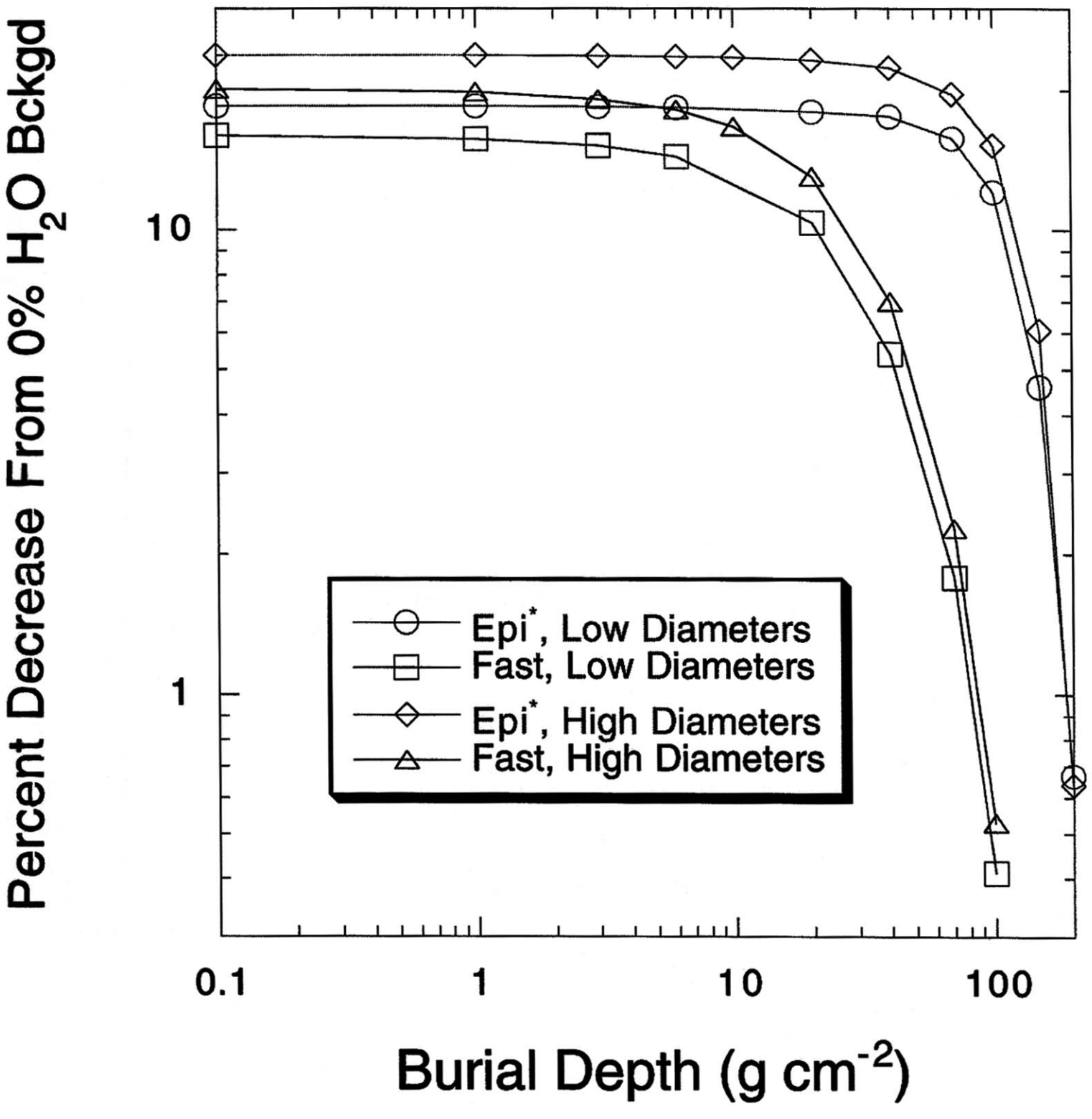


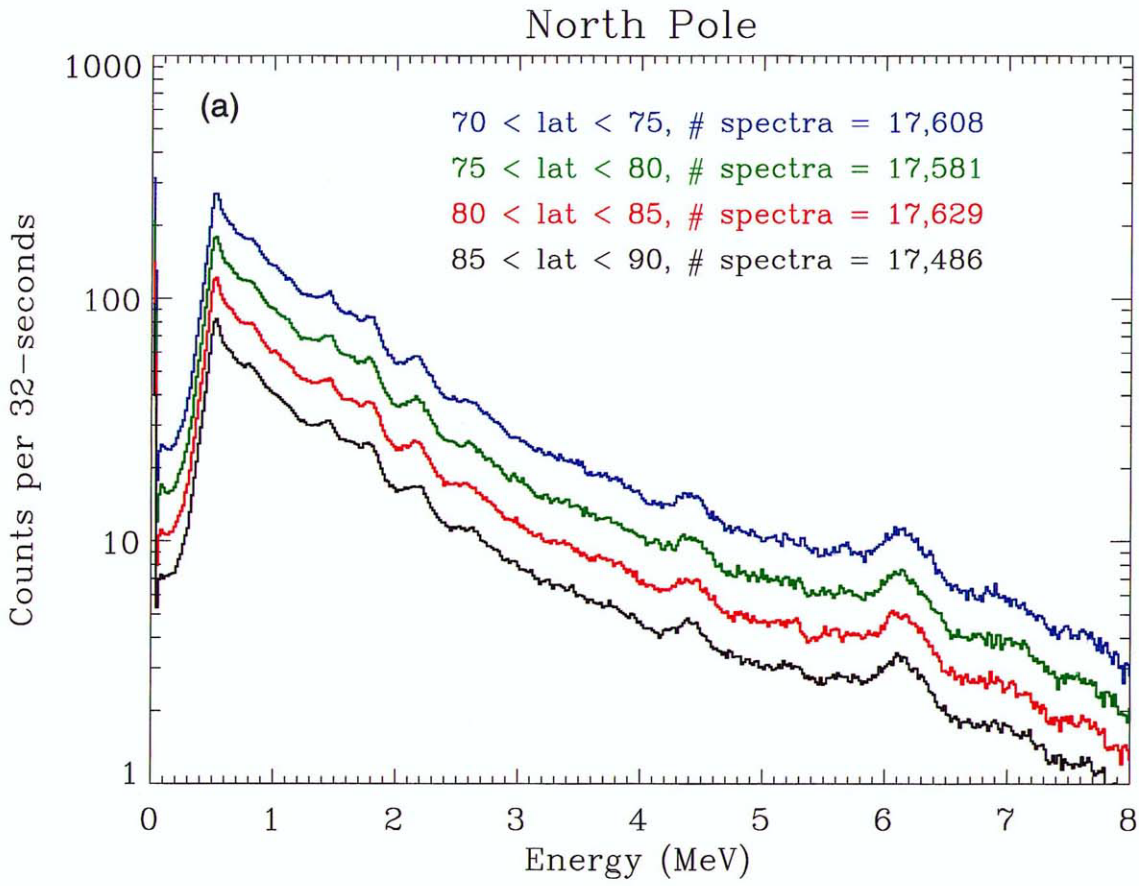
Fast Neutrons

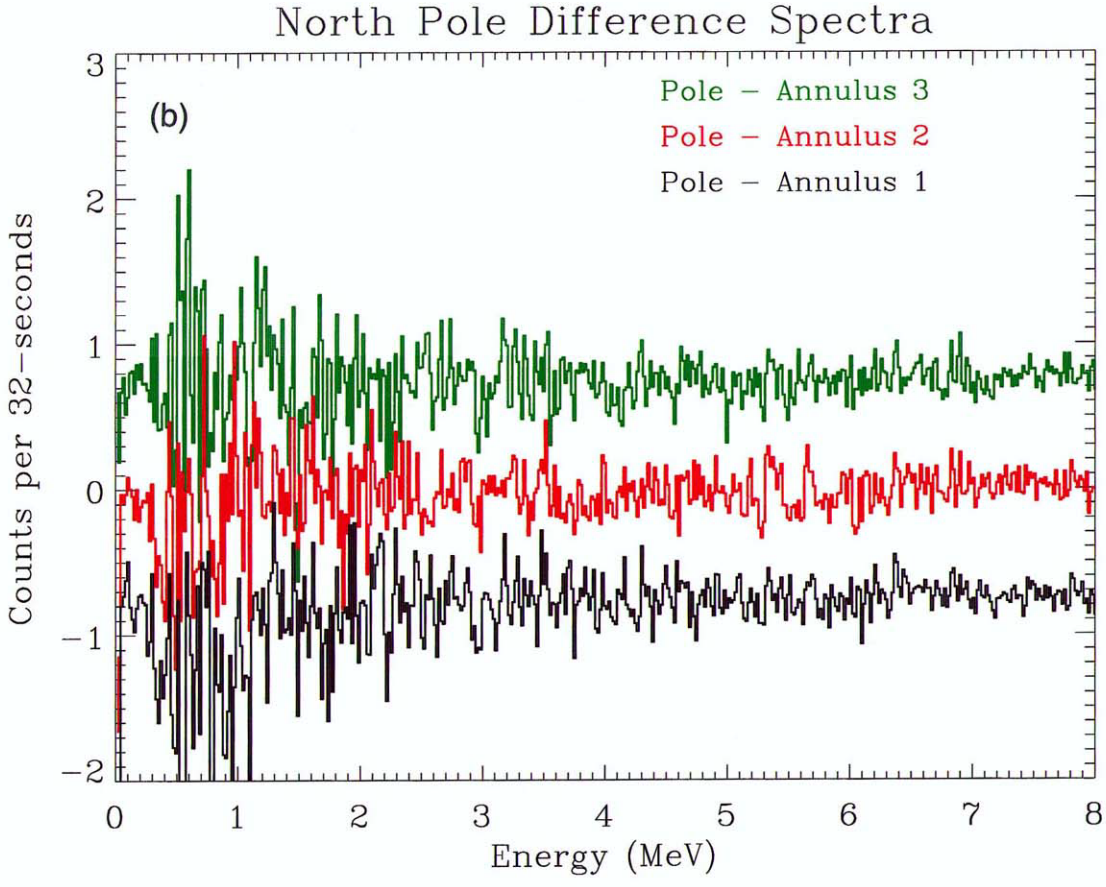


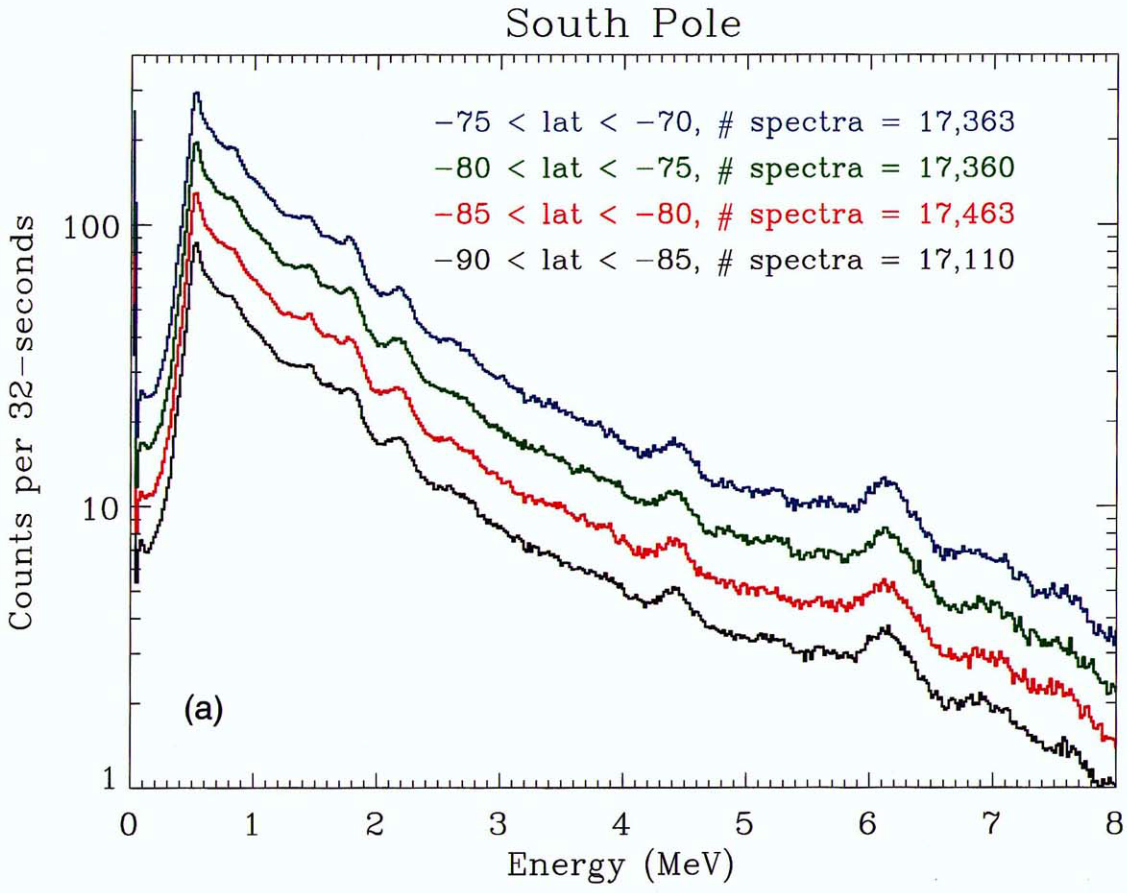

Neutron Simulation of the Three
Large South Pole Craters
Epi* = Epi - 0.07 x Therm
(a)
Percent Decrease From 0% H2O Bckgd
20
10
9
8
7
6
5
1
10
100
High Diameter Estimate
Low Diameter Estimate
Fast Neutrons
(b)
Percent Decrease From 0% H2O Bckgd
10
1
1
10
100
High Diameter Estimate
Low Diameter Estimate
Weight Percent of H2O

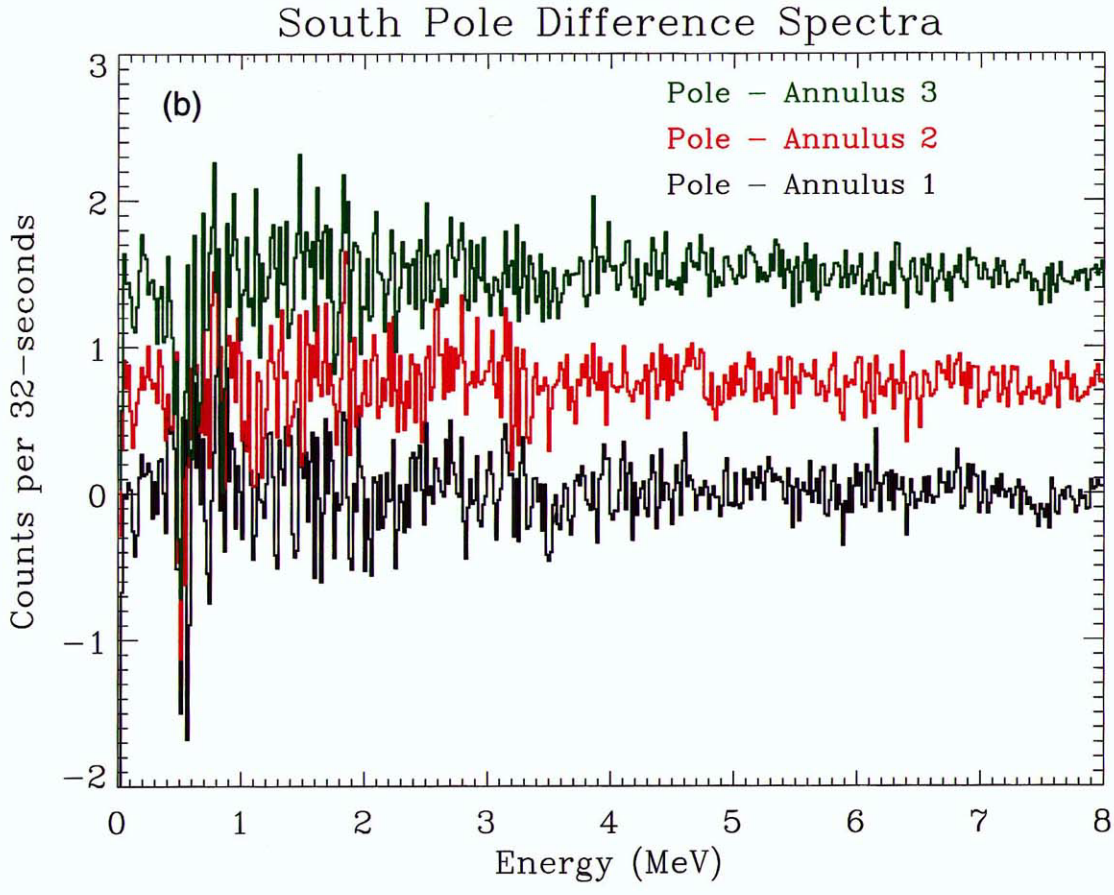
Neutron Simulation of the Three Large South Pole Craters




North Pole
(a)
70 < lat < 75, # spectra = 17,608
75 < lat < 80, # spectra = 17,581
80 < lat < 85, # spectra = 17,629
85 < lat < 90, # spectra = 17,486
Counts per 32-seconds
Energy (MeV)


North Pole Difference Spectra
(b)
Pole − Annulus 3
Pole − Annulus 2
Pole − Annulus 1
Counts per 32-seconds
Energy (MeV)


South Pole
−75 < lat < −70, # spectra = 17,363
−80 < lat < −75, # spectra = 17,360
−85 < lat < −80, # spectra = 17,463
−90 < lat < −85, # spectra = 17,110
(a)
Counts per 32−seconds
Energy (MeV)


South Pole Difference Spectra
(b)
Pole − Annulus 3
Pole − Annulus 2
Pole − Annulus 1
Counts per 32−seconds
Energy (MeV)

Data for Latitude > 85 Degrees

y = m*x + b
m = −0.117
b = 1.482
R = −0.291

(a)

Epithermal/Fast

1.38
1.36
1.34
1.32
1.30

1.00 1.10 1.20 1.30 1.40 1.50

Thermal/Fast

South Pole, Data for Latitudes < −85

y = m*x + b
m = 0.107
b = 1.210
R = 0.447

(b)

Epithermal/Fast

1.38
1.36
1.34
1.32
1.30

1.25 1.30 1.35 1.40 1.45 1.50

Thermal/Fast

Data for Latitude > 80 Degrees

y = m*x + b
m = −0.103
b = 1.482
R = −0.094

(a)

Epithermal/Fast

1.50
1.45
1.40
1.35
1.30

1.00 1.10 1.20 1.30 1.40 1.50

Thermal/Fast

South Pole, Data for Latitudes < −80

y = m*x + b
m = 0.159
b = 1.148
R = 0.526

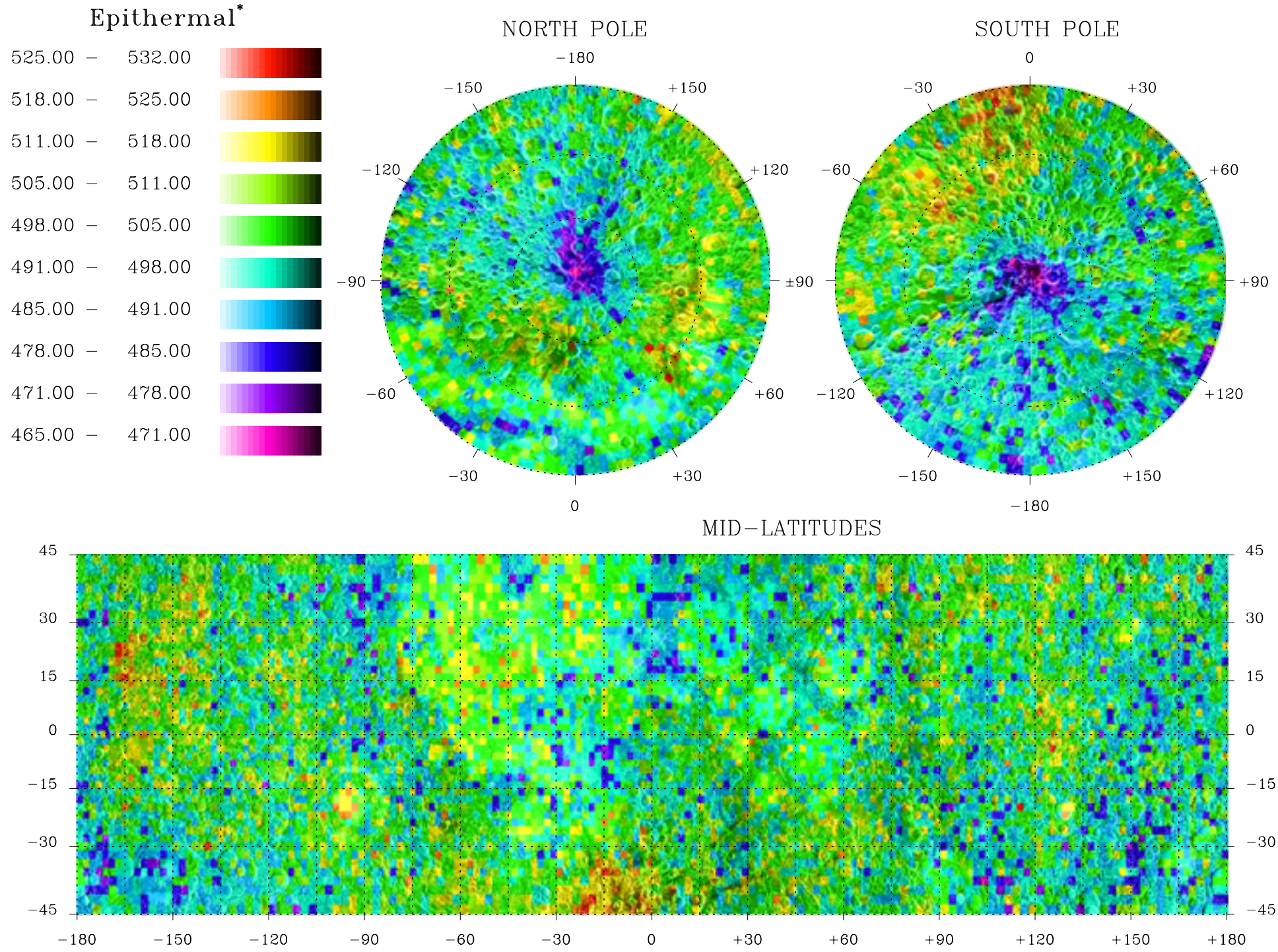
(b)

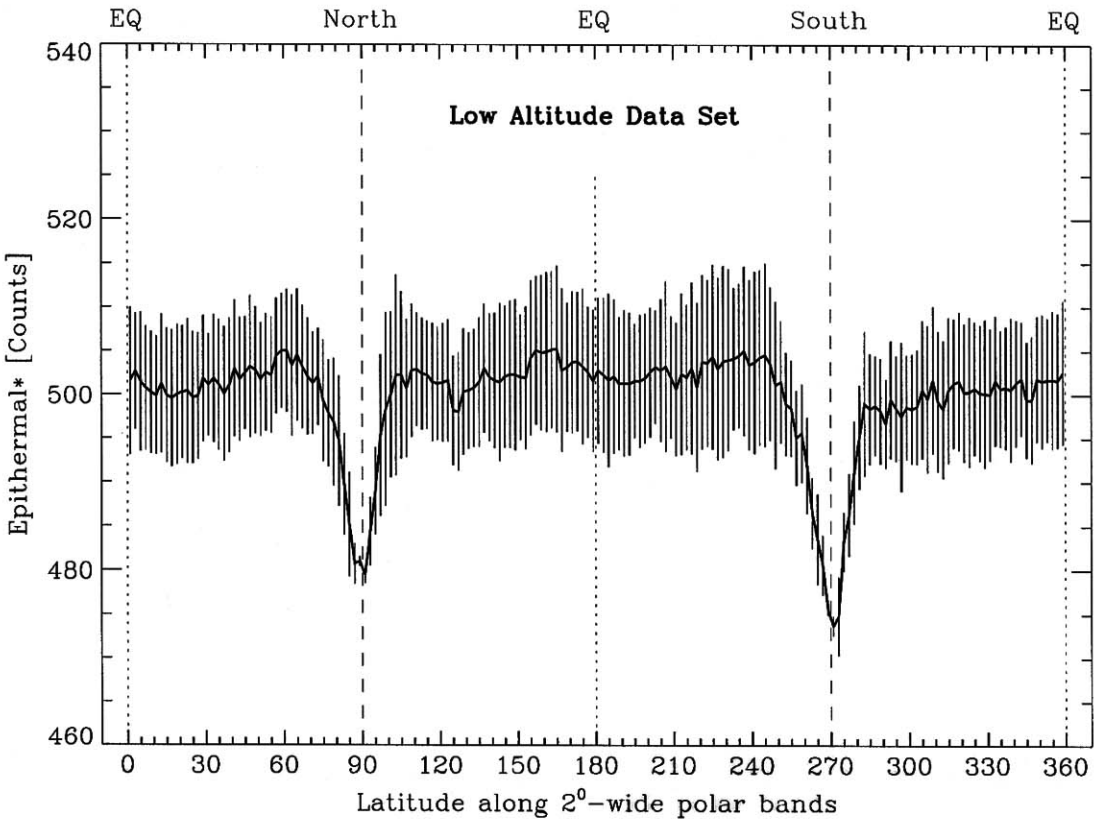
Epithermal/Fast

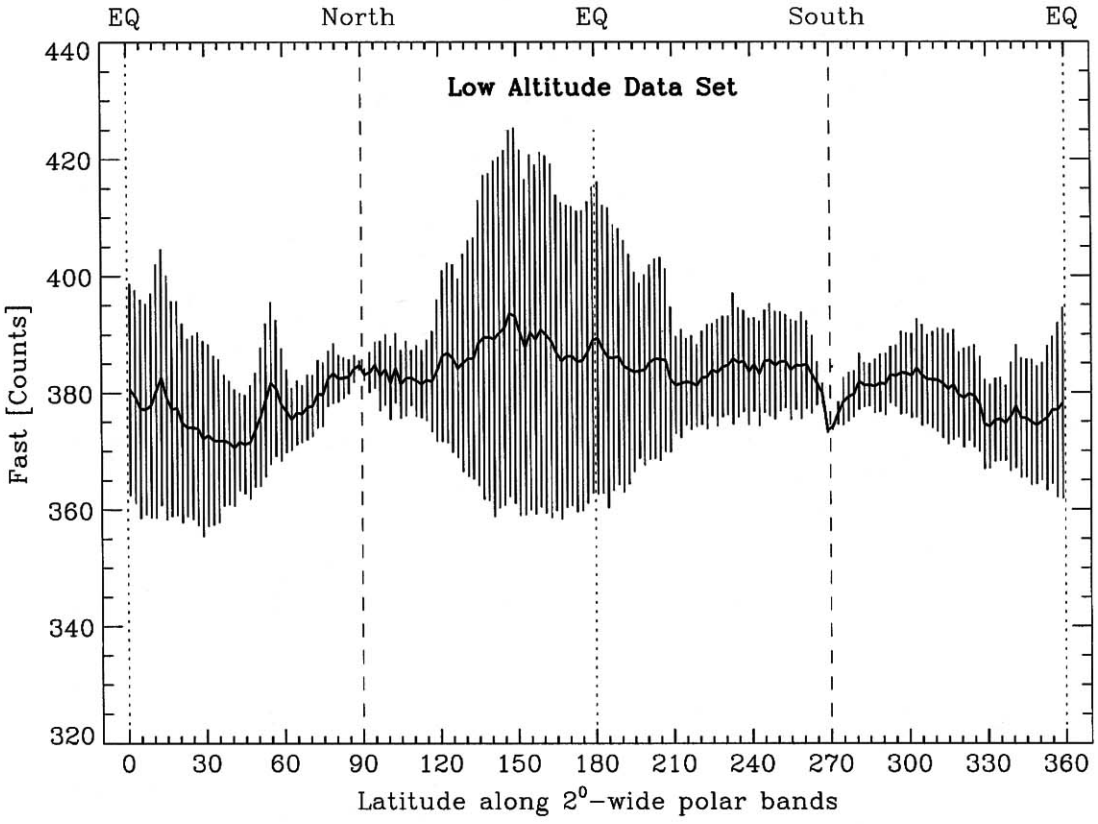
1.44
1.42
1.40
1.38
1.36
1.34
1.32
1.30

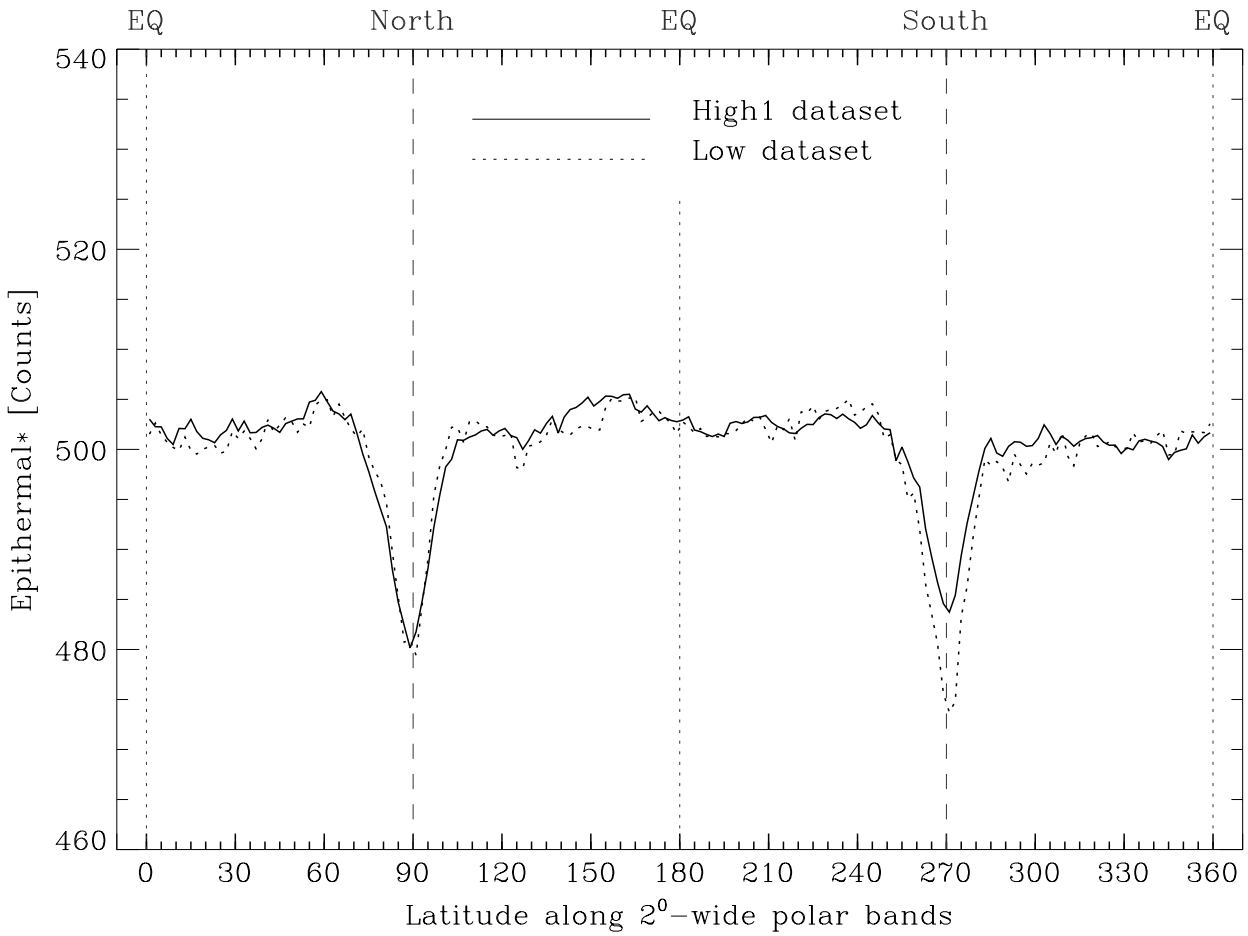
1.00 1.10 1.20 1.30 1.40 1.50

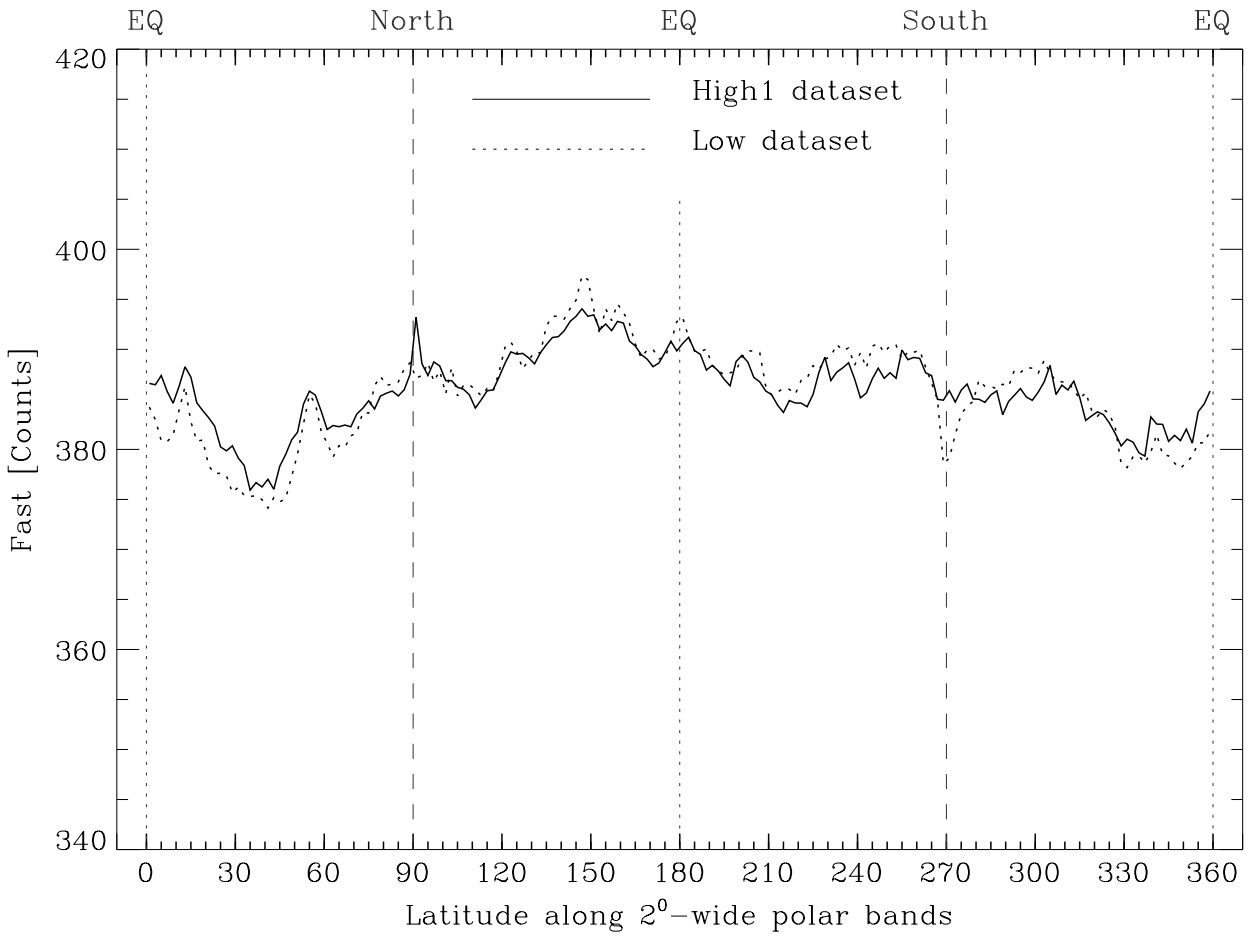
Thermal/Fast


Epithermal*
525.00 – 532.00
518.00 – 525.00
511.00 – 518.00
505.00 – 511.00
498.00 – 505.00
491.00 – 498.00
485.00 – 491.00
478.00 – 485.00
471.00 – 478.00
465.00 – 471.00
NORTH POLE
−180
−150
+150
−120
+120
−90
±90
−60
+60
−30
+30
0
SOUTH POLE
0
−30
+30
−60
+60
+90
−120
+120
−150
+150
−180
MID−LATITUDES
45
30
15
0
−15
−30
−45
−180
−150
−120
−90
−60
−30
0
+30
+60
+90
+120
+150
+180


EQ
North
EQ
South
EQ
Low Altitude Data Set
Epithermal* [Counts]
540
520
500
480
460
0
30
60
90
120
150
180
210
240
270
300
330
360
Latitude along 2⁰–wide polar bands


EQ
North
EQ
South
EQ
Low Altitude Data Set
Fast [Counts]
440
420
400
380
360
340
320
0
30
60
90
120
150
180
210
240
270
300
330
360
Latitude along 2⁰–wide polar bands


EQ
North
EQ
South
EQ
High1 dataset
Low dataset
Epithermal* [Counts]
540
520
500
480
460
0
30
60
90
120
150
180
210
240
270
300
330
360
Latitude along 2⁰−wide polar bands


EQ
North
EQ
South
EQ
High1 dataset
Low dataset
Fast [Counts]
420
400
380
360
340
0
30
60
90
120
150
180
210
240
270
300
330
360
Latitude along 2⁰−wide polar bands

Data for Latitude > 85 Degrees

y = m*x + b
m = 0.616
b = 0.384
R = 0.302

(a)

Epithermal* Neutrons/mean(Epithermal* Neutrons)

1.04
1.02
1.00
0.98

0.98 1.00 1.02 1.04

Fast Neutrons/mean(Fast Neutrons)

South Pole, Data for Latitude < −85 Degrees

y = m*x + b
m = 0.893
b = 0.107
R = 0.816

(b)

Epithermal* Neutrons/mean(Epithermal* Neutrons)

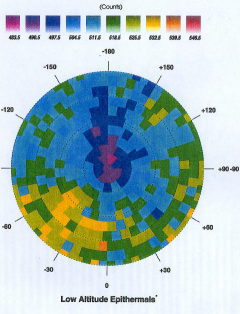
1.020
1.010
1.000
0.990
0.980

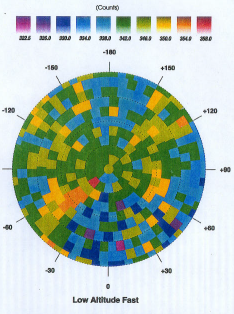
0.980 0.990 1.000 1.010 1.020

Fast Neutrons/mean(Fast Neutrons)

NORTH POLE

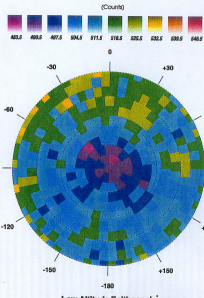
Lunar Prospector NS/LANL OBS-MIP



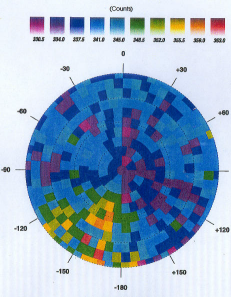


SOUTH POLE

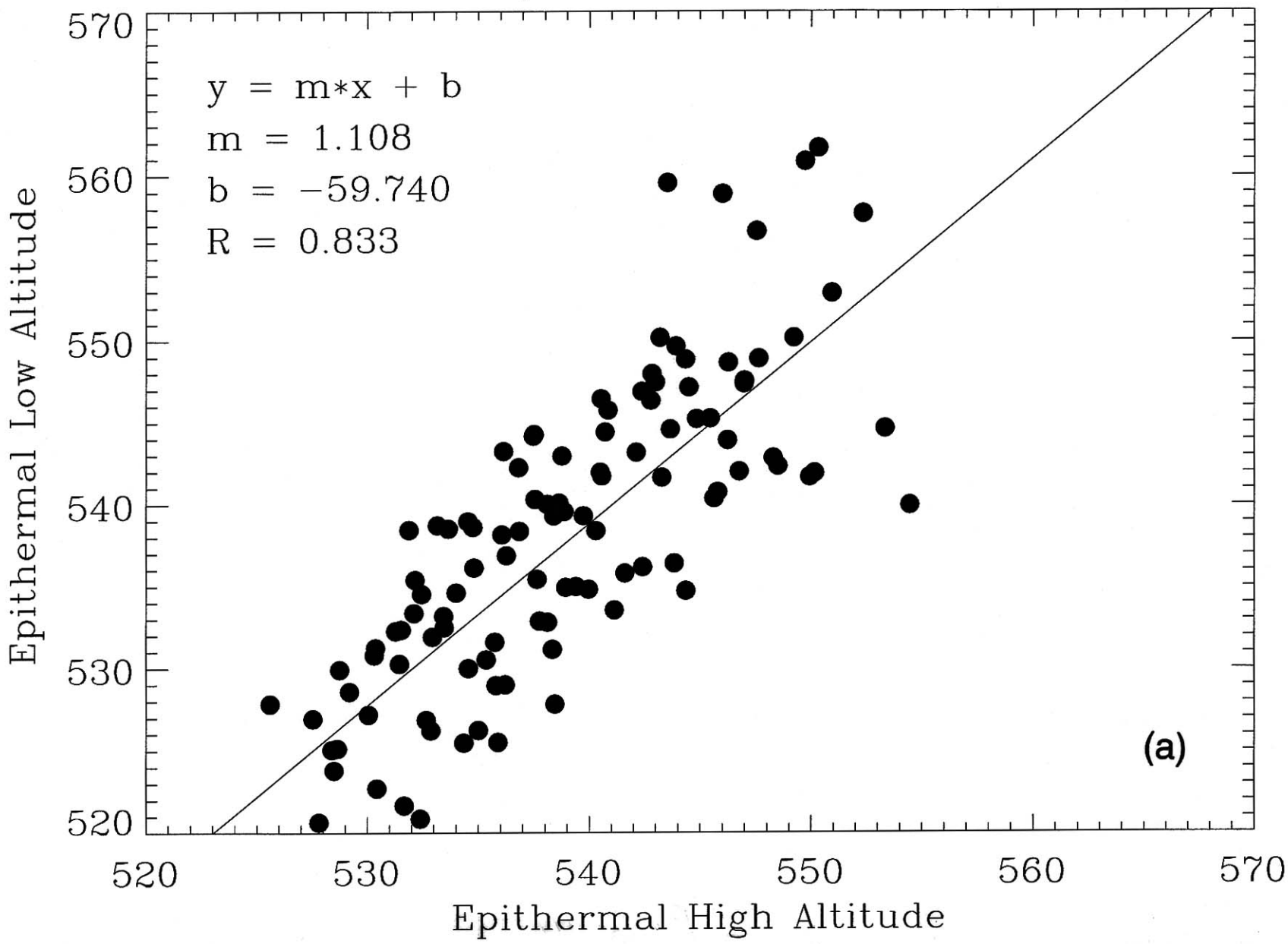
Lunar Prospector NS/LANL OBS-MIP

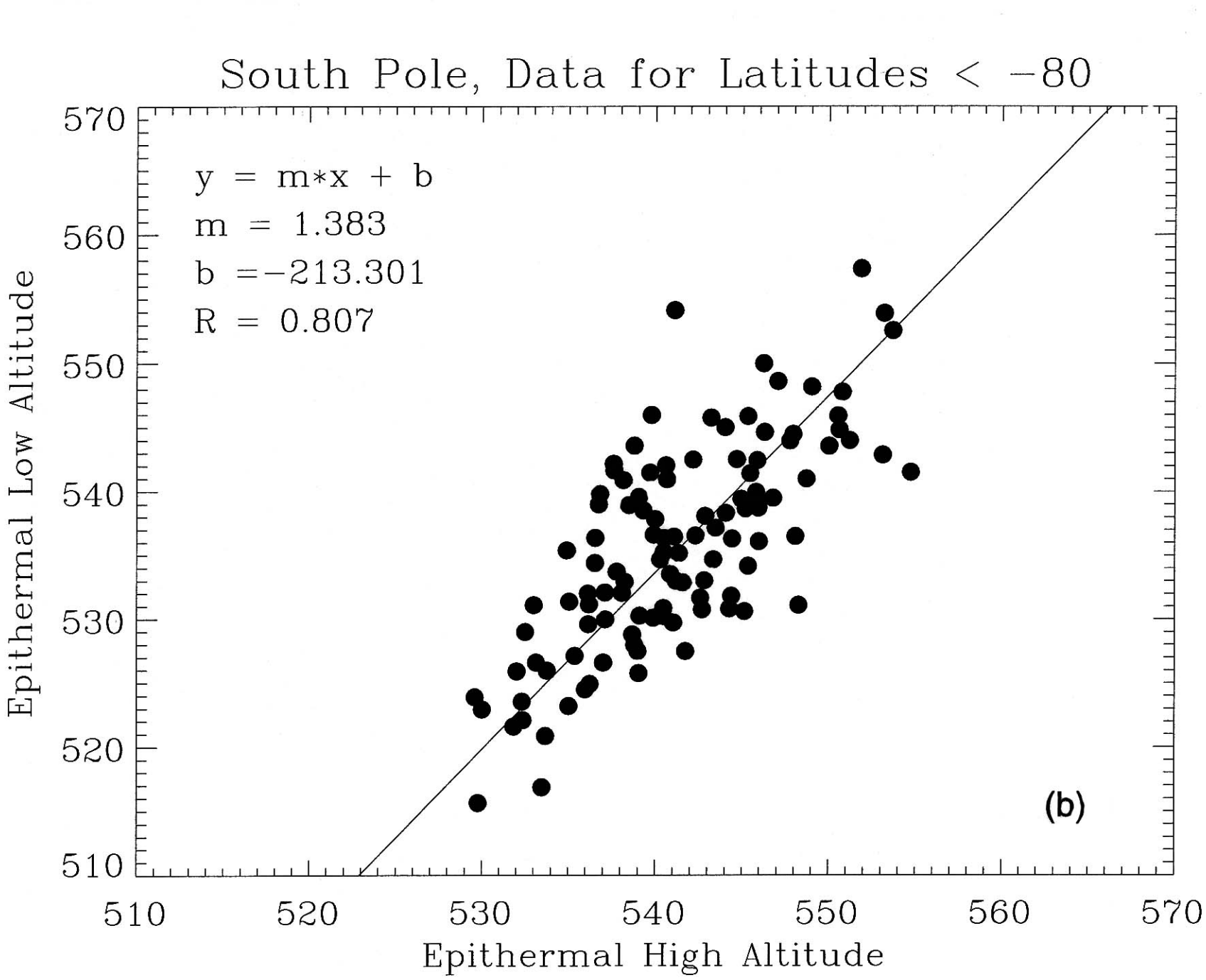


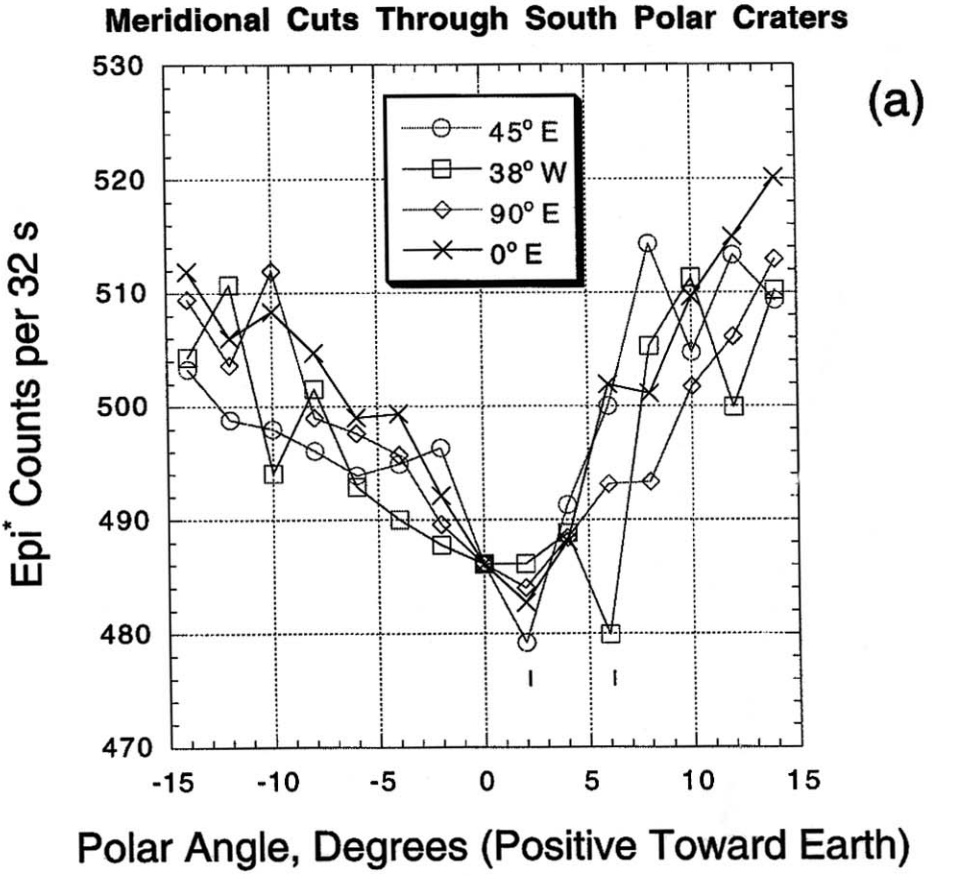
Low Altitude Epithermals

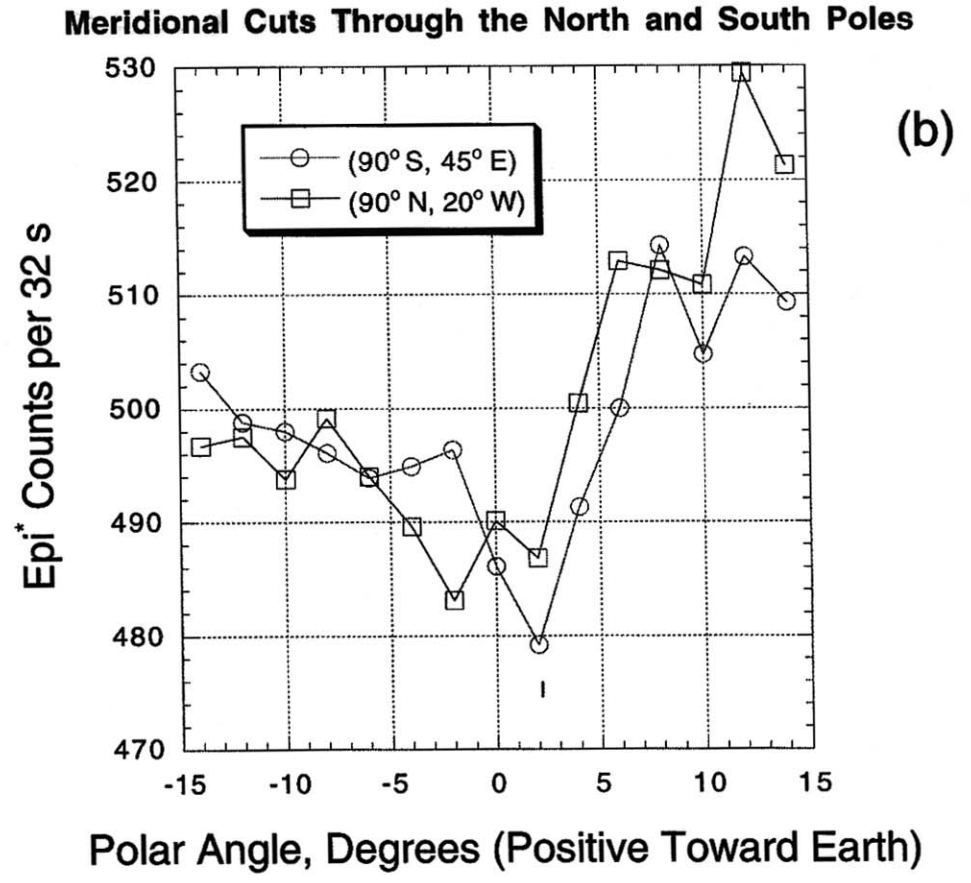


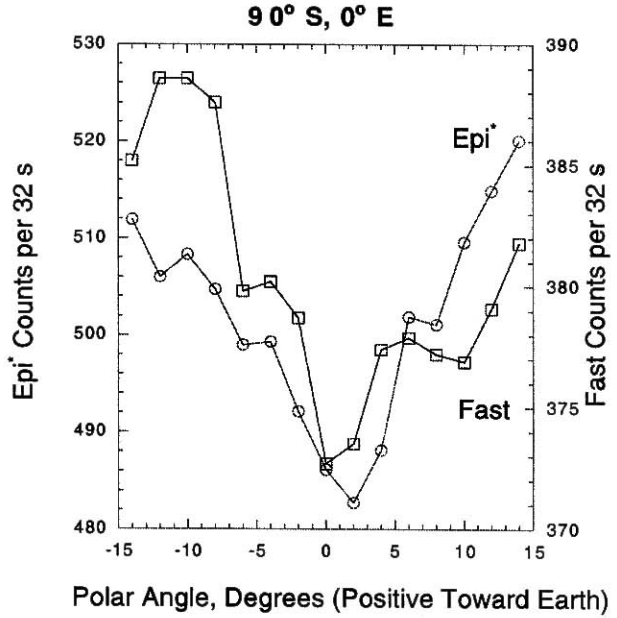
Low Altitude Fast

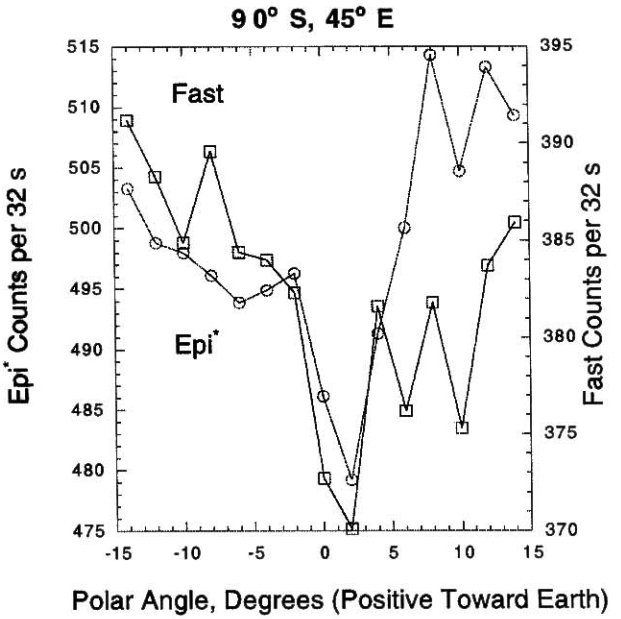

North Pole, Data for Latitudes > 80
y = m*x + b
m = 1.108
b = −59.740
R = 0.833
Epithermal Low Altitude
Epithermal High Altitude
520
530
540
550
560
570
(a)

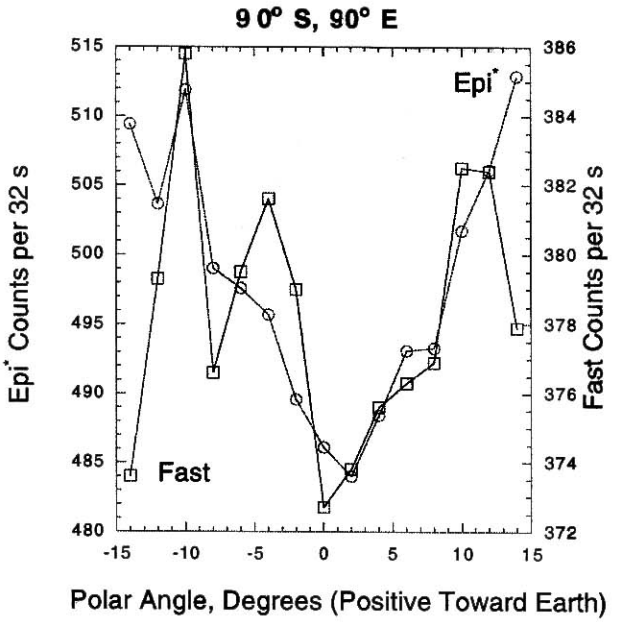

South Pole, Data for Latitudes < −80
y = m*x + b
m = 1.383
b =−213.301
R = 0.807
Epithermal Low Altitude
Epithermal High Altitude
510
520
530
540
550
560
570
(b)

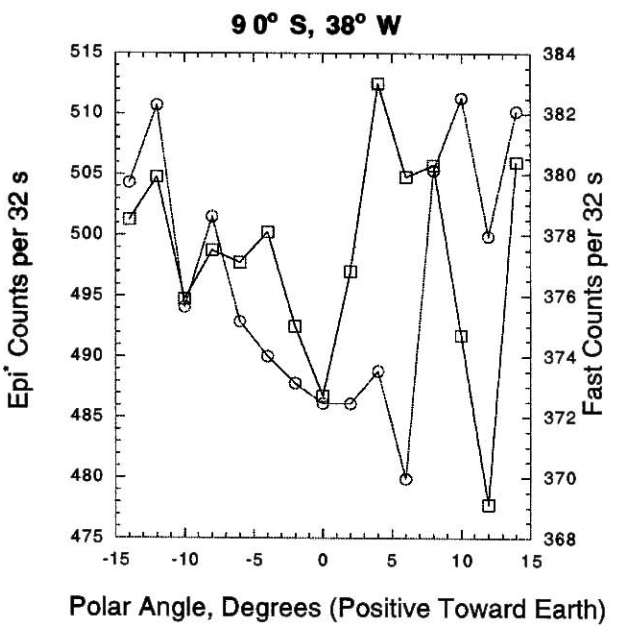

Meridional Cuts Through South Polar Craters
(a)
45° E
38° W
90° E
0° E
Epi* Counts per 32 s
530
520
510
500
490
480
470
-15
-10
-5
0
5
10
15
Polar Angle, Degrees (Positive Toward Earth)

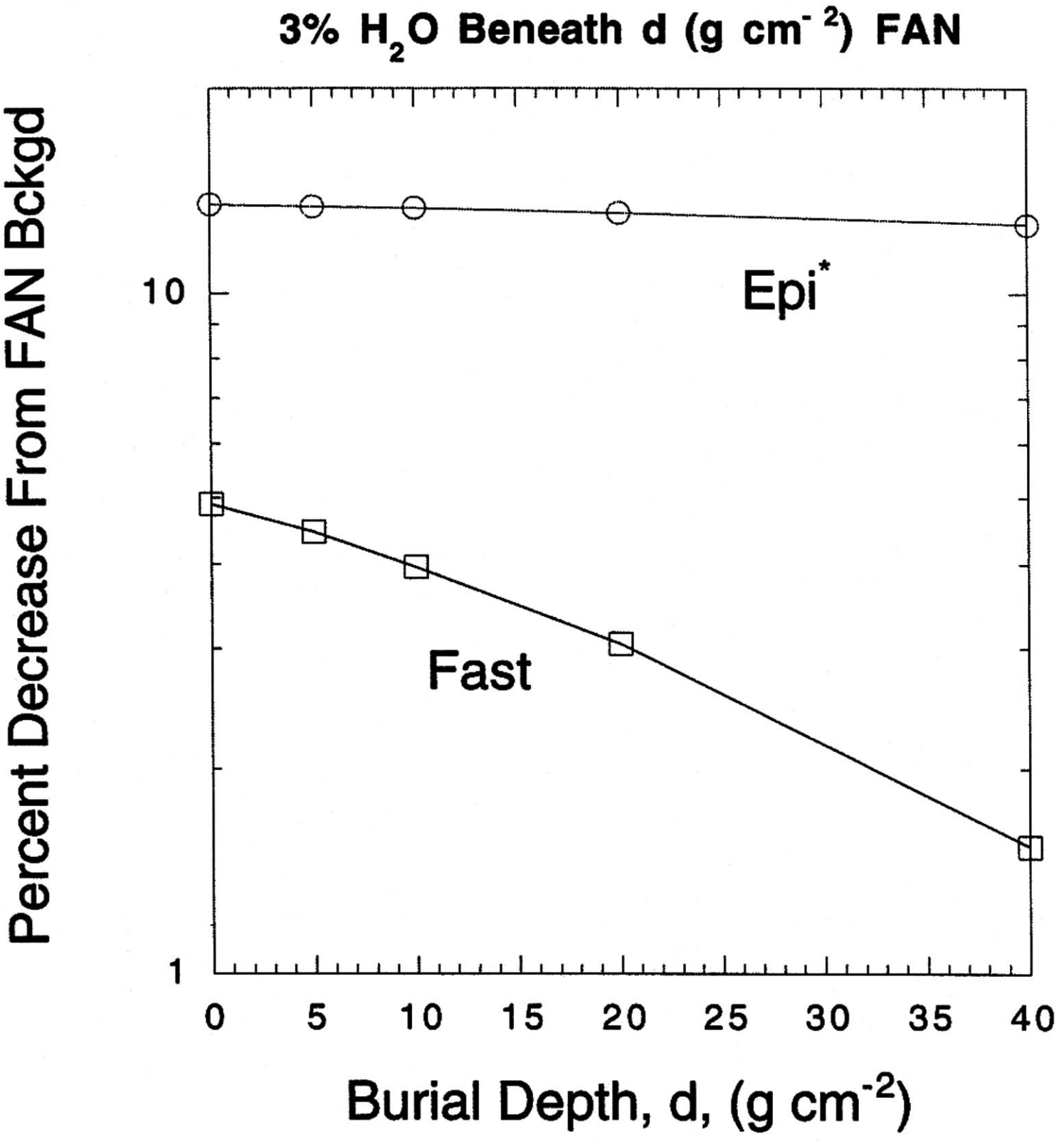

Meridional Cuts Through the North and South Poles
(b)
(90° S, 45° E)
(90° N, 20° W)
Epi* Counts per 32 s
530
520
510
500
490
480
470
-15
-10
-5
0
5
10
15
Polar Angle, Degrees (Positive Toward Earth)

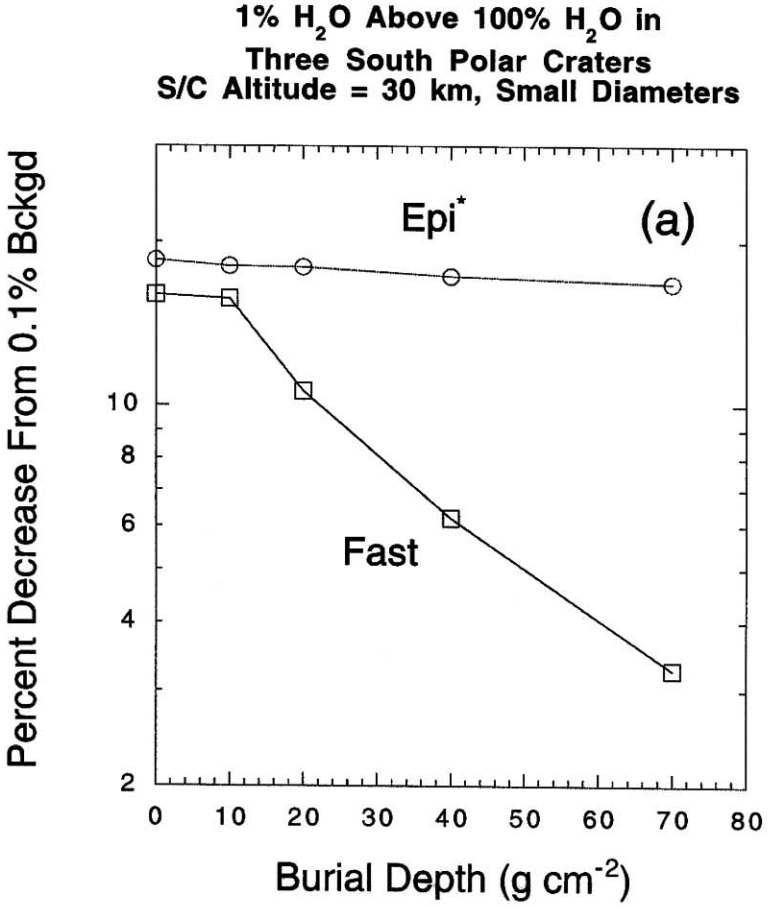

9 0° S, 0° E
Epi* Counts per 32 s
Fast Counts per 32 s
Epi*
Fast
Polar Angle, Degrees (Positive Toward Earth)

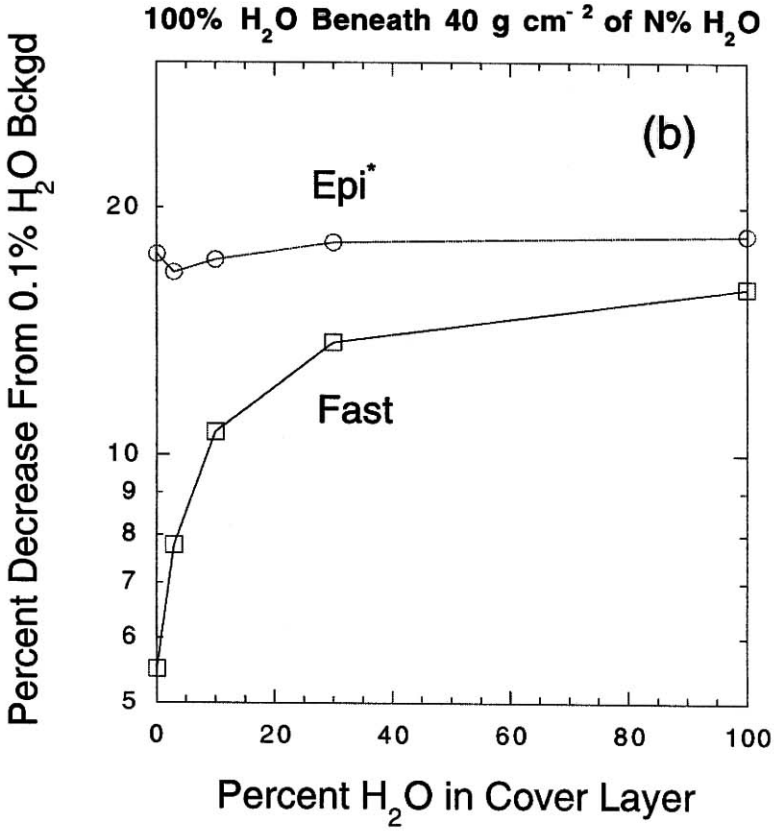

9 0° S, 45° E
Epi* Counts per 32 s
Fast Counts per 32 s
Fast
Epi*
Polar Angle, Degrees (Positive Toward Earth)


9 0° S, 90° E
Epi* Counts per 32 s
Fast Counts per 32 s
Epi*
Fast
Polar Angle, Degrees (Positive Toward Earth)


9 0° S, 38° W
Epi* Counts per 32 s
Fast Counts per 32 s
Polar Angle, Degrees (Positive Toward Earth)


3% H2O Beneath d (g cm- 2) FAN
Percent Decrease From FAN Bckgd
10
1
Epi*
Fast
0
5
10
15
20
25
30
35
40
Burial Depth, d, (g cm-2)


1% H2O Above 100% H2O in
Three South Polar Craters
S/C Altitude = 30 km, Small Diameters
Percent Decrease From 0.1% Bckgd
Epi*
(a)
Fast
10
8
6
4
2
0
10
20
30
40
50
60
70
80
Burial Depth (g cm-2)


100% H2O Beneath 40 g cm-2 of N% H2O
Percent Decrease From 0.1% H2O Bckgd
(b)
Epi*
Fast
20
10
9
8
7
6
5
0
20
40
60
80
100
Percent H2O in Cover Layer