Theoretical Simulations of ADMs based on Sigmoidal Fits

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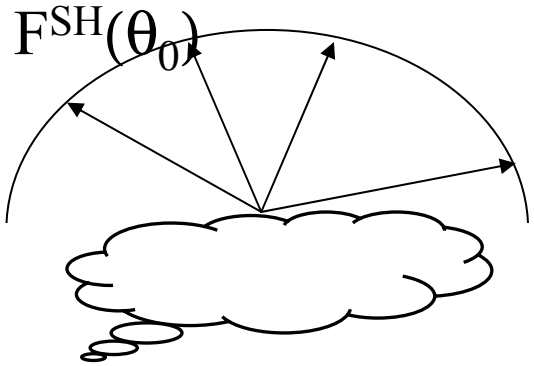
Approach

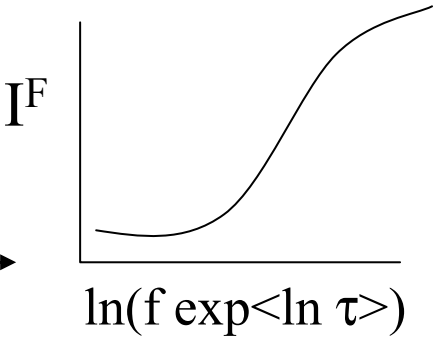
- Use existing theoretical calculations for realistic cloud scenes from Landsat to assess the use of the proposed parameter

Concept

1



Sigmoid Fit



From SHDOM have
- computed radiances
- computed flux

2

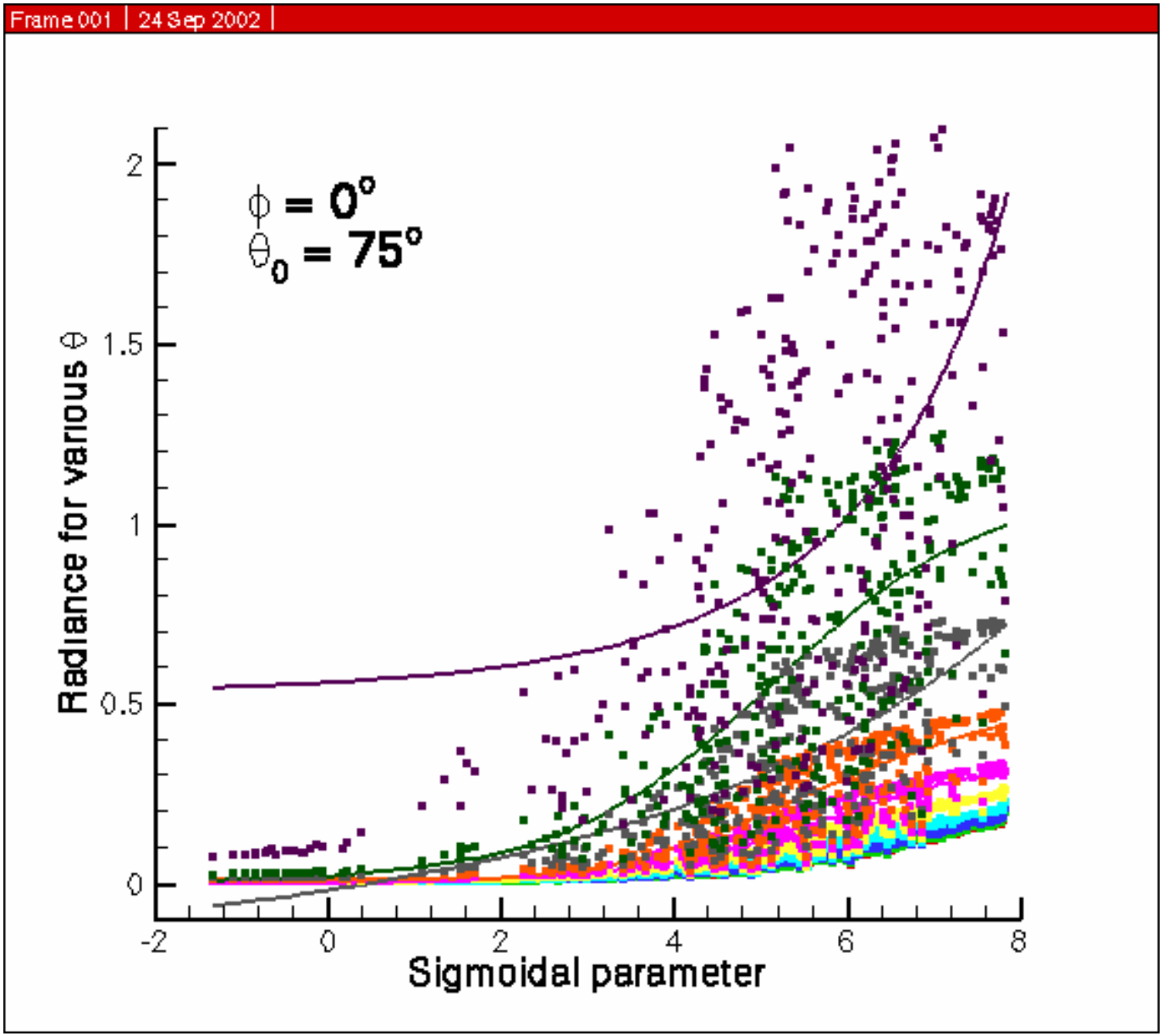
From fit: $F^F = \Sigma I^F$

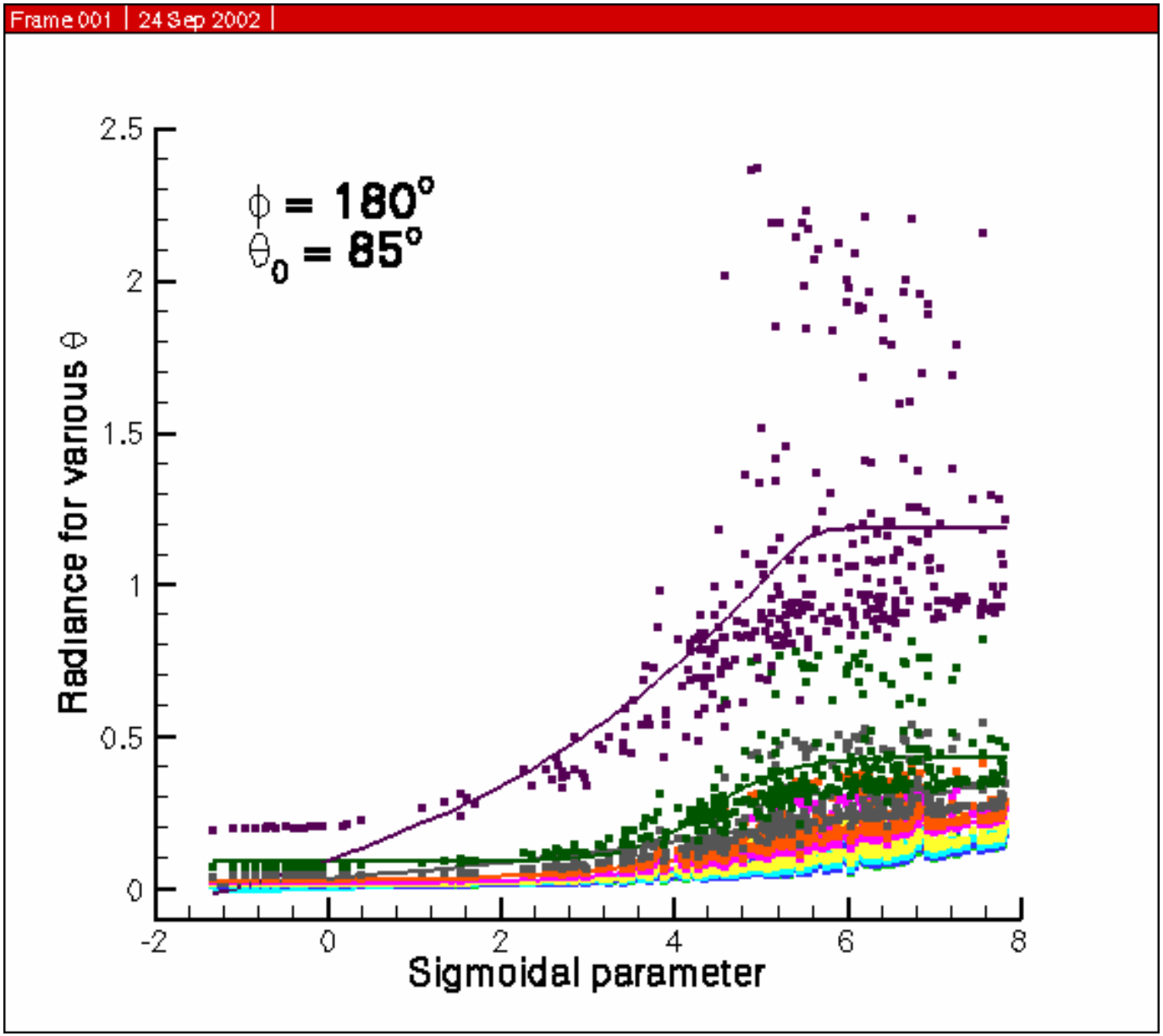
$ADM^F = \pi I^F / F^F$

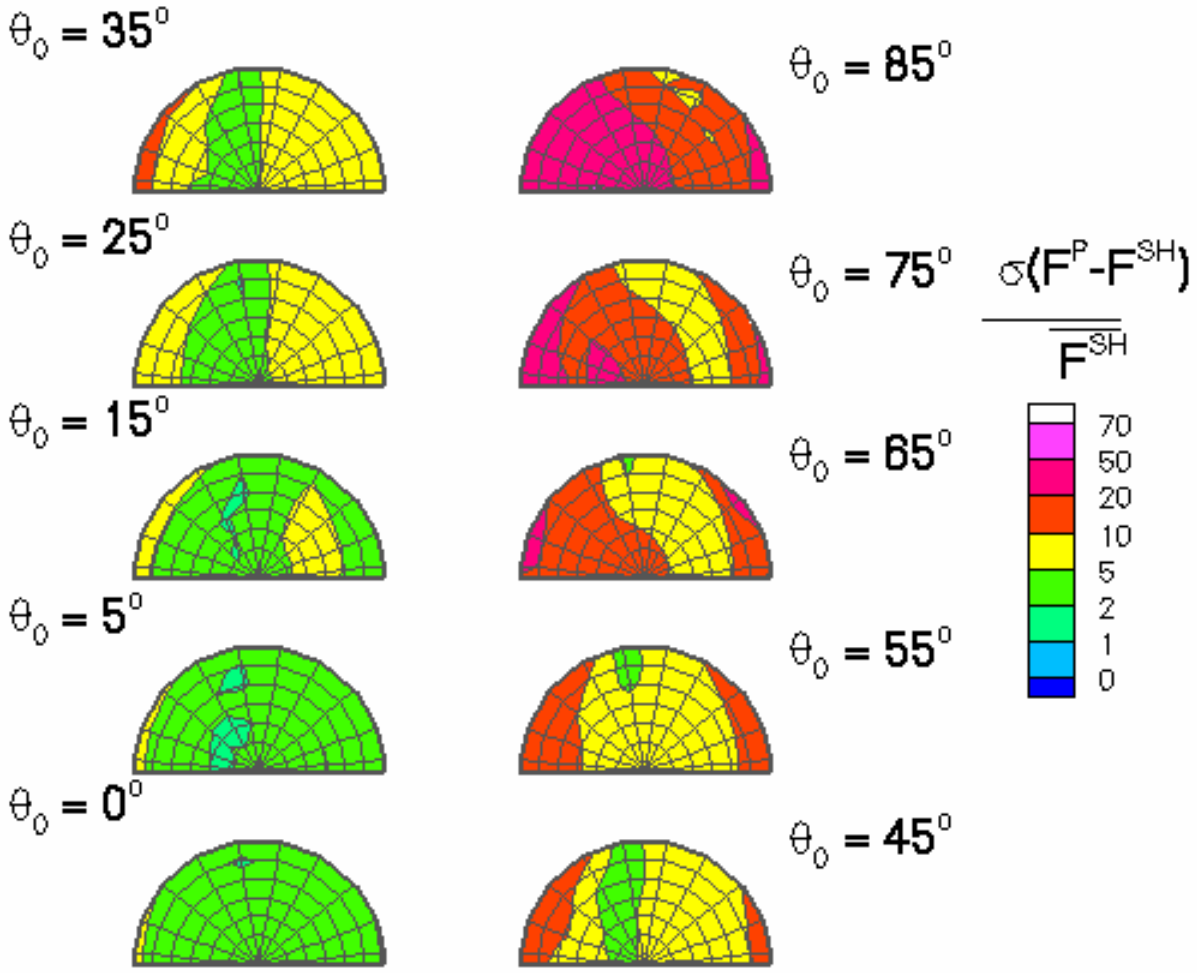
3

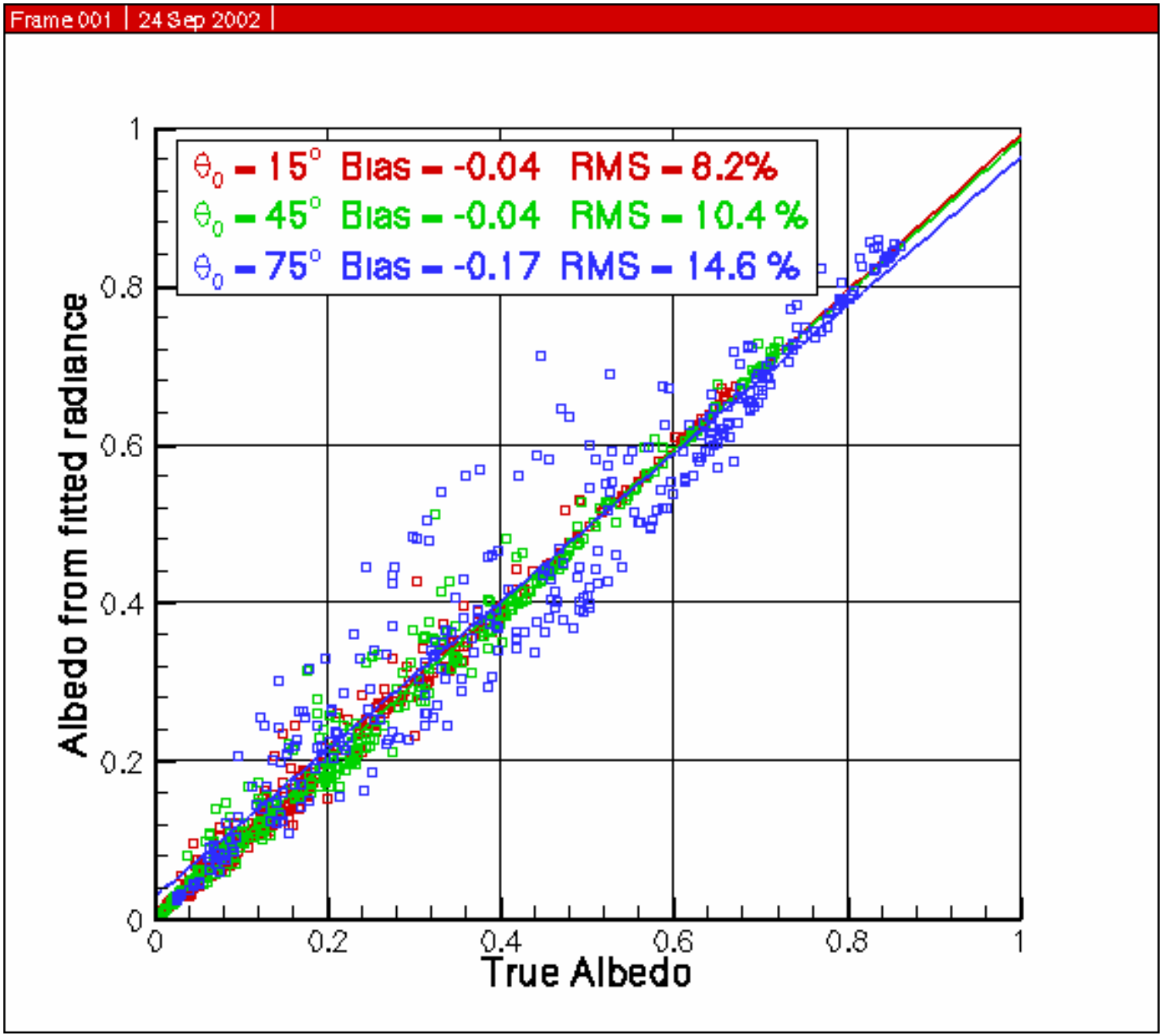
Predict:

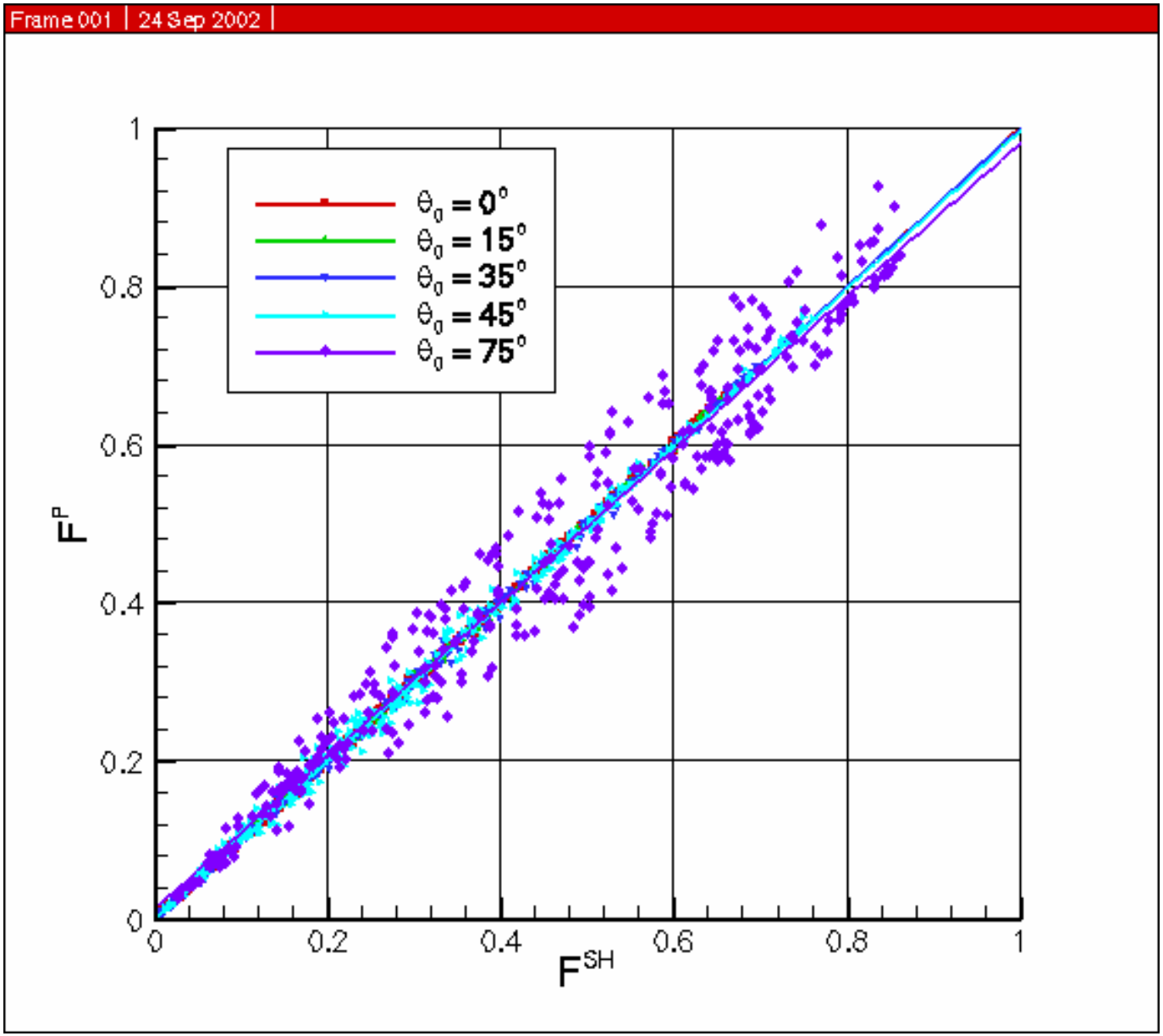
$F^P = \pi I^{SH} / ADM^F$

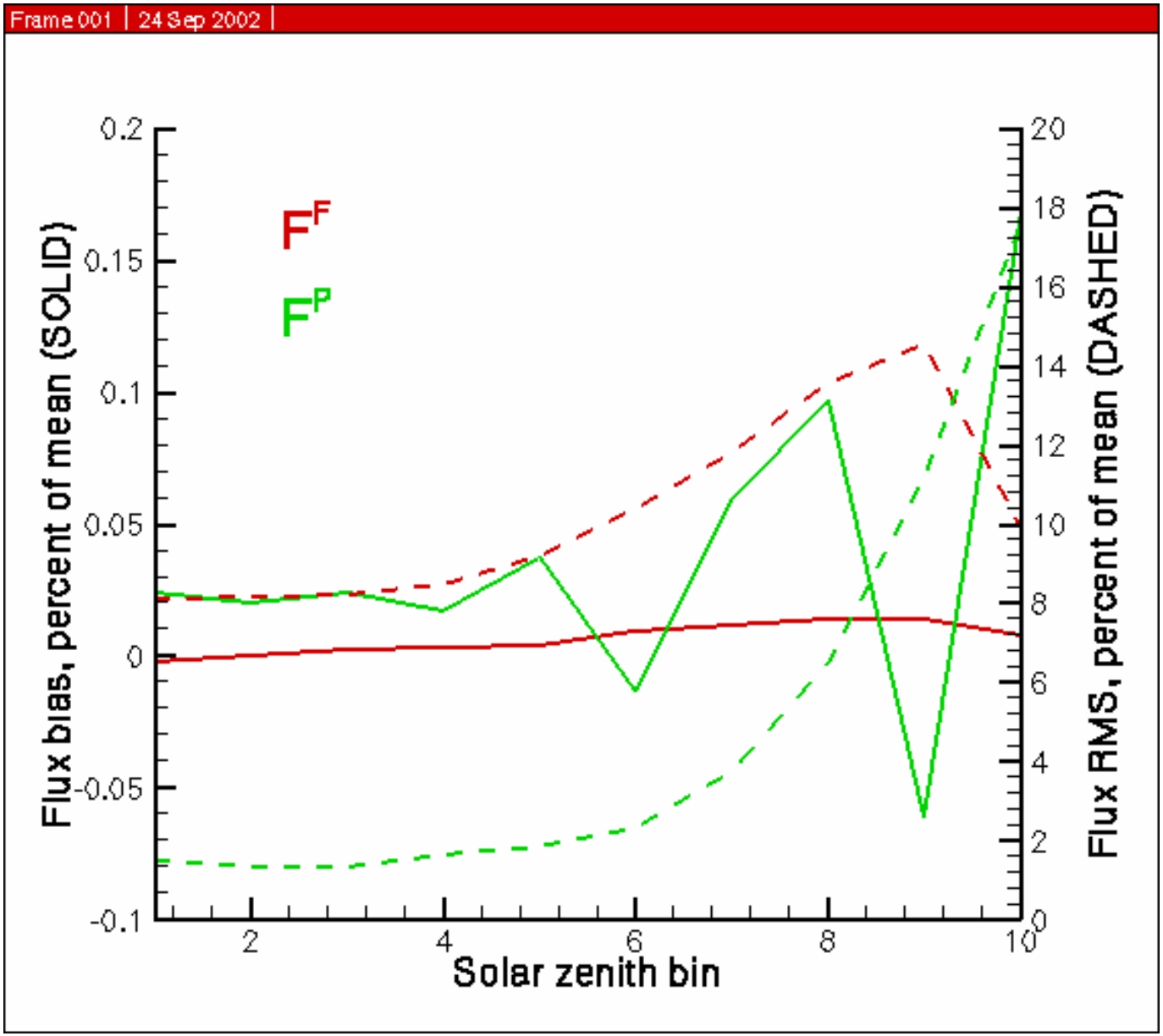

Frame 001 | 24 Sep 2002
$\phi = 0°$
$\theta_0 = 75°$
Radiance for various θ
Sigmoidal parameter
2
1.5
1
0.5
0
-2
0
2
4
6
8


Frame 001 | 24 Sep 2002
$\phi = 180°$
$\theta_0 = 85°$
Radiance for various Θ
Sigmoidal parameter
2.5
2
1.5
1
0.5
0
-2
0
2
4
6
8


θ0 = 35°
θ0 = 25°
θ0 = 15°
θ0 = 5°
θ0 = 0°
θ0 = 85°
θ0 = 75°
θ0 = 65°
θ0 = 55°
θ0 = 45°
σ(F^P-F^SH)
F^SH
70
50
20
10
5
2
1
0


Frame 001 | 24 Sep 2002
θ0 = 15° Bias = -0.04 RMS = 8.2%
θ0 = 45° Bias = -0.04 RMS = 10.4 %
θ0 = 75° Bias = -0.17 RMS = 14.6 %
Albedo from fitted radiance
True Albedo
0
0.2
0.4
0.6
0.8
1


Frame 001 | 24 Sep 2002 |
θ0 = 0°
θ0 = 15°
θ0 = 35°
θ0 = 45°
θ0 = 75°
F^P
F^SH
0
0.2
0.4
0.6
0.8
1


Frame 001 | 24 Sep 2002
F^F
F^P
Flux bias, percent of mean (SOLID)
Flux RMS, percent of mean (DASHED)
Solar zenith bin
0.2
0.15
0.1
0.05
0
-0.05
-0.1
20
18
16
14
12
10
8
6
4
2
0
2
4
6
8
10

Status

- F^{SH} and F^{F} agree quite well
- Increasing RMS difference for F^{P} with θ_0
- Sigmoidal fit breaks down at some angles
  - No correlation to typical cloud props
  - Suggests great sensitivity to cloud geometry
  - Needs further study