R.S. of AEROSOL & ATMOSPHERIC CORR.

INTERNATIONAL WORKSHOP

APRIL 15-19 JGR-D PUBLICATION

Kaufman, Tanré, Nakajima, Gordon

INFORMATION CONTENT OF $L(\lambda)$ GROUND / SATELLITE

* $L_s(\lambda)$ OVER OCEAN $\rightarrow$ V_s/V_L, τ_s? τ_L?
  $\hookrightarrow$ CORRECTION
* $L_s(\lambda,\theta) \rightarrow \tau$, $n(r)$, ω_0? m_r, m_i, $P(\theta)$
* Particle shape and structure

AFGL MODELS $\Longleftrightarrow$ DYNAMIC MODELS
THE PARAMETES SPACE AERONET

WHICH PARAMETERS DO WE DERIVE AND ARE THEY WANT NEEDED BY SCIENTIFIC COMMUNITIES.

INTEGRATON BETWEEN SYSTEMS
MODIS/MISR/POLDER/OCTS/GLI

GROUND MONITORING OF AEROSOL
SIZE, CHEMISTRY

VALIDATION: AERONET, AIRCRAFT

ATMOSPHERIC CORRECTION

WATER VAPOR, OZONE, | POLAR REGIONS

WIND SPEED

OCEANIC CLOUD - INSTRUMENT VS AEROSOL

INVERSIONS - SATELLITE
GROUND

AEROSOL ABSORPTION — HOW TO MEASURE & HANDLE

. 7 λ

470

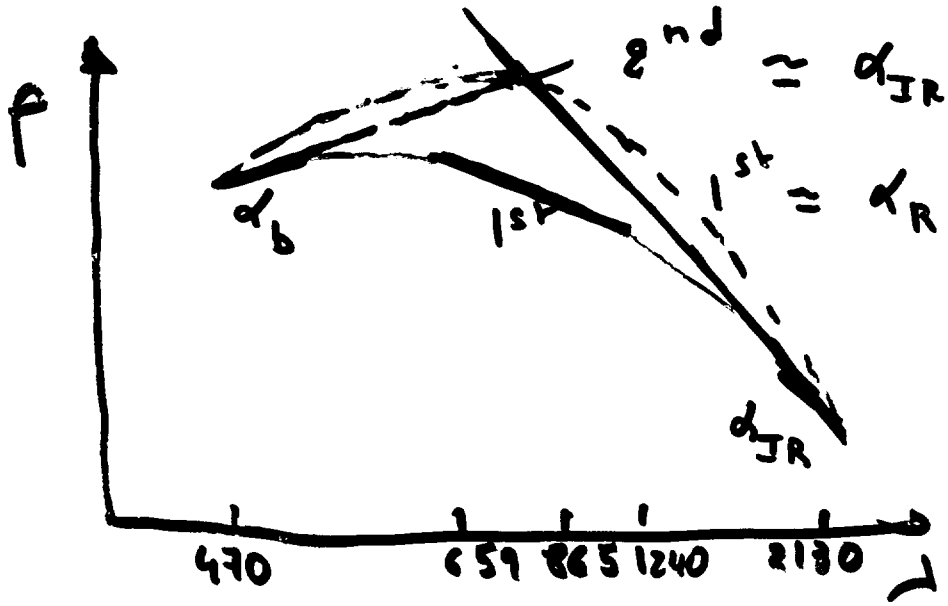
⋮

2130

→ 2 quantities

(1st comp)

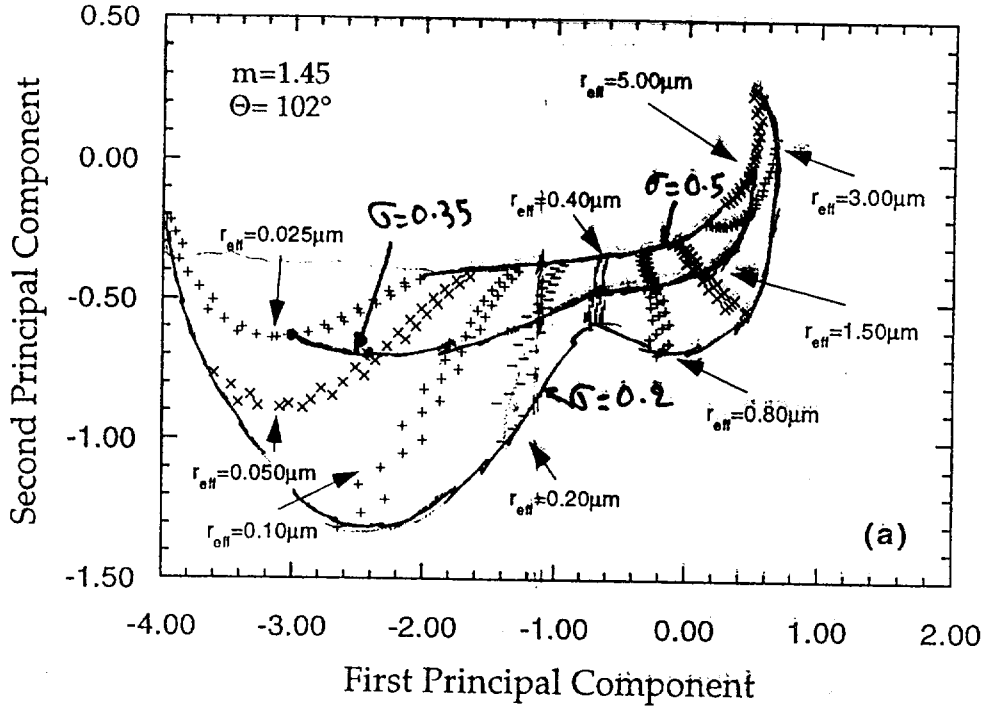
(2nd comp)



$2^{nd} \simeq \alpha_{JR} - \alpha_b$

$1^{st} \simeq \alpha_R$

$$\alpha = \frac{\mathrm{Ln}\,(P_{\lambda_1}/P_{ECS})}{\mathrm{Ln}\,(\lambda_1/ECS)}$$


m=1.45
Θ= 102°
r_{eff}=5.00µm
r_{eff}=3.00µm
r_{eff}=1.50µm
r_{eff}=0.80µm
r_{eff}=0.40µm
r_{eff}=0.20µm
r_{eff}=0.10µm
r_{eff}=0.050µm
r_{eff}=0.025µm
σ=0.5
σ=0.35
σ=0.2
(a)
0.50
0.00
-0.50
-1.00
-1.50
-4.00
-3.00
-2.00
-1.00
0.00
1.00
2.00
Second Principal Component
First Principal Component

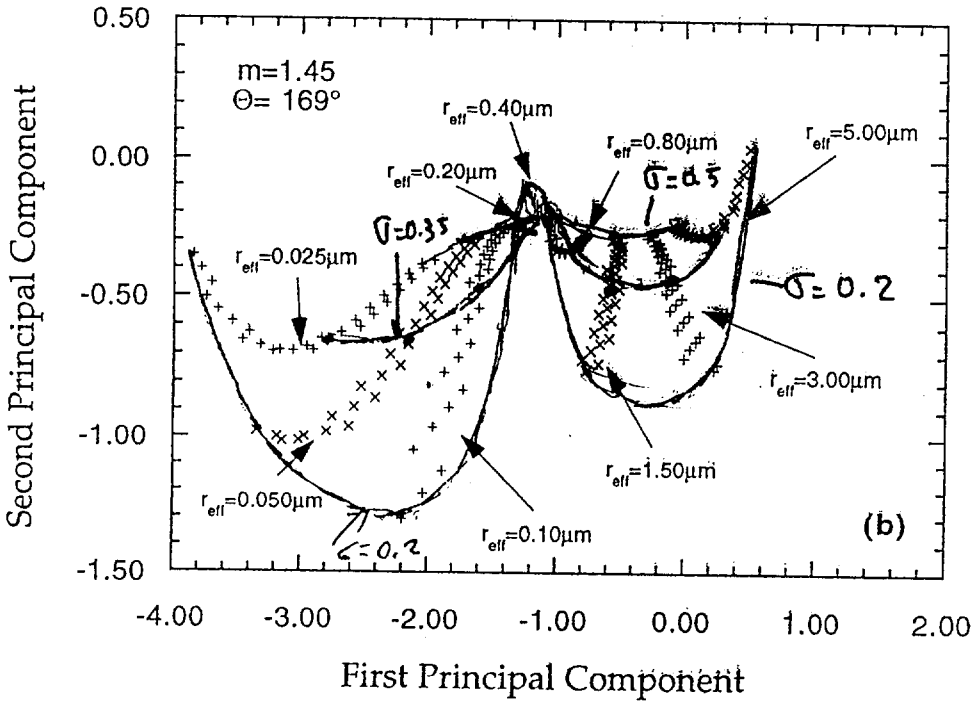
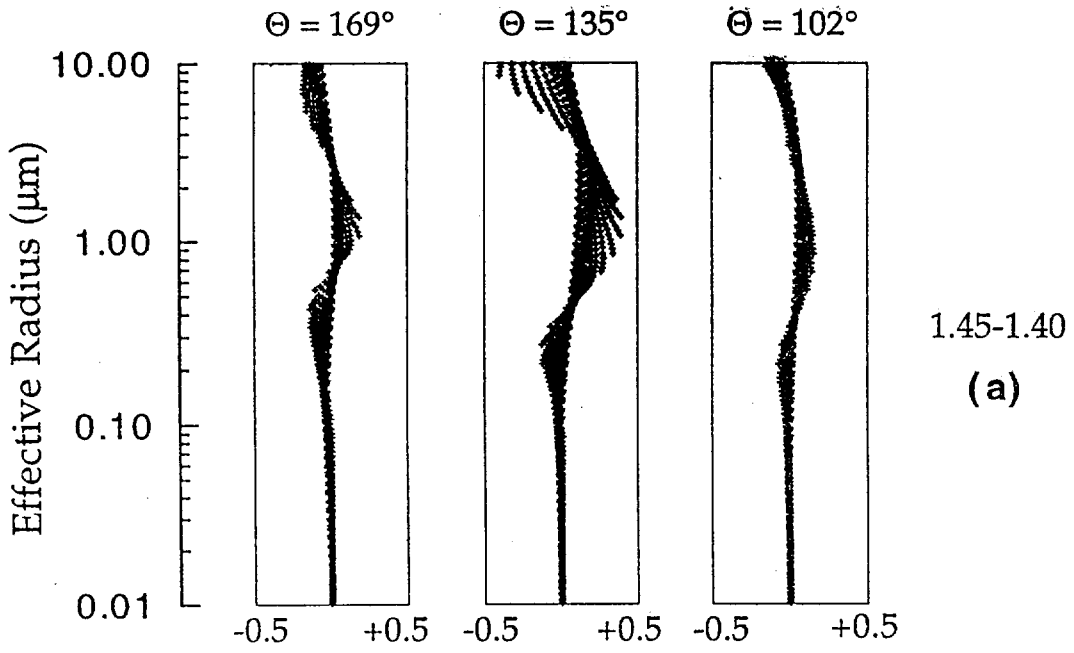
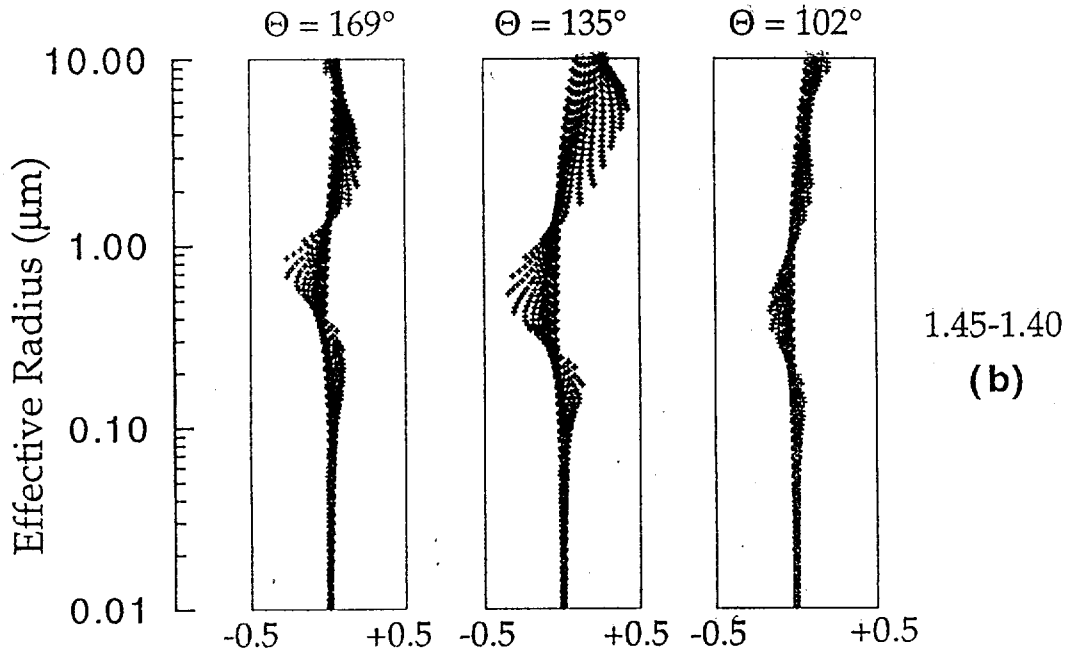

m=1.45
Θ= 169°
r_{eff}=0.40µm
r_{eff}=0.80µm
r_{eff}=5.00µm
r_{eff}=0.20µm
r_{eff}=0.025µm
r_{eff}=3.00µm
r_{eff}=1.50µm
r_{eff}=0.050µm
r_{eff}=0.10µm
σ=0.5
σ=0.35
σ=0.2
σ=0.2
(b)
0.50
0.00
-0.50
-1.00
-1.50
-4.00
-3.00
-2.00
-1.00
0.00
1.00
2.00
Second Principal Component
First Principal Component

Fig 7

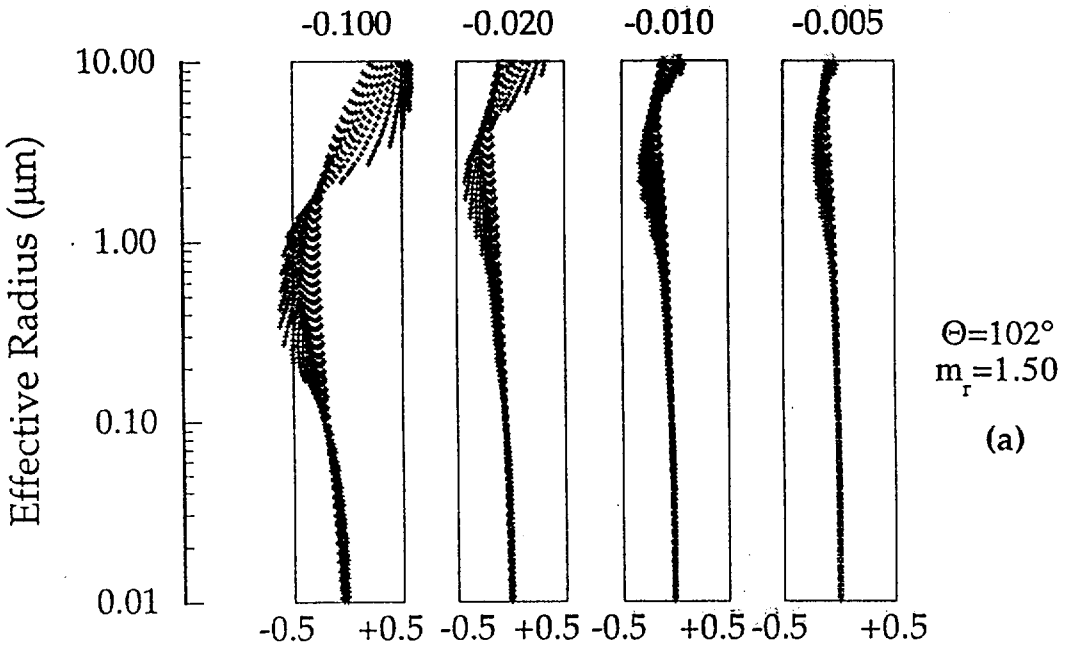


Difference Between The First Principal Components



Difference Between The Second Principal Components

Fig. 9


-0.100
-0.020
-0.010
-0.005
10.00
1.00
0.10
0.01
Effective Radius (μm)
-0.5 +0.5 -0.5 +0.5 -0.5 +0.5 -0.5 +0.5
Θ=102°
m_r=1.50
(a)
Difference Between the First Principal Components

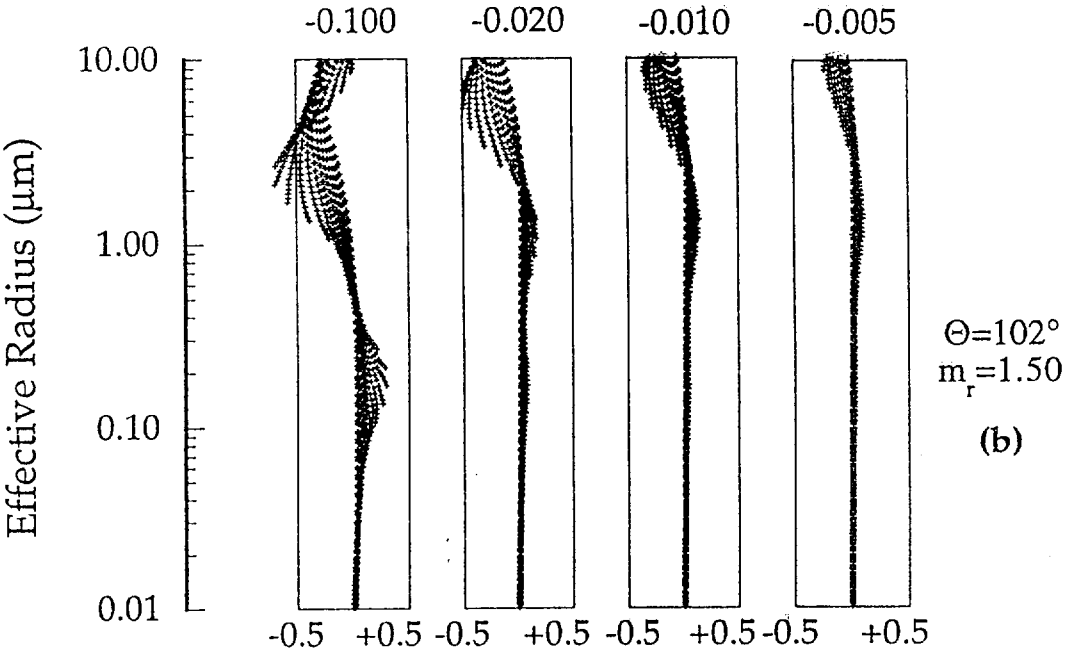
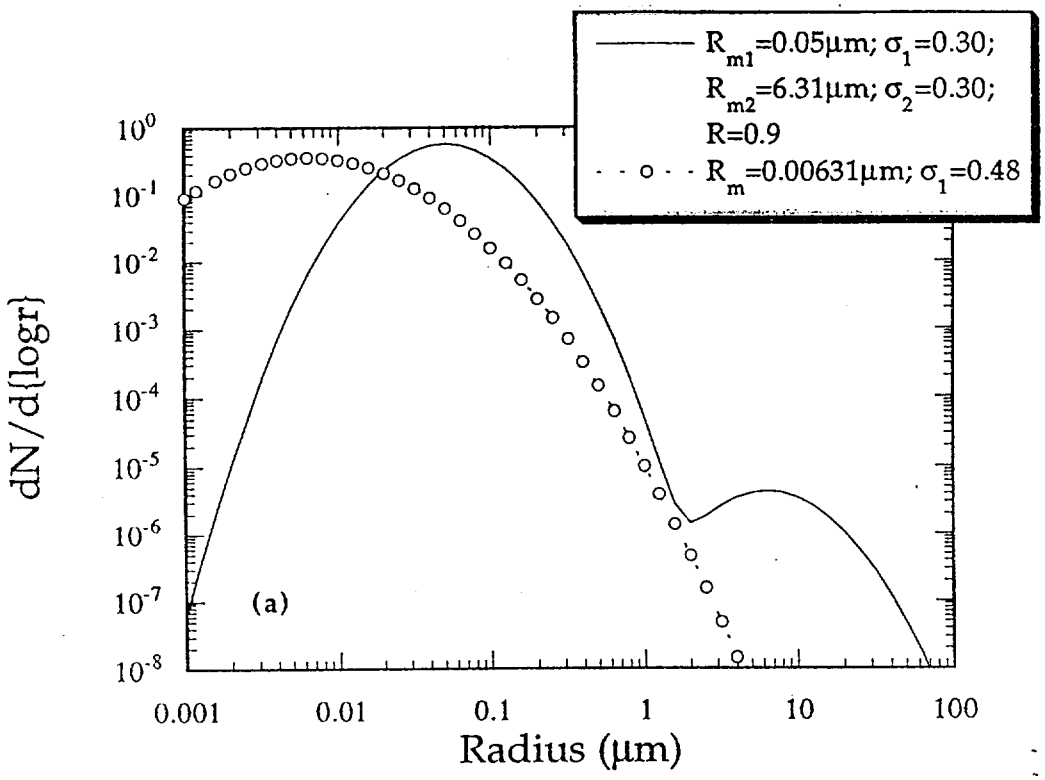

-0.100
-0.020
-0.010
-0.005
10.00
1.00
0.10
0.01
Effective Radius (μm)
-0.5 +0.5 -0.5 +0.5 -0.5 +0.5 -0.5 +0.5
Θ=102°
m_r=1.50
(b)
Difference Between the Second Principal Components

Fig. 11


R_{m1}=0.05μm; σ_1=0.30;
R_{m2}=6.31μm; σ_2=0.30;
R=0.9
R_m=0.00631μm; σ_1=0.48
dN/d{logr}
10^0
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
(a)
0.001
0.01
0.1
1
10
100
Radius (μm)

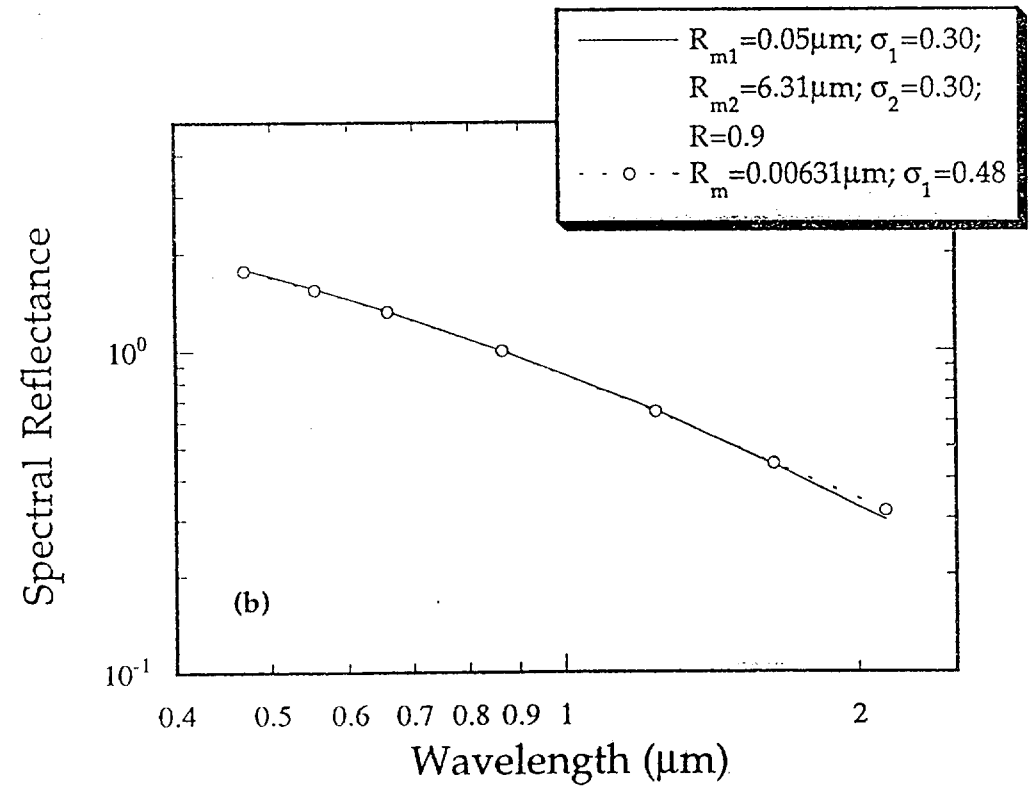
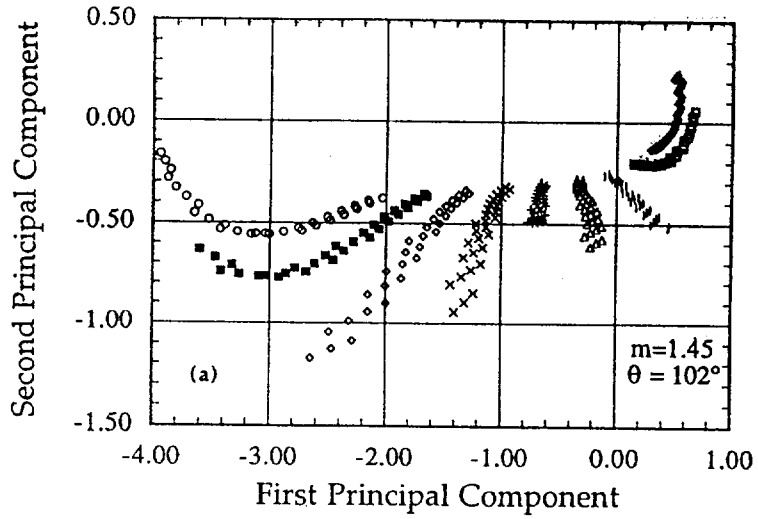
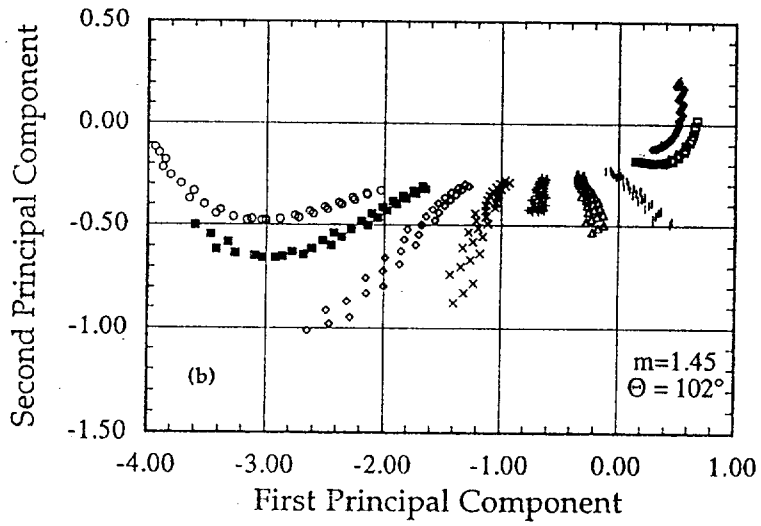
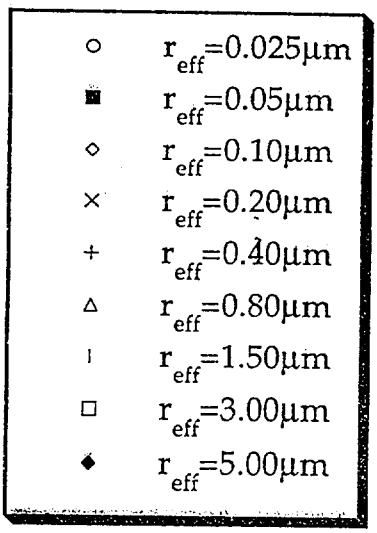

R_{m1}=0.05μm; σ_1=0.30;
R_{m2}=6.31μm; σ_2=0.30;
R=0.9
R_m=0.00631μm; σ_1=0.48
Spectral Reflectance
10^0
10^{-1}
(b)
0.4
0.5
0.6
0.7
0.8
0.9
1
2
Wavelength (μm)

Fig. 17


Second Principal Component
0.50
0.00
-0.50
-1.00
-1.50
-4.00
-3.00
-2.00
-1.00
0.00
1.00
First Principal Component
(a)
m=1.45
θ = 102°


Second Principal Component
0.50
0.00
-0.50
-1.00
-1.50
-4.00
-3.00
-2.00
-1.00
0.00
1.00
First Principal Component
(b)
m=1.45
Θ = 102°


r_eff=0.025μm
r_eff=0.05μm
r_eff=0.10μm
r_eff=0.20μm
r_eff=0.40μm
r_eff=0.80μm
r_eff=1.50μm
r_eff=3.00μm
r_eff=5.00μm

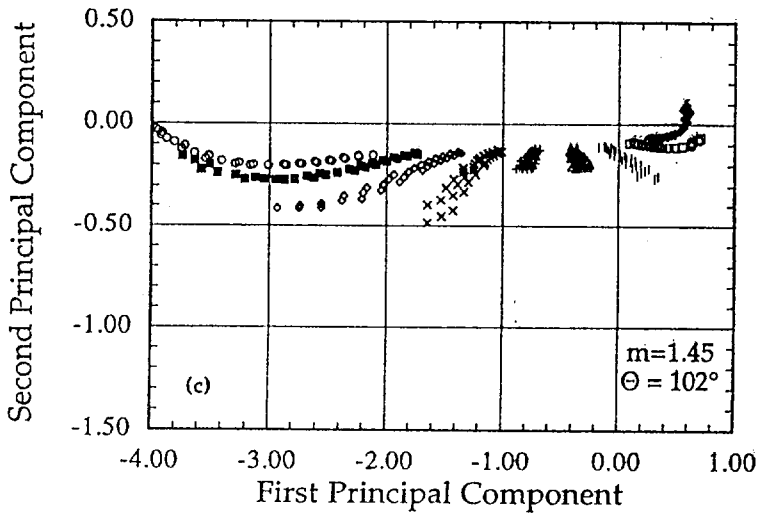
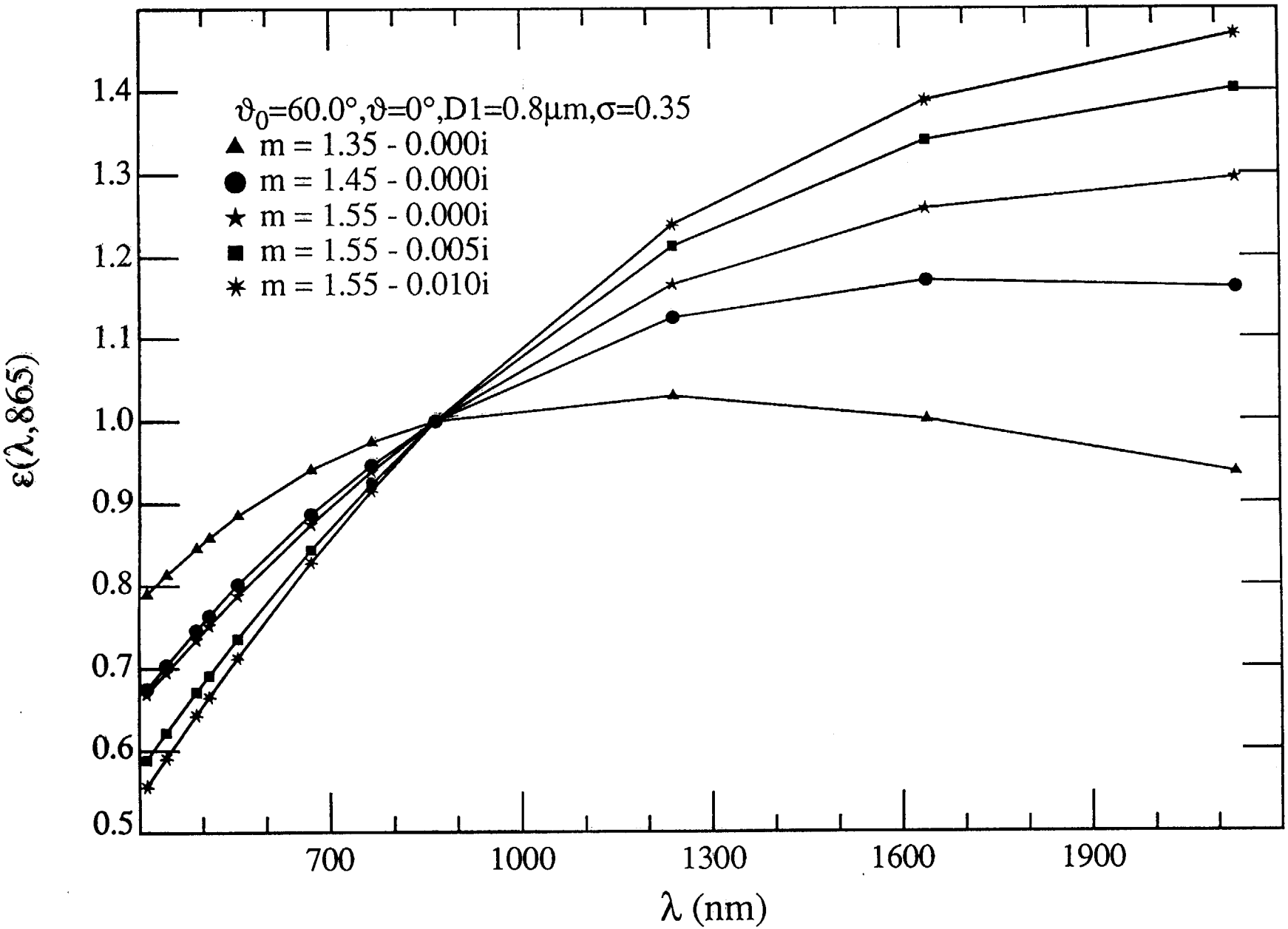
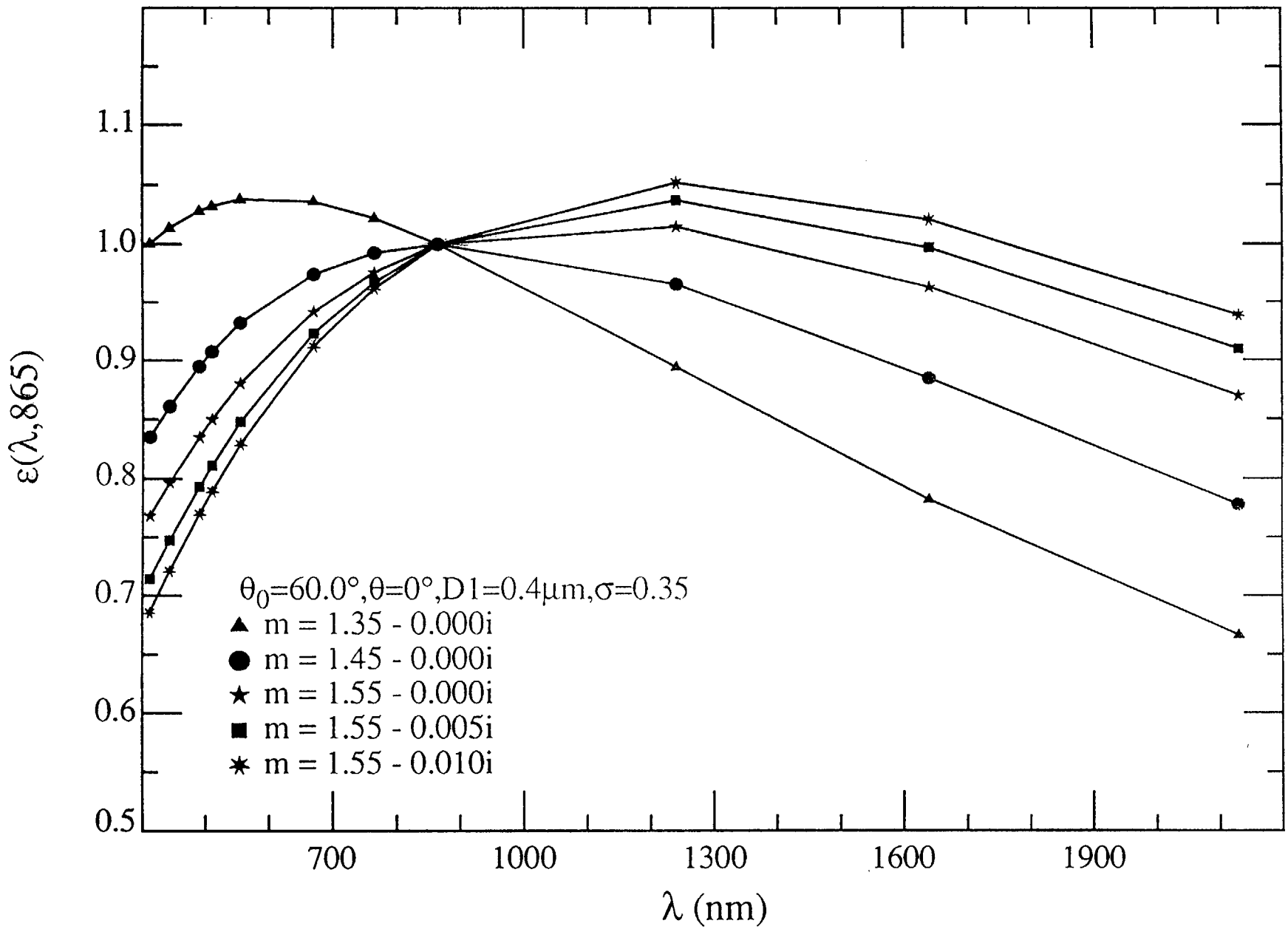
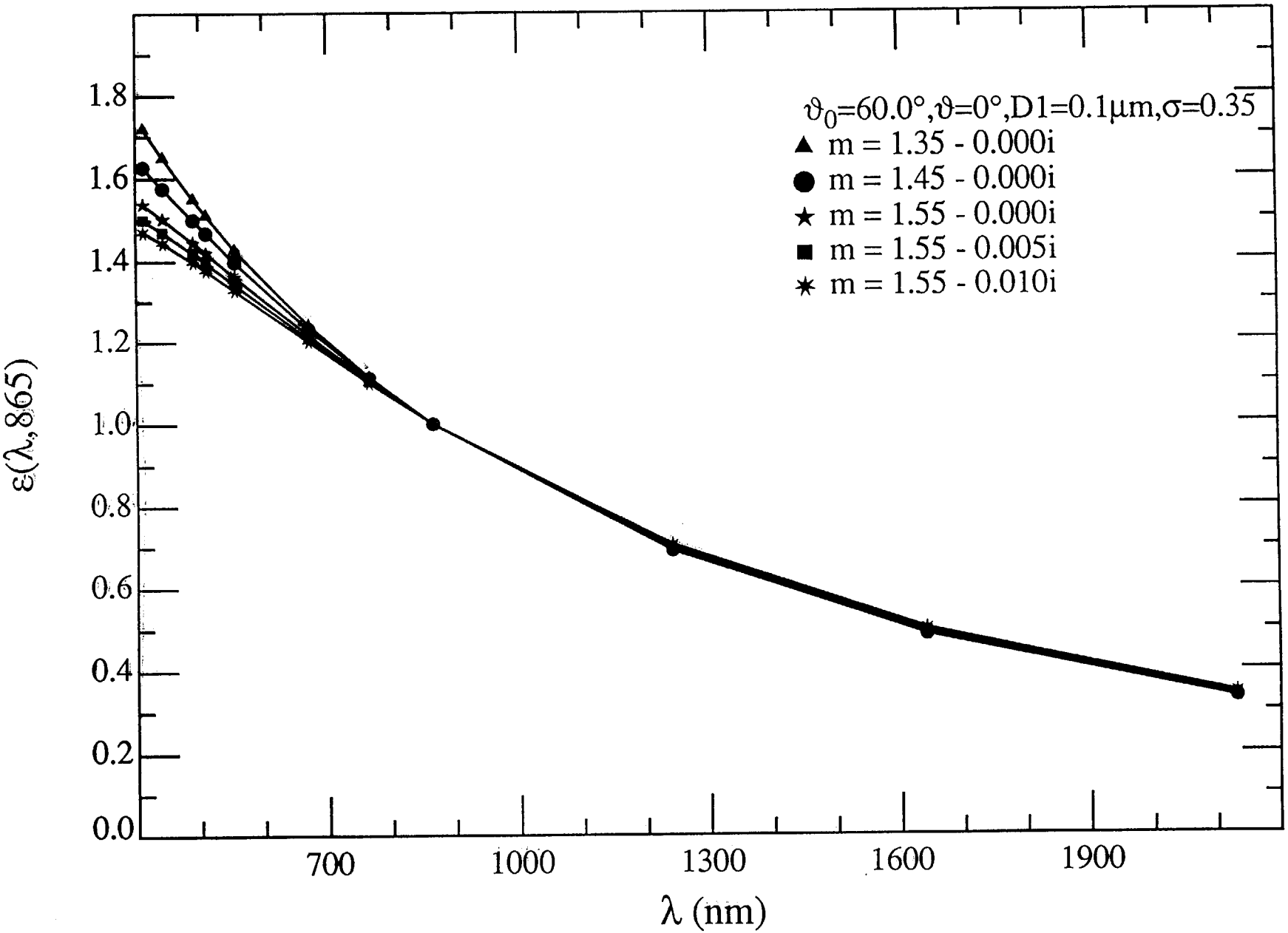

Second Principal Component
0.50
0.00
-0.50
-1.00
-1.50
-4.00
-3.00
-2.00
-1.00
0.00
1.00
First Principal Component
(c)
m=1.45
Θ = 102°

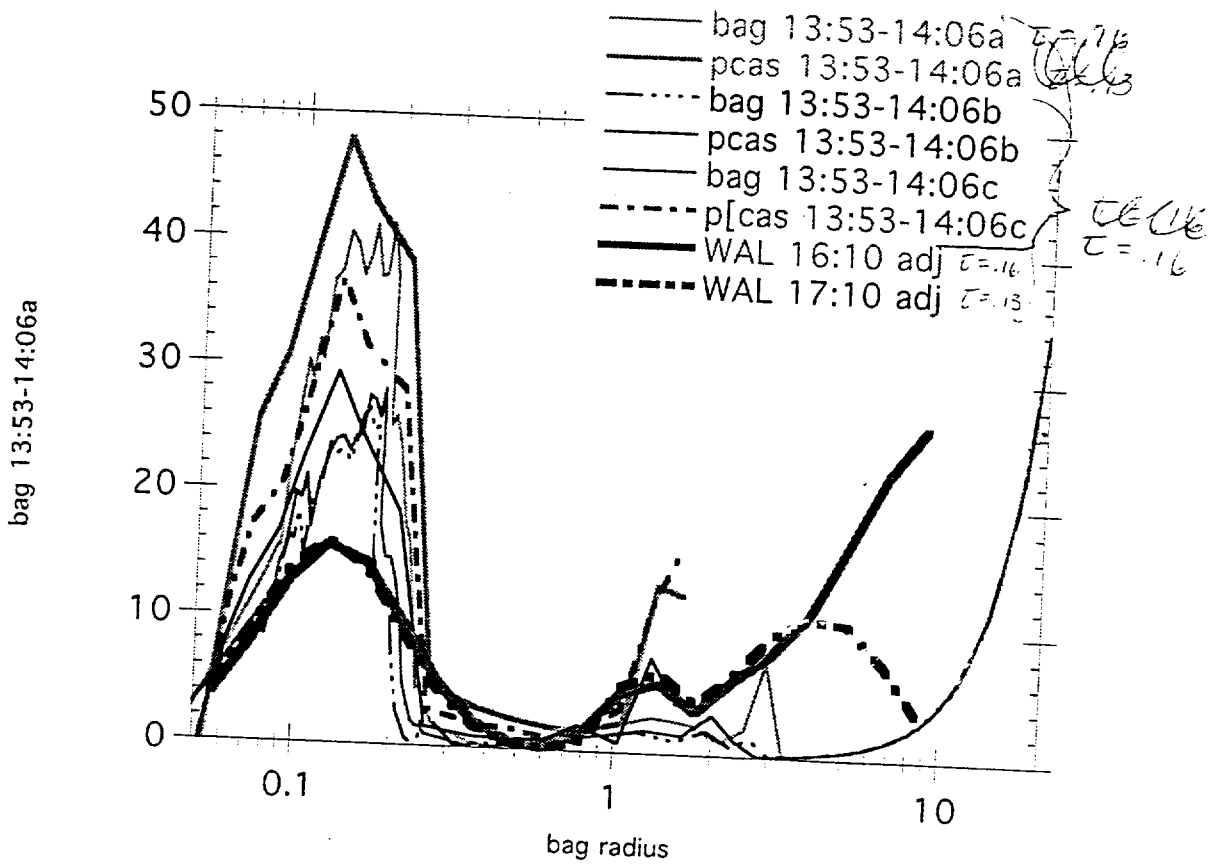
Fig. 19


ϑ_0=60.0°,ϑ=0°,D1=0.8μm,σ=0.35
m = 1.35 - 0.000i
m = 1.45 - 0.000i
m = 1.55 - 0.000i
m = 1.55 - 0.005i
m = 1.55 - 0.010i
ε(λ,865)
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
700
1000
1300
1600
1900
λ (nm)

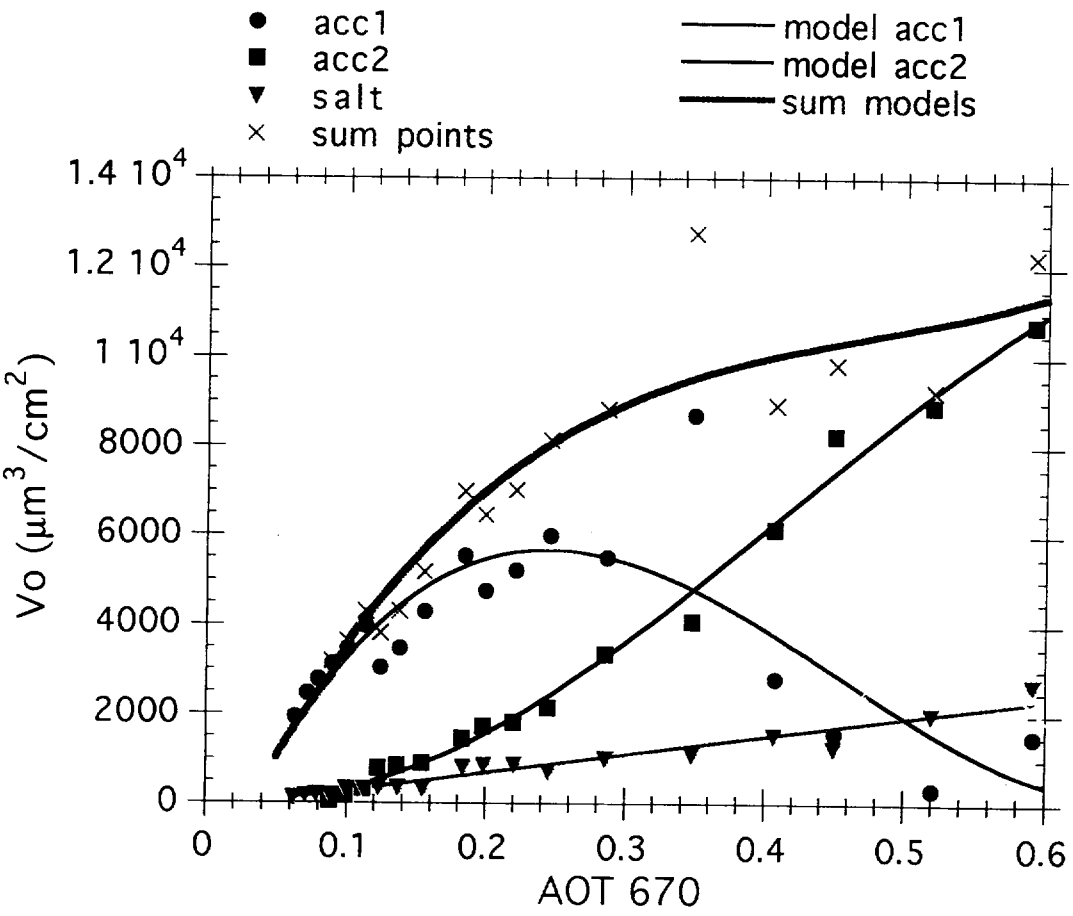

1.1
1.0
0.9
0.8
0.7
0.6
0.5
ε(λ,865)
700
1000
1300
1600
1900
λ (nm)
θ0=60.0°,θ=0°,D1=0.4μm,σ=0.35
m = 1.35 - 0.000i
m = 1.45 - 0.000i
m = 1.55 - 0.000i
m = 1.55 - 0.005i
m = 1.55 - 0.010i

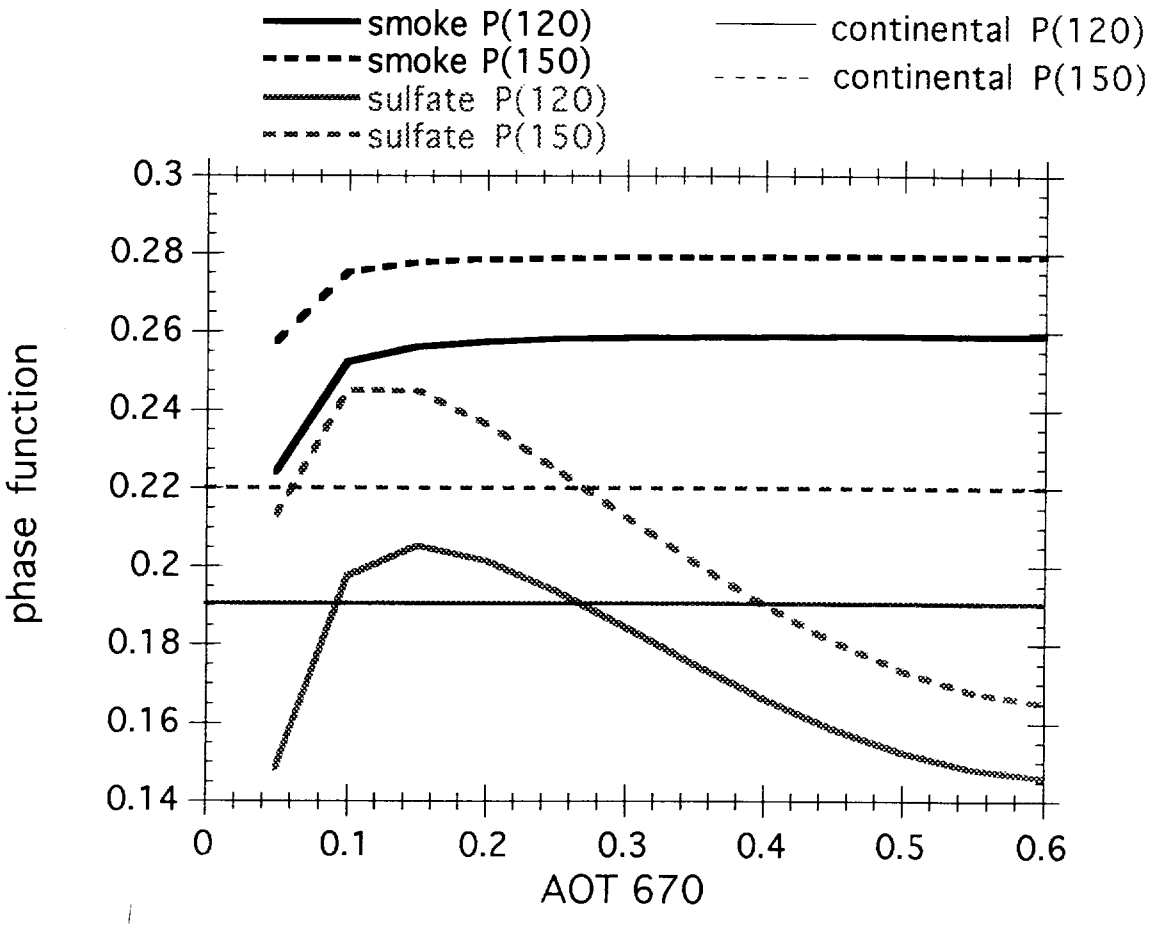

ϑ_0=60.0°,ϑ=0°,D1=0.1μm,σ=0.35
▲ m = 1.35 - 0.000i
● m = 1.45 - 0.000i
★ m = 1.55 - 0.000i
■ m = 1.55 - 0.005i
✱ m = 1.55 - 0.010i
ε(λ,865)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
700
1000
1300
1600
1900
λ (nm)

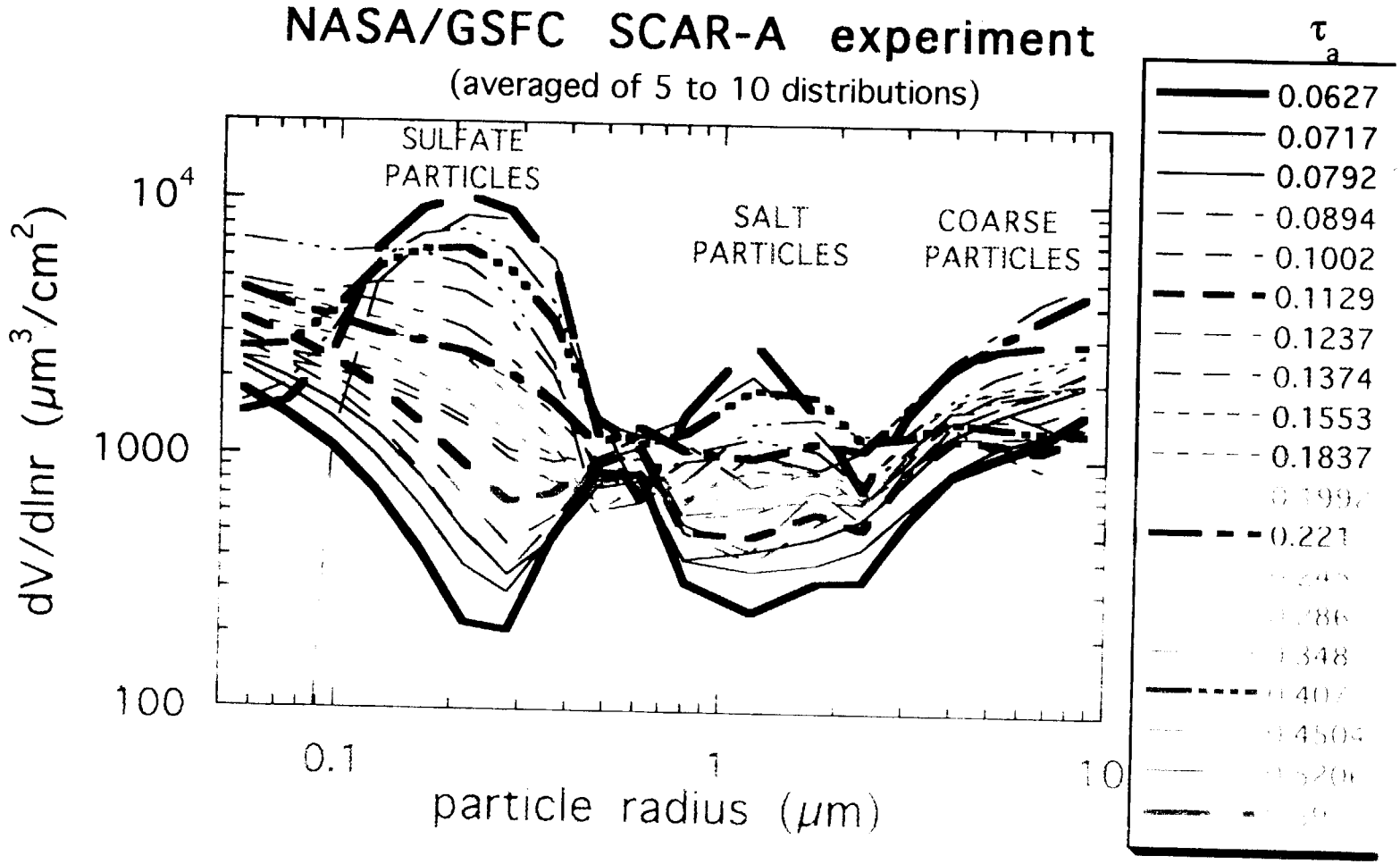
July 28
descent near Wallops



SCAR-A


acc1
acc2
salt
sum points
model acc1
model acc2
sum models
1.4 10^4
1.2 10^4
1 10^4
8000
6000
4000
2000
0
Vo (µm^3/cm^2)
0
0.1
0.2
0.3
0.4
0.5
0.6
AOT 670


smoke P(120)
smoke P(150)
sulfate P(120)
sulfate P(150)
continental P(120)
continental P(150)
phase function
0.3
0.28
0.26
0.24
0.22
0.2
0.18
0.16
0.14
0
0.1
0.2
0.3
0.4
0.5
0.6
AOT 670


NASA/GSFC SCAR-A experiment
(averaged of 5 to 10 distributions)
SULFATE PARTICLES
SALT PARTICLES
COARSE PARTICLES
dV/dlnr (μm³/cm²)
10⁴
1000
100
0.1
1
10
particle radius (μm)
τa
0.0627
0.0717
0.0792
0.0894
0.1002
0.1129
0.1237
0.1374
0.1553
0.1837
0.221

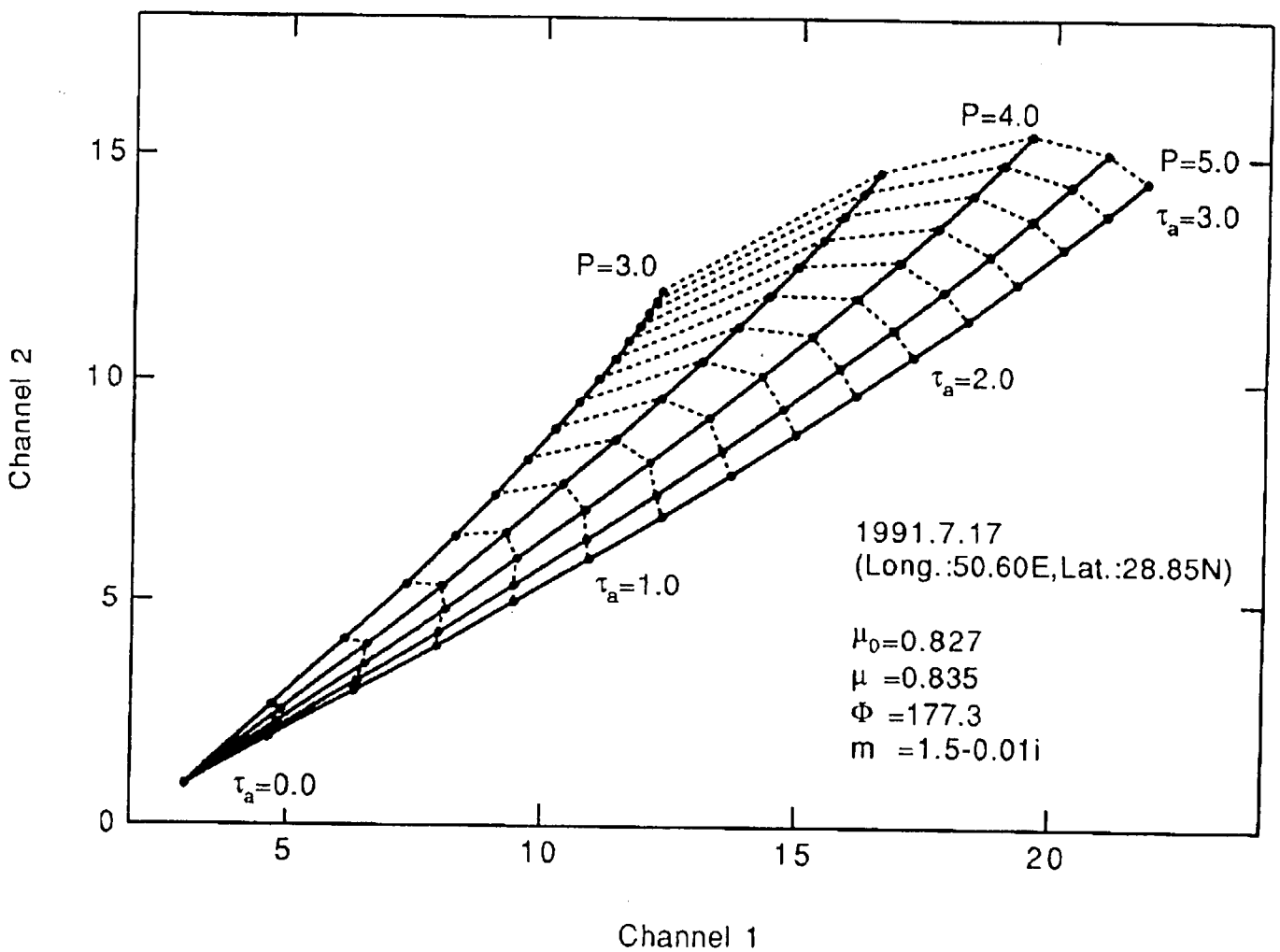


Fig.1

Nakajima et al. (1993)

T. HAYASAKA *et al.* (1992)

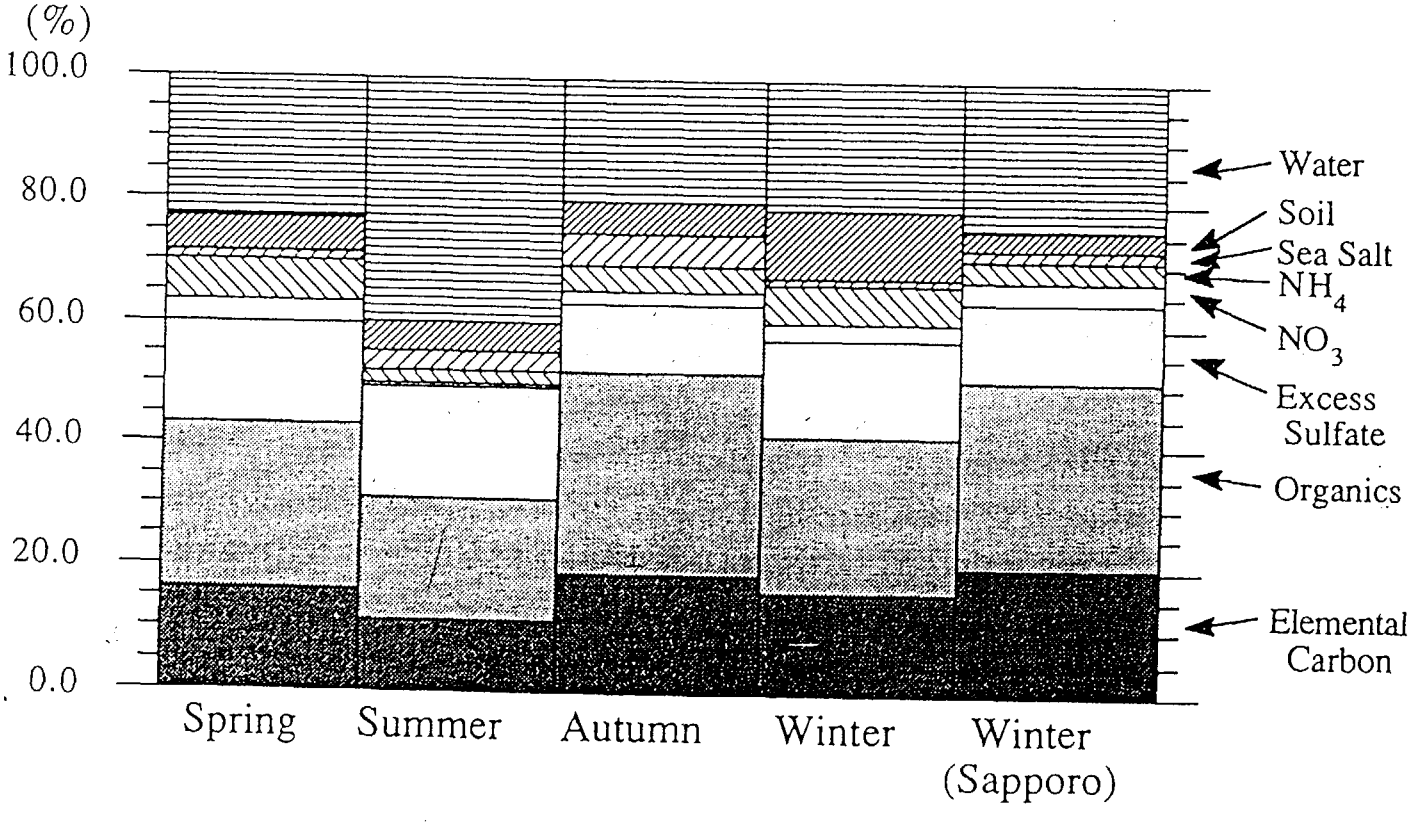
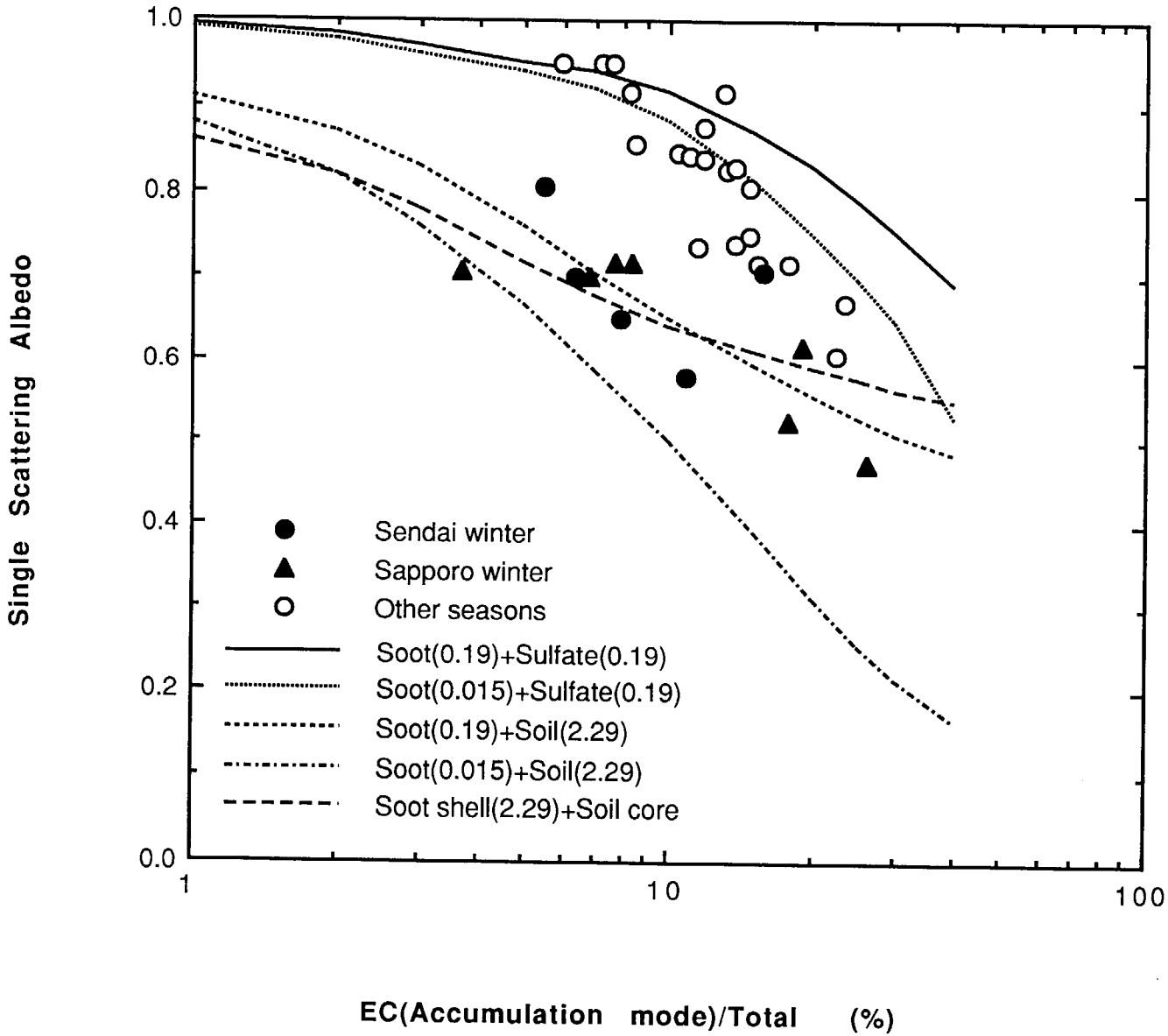


Fig. 6. Mass fraction of each chemical component in aerosols smaller than 1 μm in radius for the respective seasons.

Hayasaka et al. (1992), J. Atmos. Environ. 26A, 2055-2062



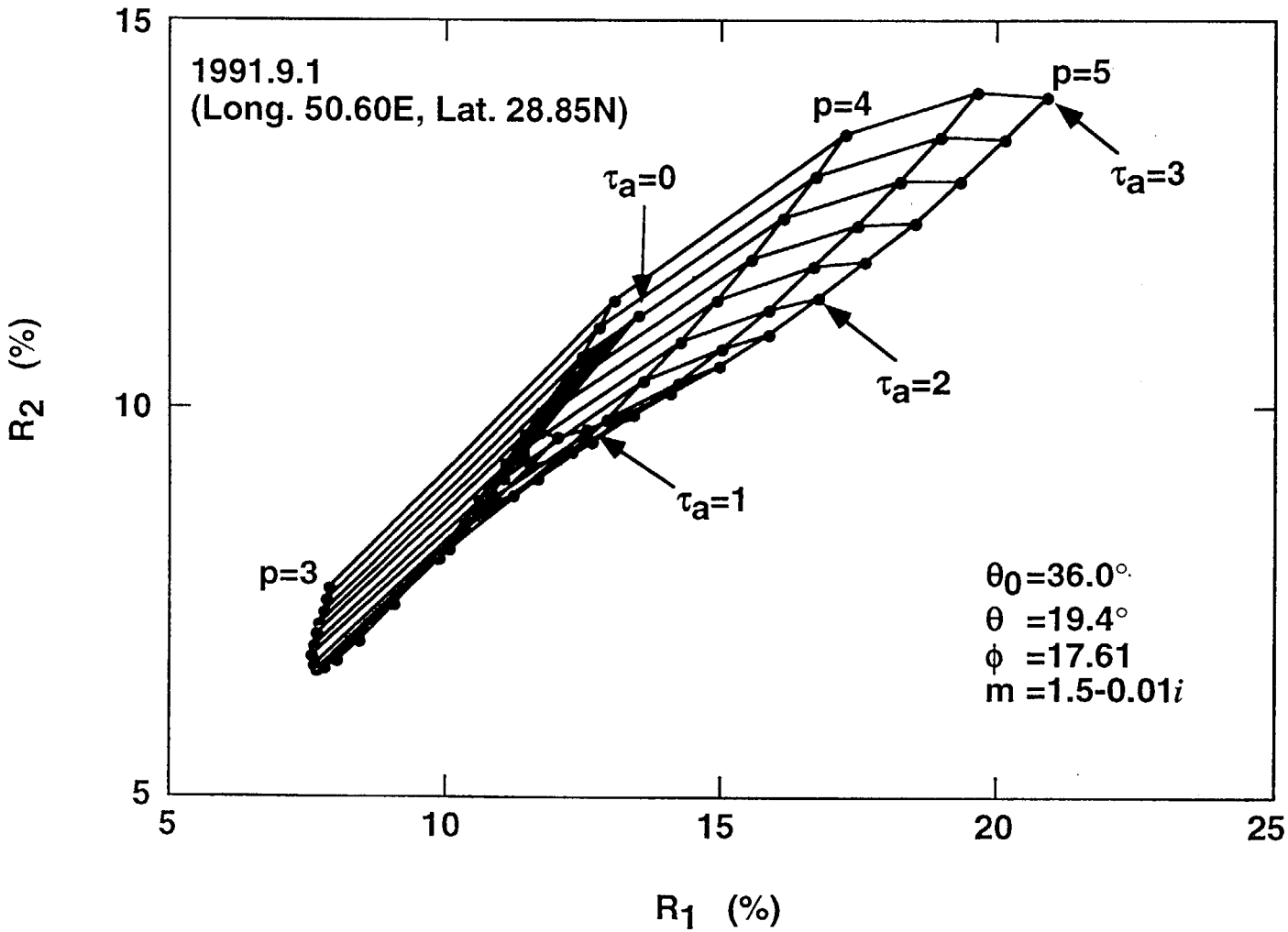


Fig. 3 Nakajima and Higurashi

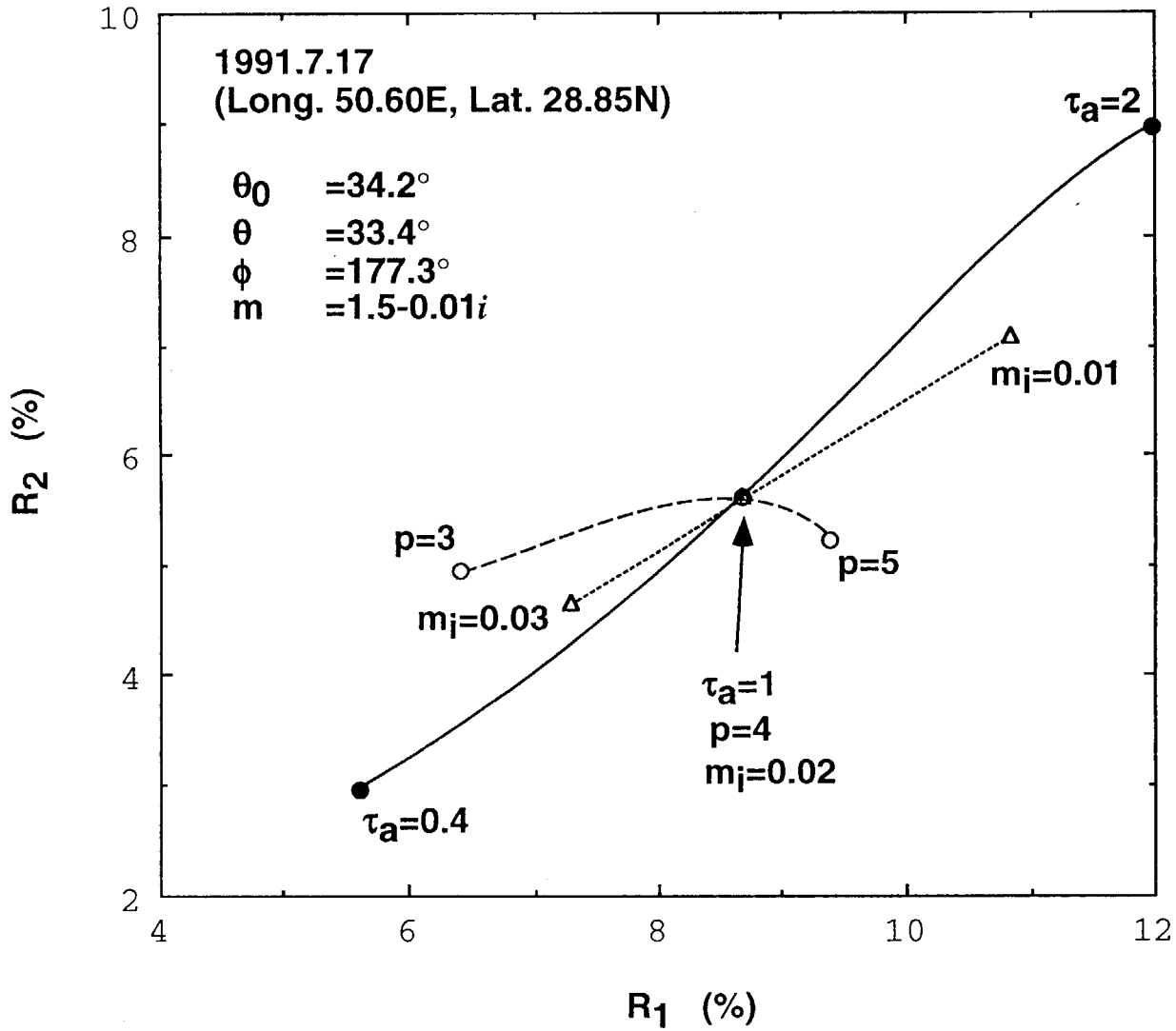


Fig. 4 Nakajima and Higurashi

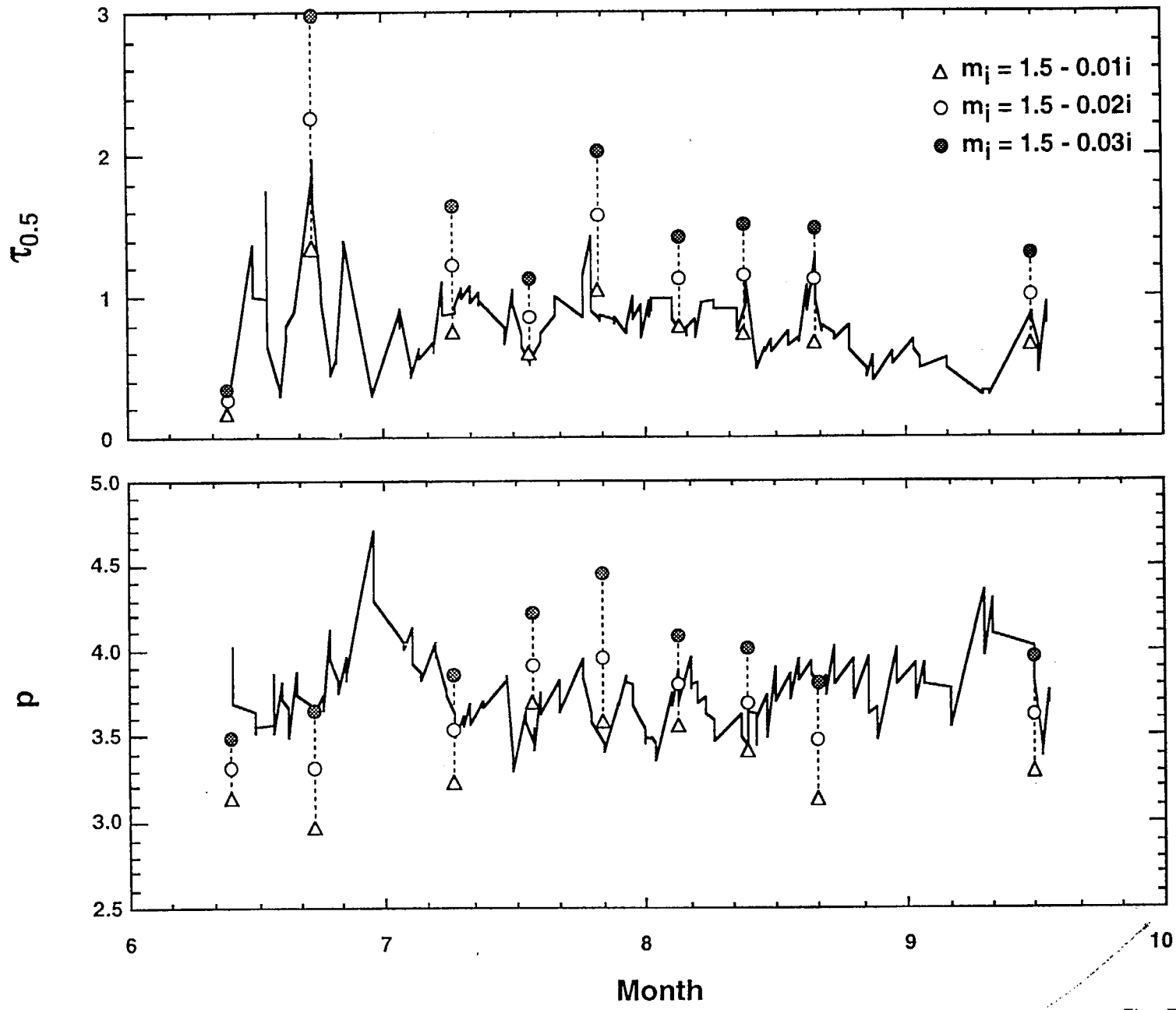


Fig. 5 Nakajima and Higurashi

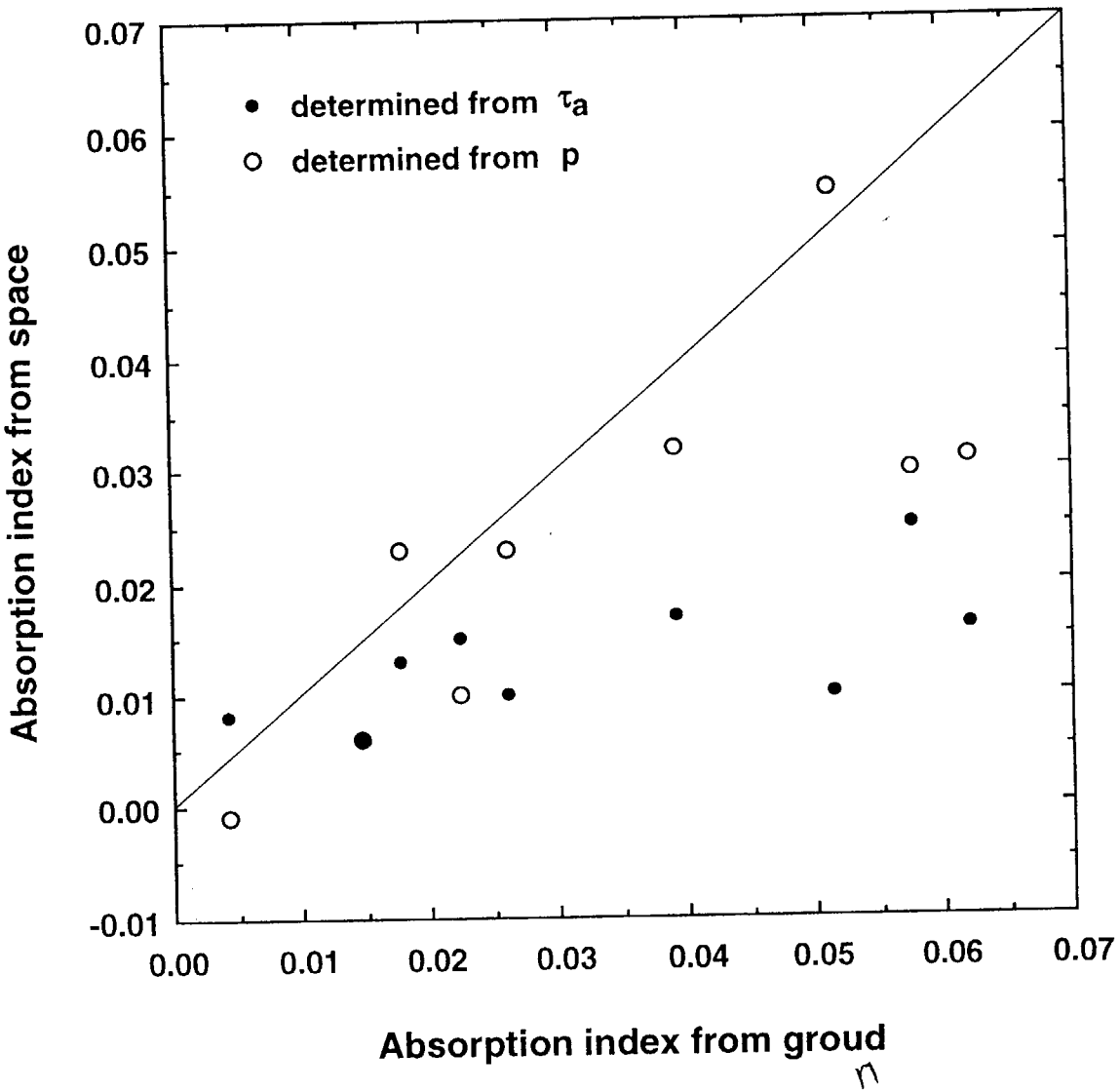


Fig. 6 Nakajima and Higurashi