

***A long time ago in a galaxy far, far
away....***

***Research was a great adventure of
the mind world...***

***... a series of happenings and dead
alive battles to save a princess...***

還曆 (Kanreki, Reborne): 60th birthday

Michael

1949

Terry, Brent

1950

Didier

1951



昵图网 nipic.com/



Occupation of a Tohoku
University building in 1969

- **Generation after baby boomer**
- **End of Vietnam war**
- **End of Student movement**

makes us patient, modest ...

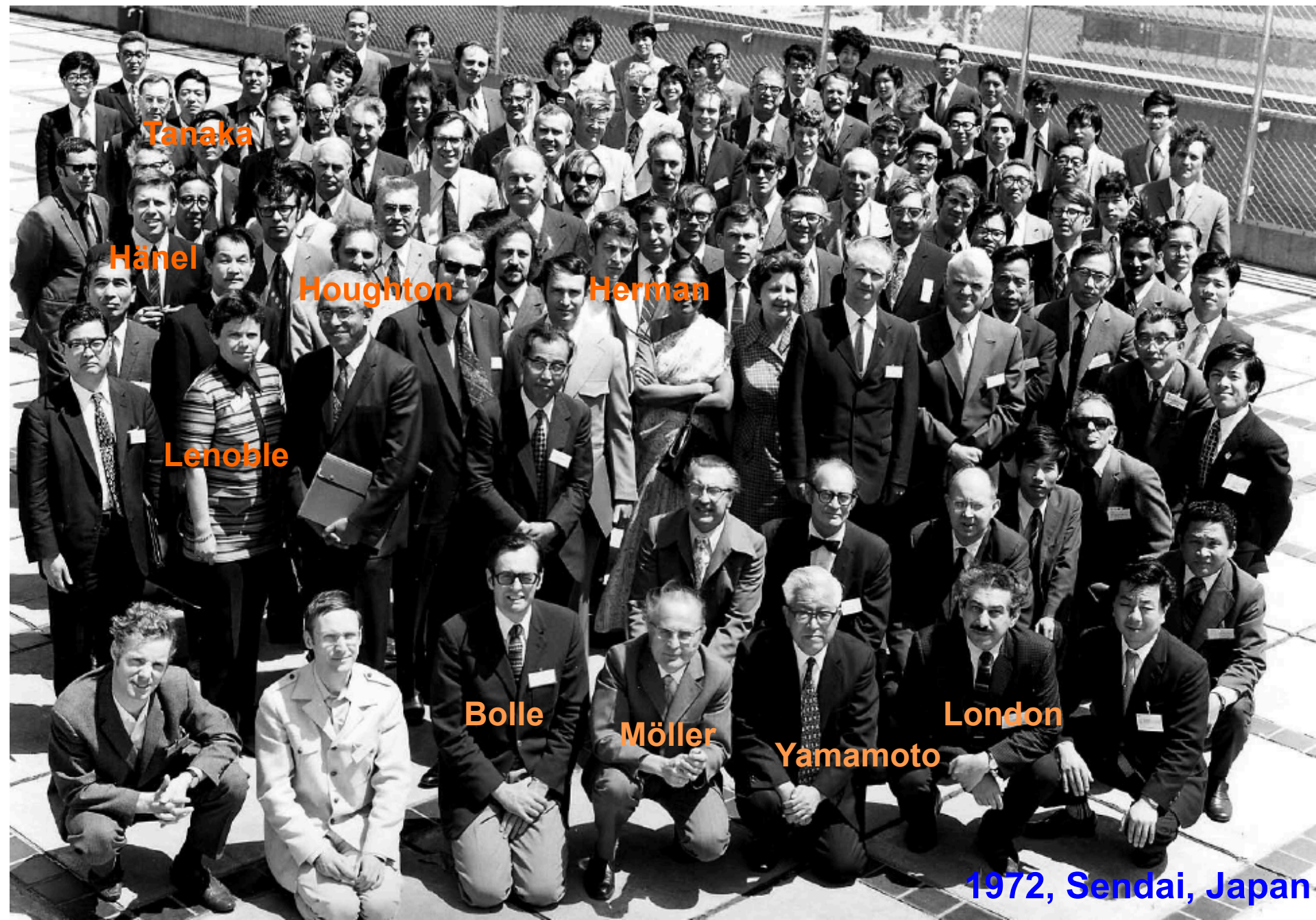
歡 東北大学大学院理学研

Summer of 2010: Terry, Michael, and Brent turning to 60, 61
... Oleg liked it !

Sendai, Japan



Path of great science of radiation..., IRC-IAM/IAMAS/IAMAP: 1948-



Tanaka

Hänel

Houghton

Herman

Lenoble

Bolle

Möller

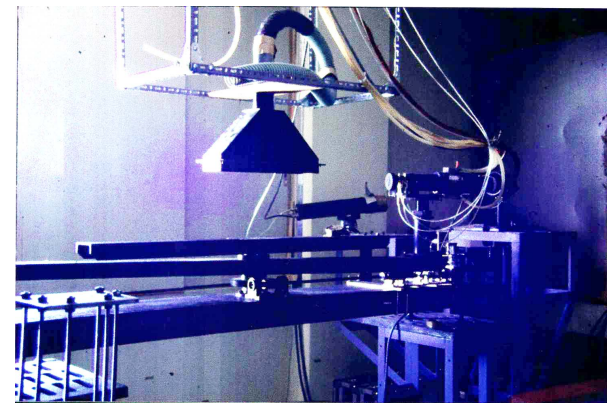
Yamamoto

London

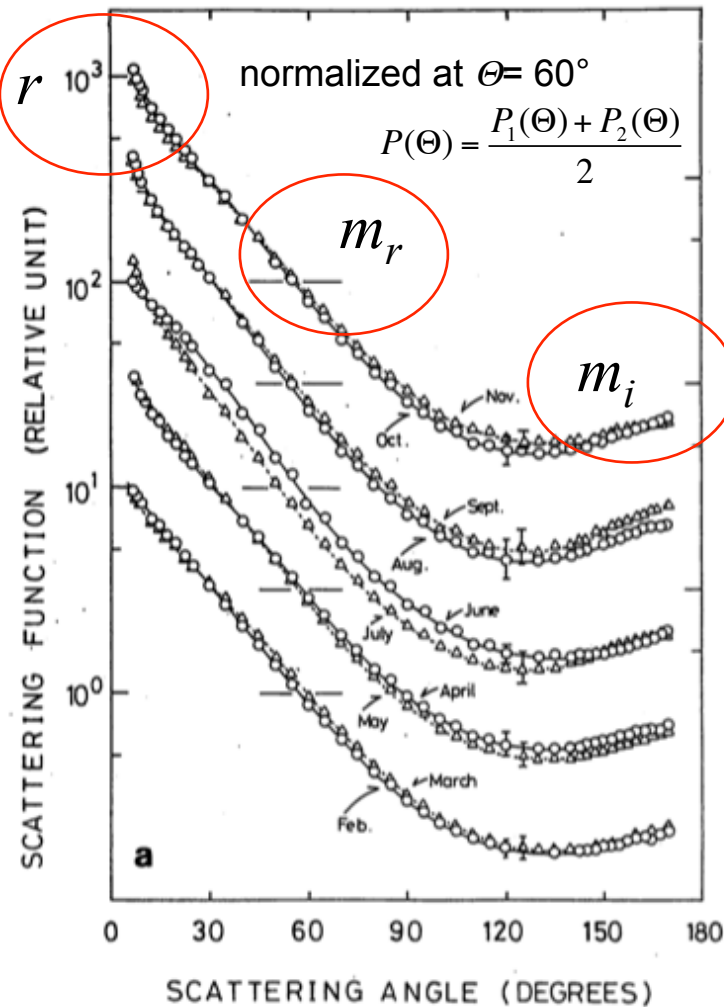
1972, Sendai, Japan

Scattering phenomena

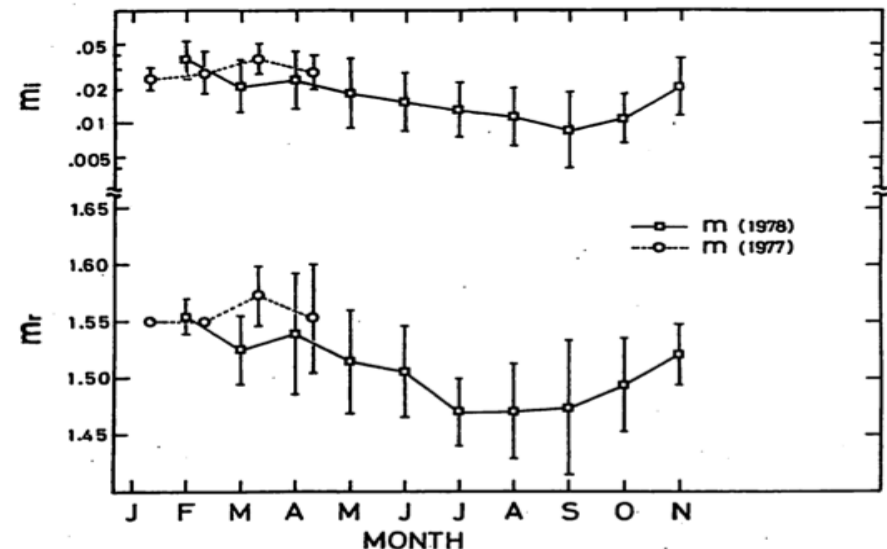
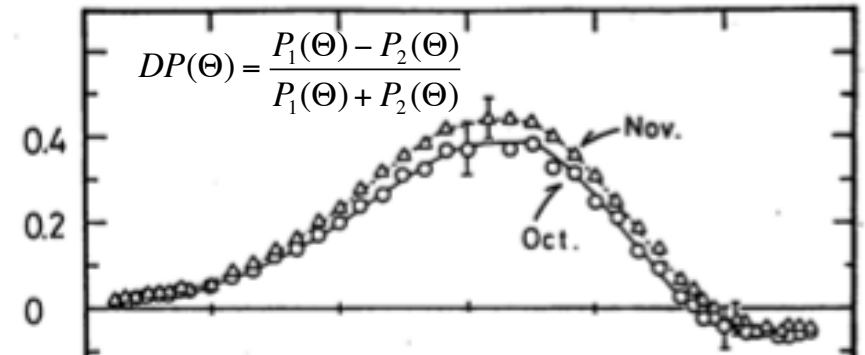
- AMS rejected, too strong absorption
- Tanaka, et al. (JMSJ 82, JCAM 83)



Polar nephelometer



Data: 1978-78, Sendai, Japan



Dreaming days...

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 93, NO. D11, PAGES 14,223-14,231, NOVEMBER 20, 1988

Radiative Properties of Desert Aerosols by Optical Ground-Based Measurements at Solar Wavelengths

D. TANRÉ, C. DEVAUX, M. HERMAN, AND R. SANTER

Laboratoire d'Optique Atmosphérique, Université des Sciences et Techniques de Lille Flandres Artois
Villeneuve d'Ascq, France

J. Y. GAC

TANRÉ ET AL.: RADIATIVE PROPERTIES OF DESERT AEROSOLS

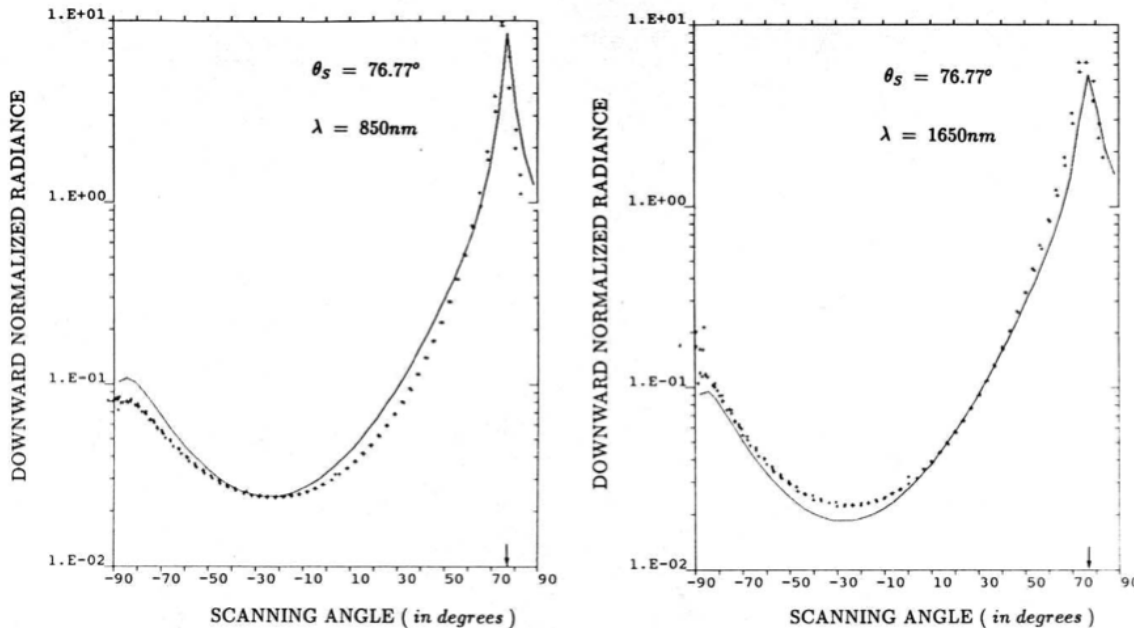


Fig. 9a. Diagram of the downward measured (plus signs) and computed (solid curve) radiances versus the scanning angle at 850 and 1650 nm for May 8. The Sun direction is shown by an arrow. Read 1.E + 01 as 1×10^1 .

M'bour, Senegal

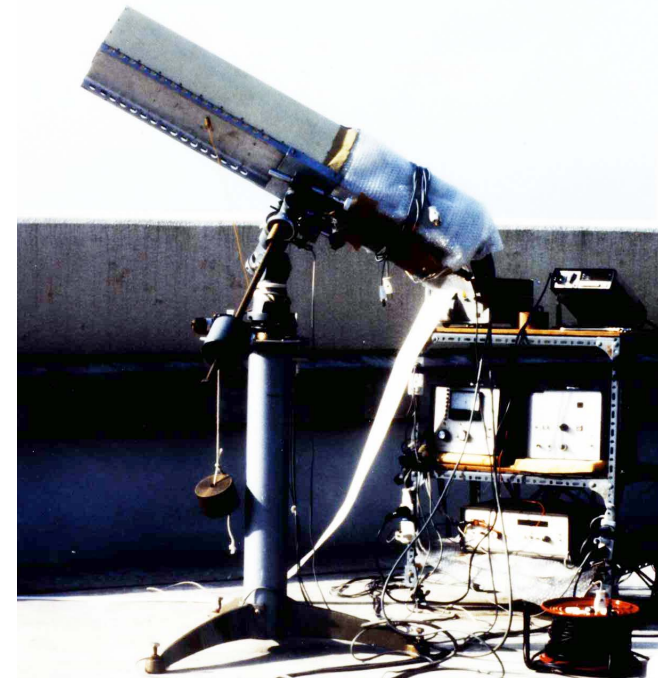
Ångström (Appl. Opt 75):
Smithsonian's Pyranometer since
1950s

Twitty (JAS75) : first aureole meter
King (JAS79): SSA from DD method

Nakajima et al. (Appl Opt 83):
extinction+sky

Tanre et al. (JGR 88): Senegal dust
Nakajima et al. (JSMJ 89): Chinese
dust

14,229



Sendai, Japan

New age...

Holben et al. (Atmos. Environ 98): Federated system

Dubovik and King (JGR 00): non-linear opt.

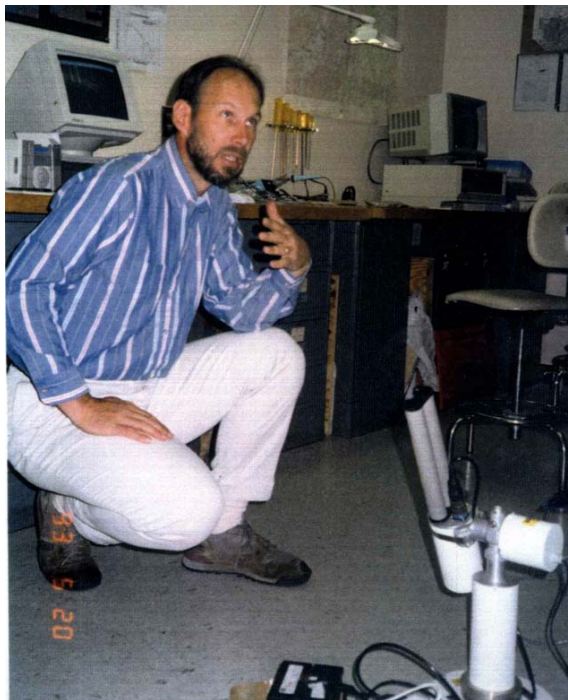
Shiobara et al. (JMSJ 01): Improved Langley

Tanre et al. (JGR 01, 03): Dust properties

Dubovik et al. (JAS 02): SSA retrieval

Campanelli et al. (Appl.Opt 07; 10):

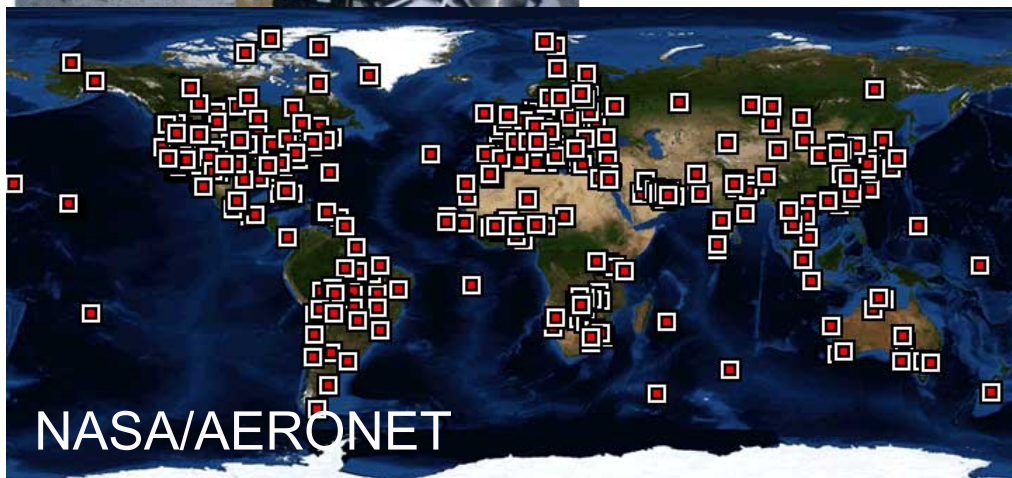
Calibration, water vapor



CiMel sun/sky photometer with Brent Holben in 1993



Skynet PREDE skyradiometer

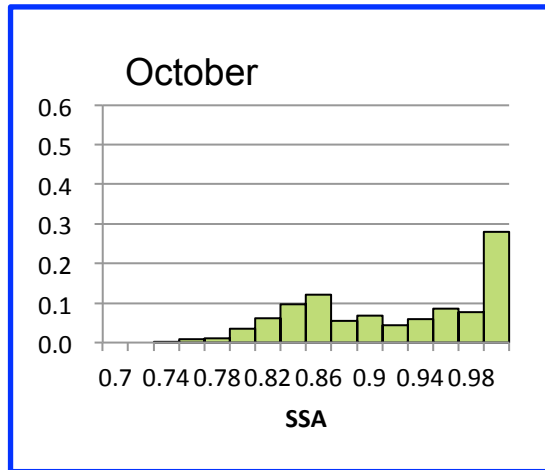


NASA/AERONET

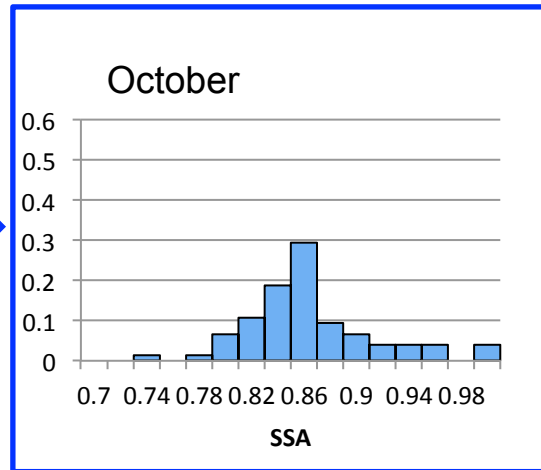
SSA statistics at Pune, India

- Lessons from collocated AERONET-SKYNET comparison
- Checked inversion code and QC learnt from AERONET
- SKYNET calibration protocol confirmed
- Large cirrus contamination

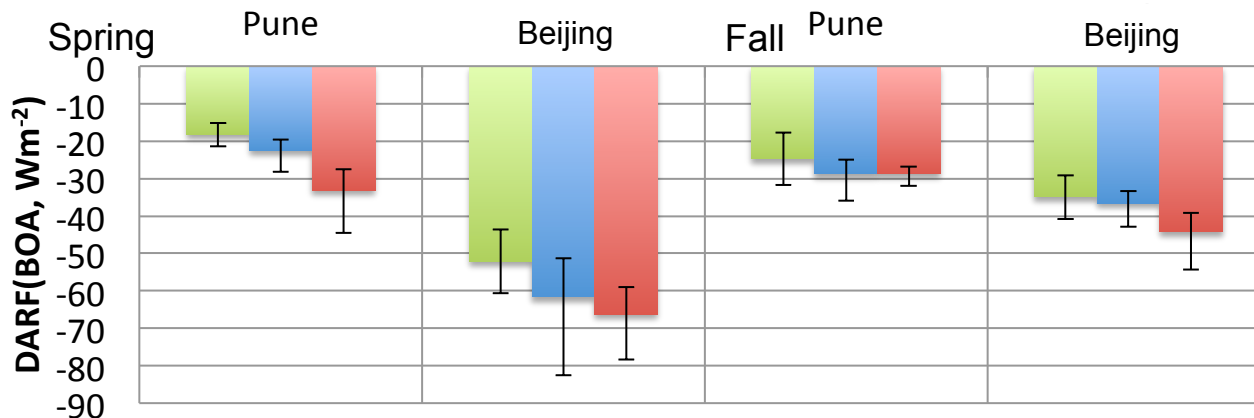
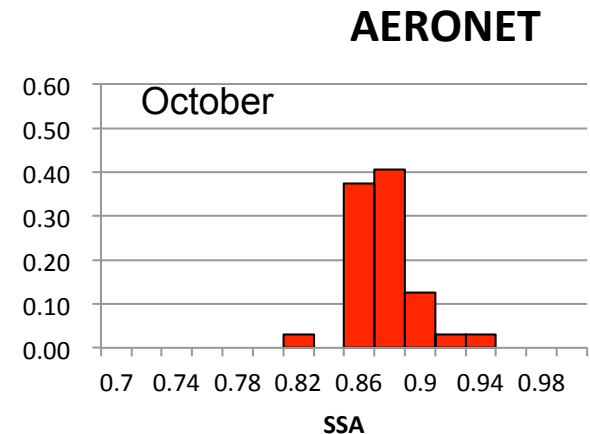
Before screening



After screening



Normalized frequency distribution of SSA500



- SKYNET before screening
- SKYNET after screening
- AERONET

M. Hashimoto (2011)

1987 at GSFC ... people arriving

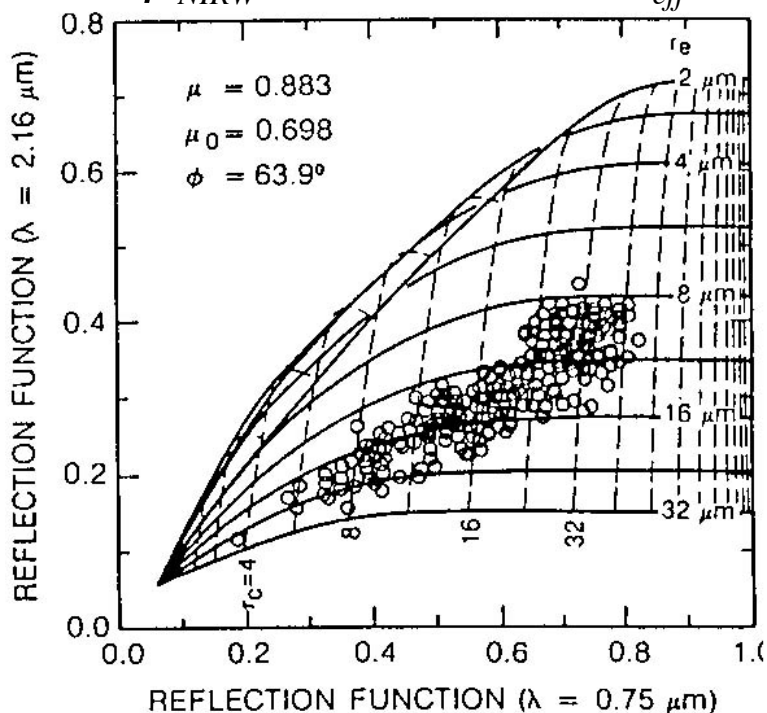
- AVHRR since 1981
- NASA Mission to Planet Earth; EOS since late 1980s: MODIS, MISR; MERIS, AATSR; GLI, POLDER

Arking and Childs (JCAM 85)

Nakajima and King (JAS 90); Nakajima et al. (JAS 91)

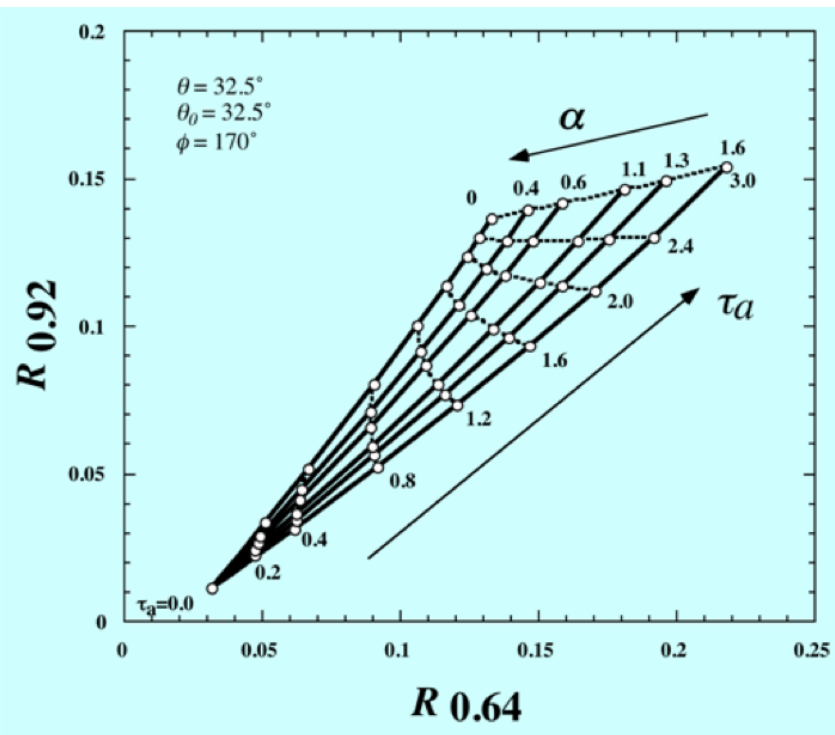
$$\Delta\rho_{VIS} \sim 1 / (1 - g)\tau_c$$

$$\Delta\rho_{NIRW} \sim \Delta\sqrt{1 - \omega} \sim -\Delta r_{eff}$$



Fraser and Kaufman (IEEE TGRS 85):
Neutral reflectance
Nakajima and Higurashi (GRL 98)

$$\frac{\rho_2 - A_2}{\rho_1 - A_1} \approx \frac{\omega_2 \tau_2 P_2(\Theta)}{\omega_1 \tau_1 P_1(\Theta)} \approx \frac{\tau_2}{\tau_1} \approx \left(\frac{\lambda_2}{\lambda_1}\right)^{-\alpha}$$



Continued adventures...

Herman et al. (JGR 97): TOMS AI

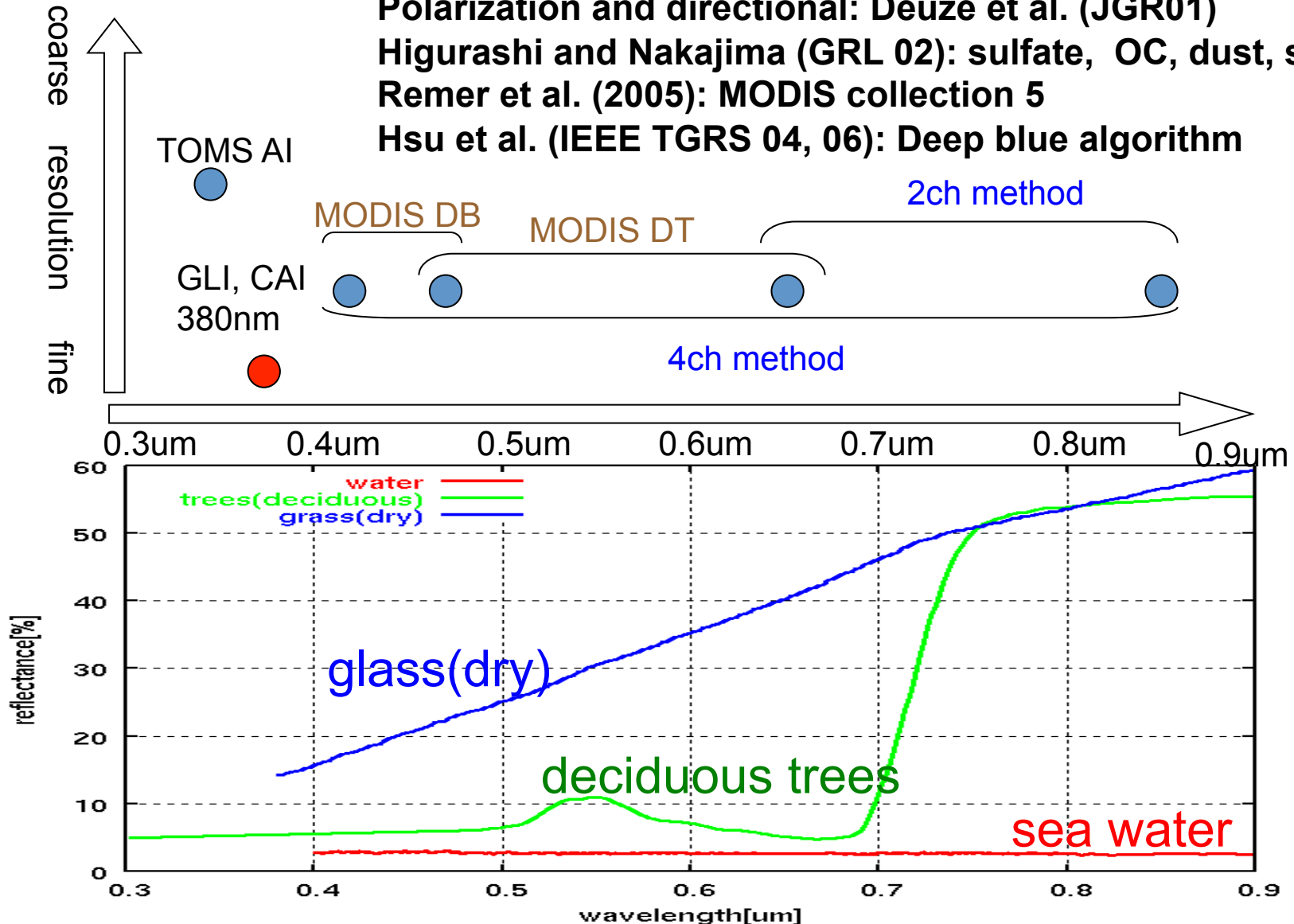
Kaufman, Tanre, et al. (GRL01) Dust SSA

Polarization and directional: Deuze et al. (JGR01)

Higurashi and Nakajima (GRL 02): sulfate, OC, dust, salt

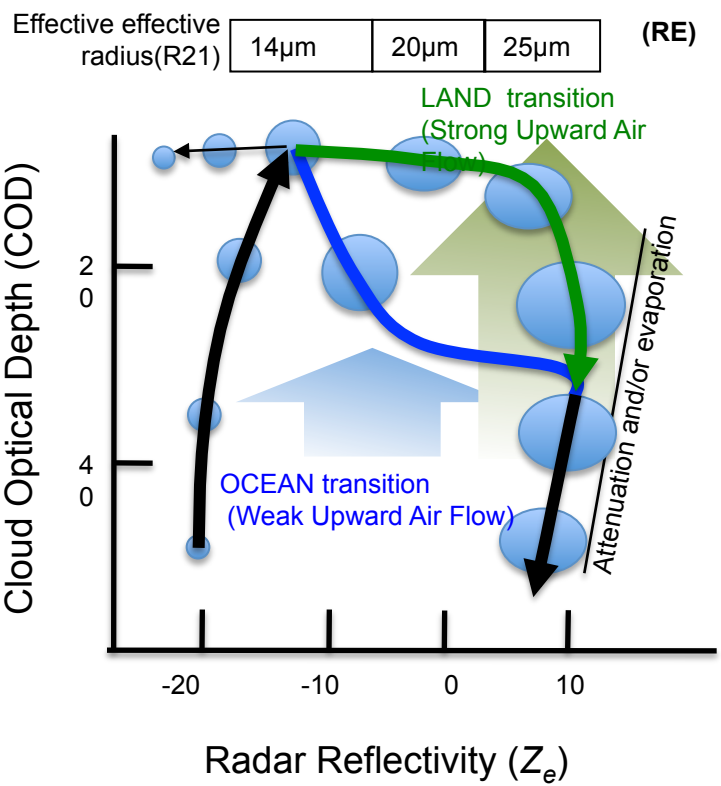
Remer et al. (2005): MODIS collection 5

Hsu et al. (IEEE TGRS 04, 06): Deep blue algorithm

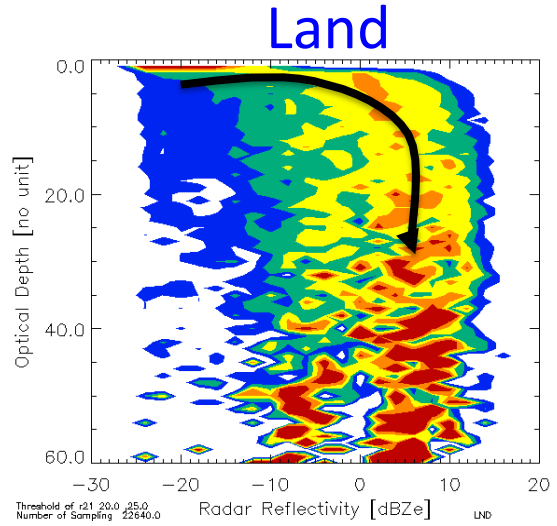
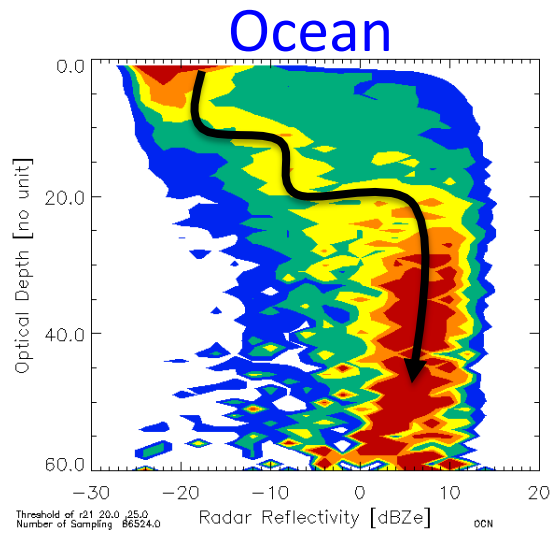


Era of new sensing ... for HPC model studies

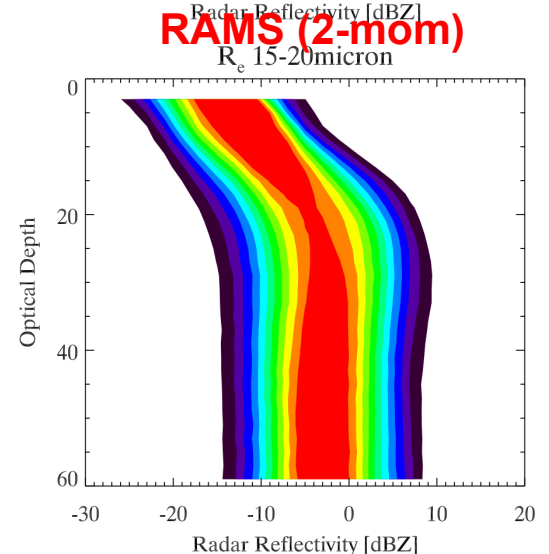
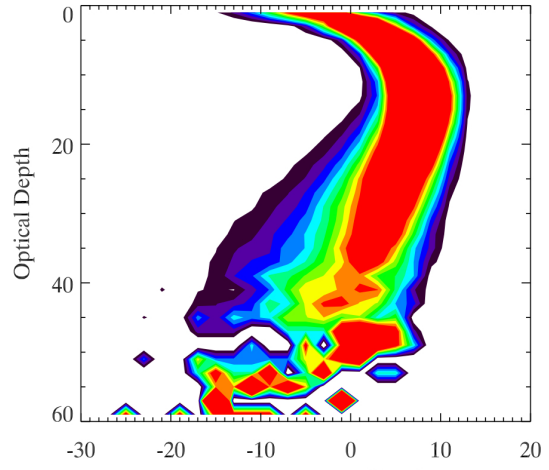
- CLOUDSAT, CALIPSO, ... EarthCARE
- Suzuki and Stephens (GRL 08; ERL 10)
- TY. Nakajima, Suzuki, Stephens (JAS 2010)



CFODD diagram

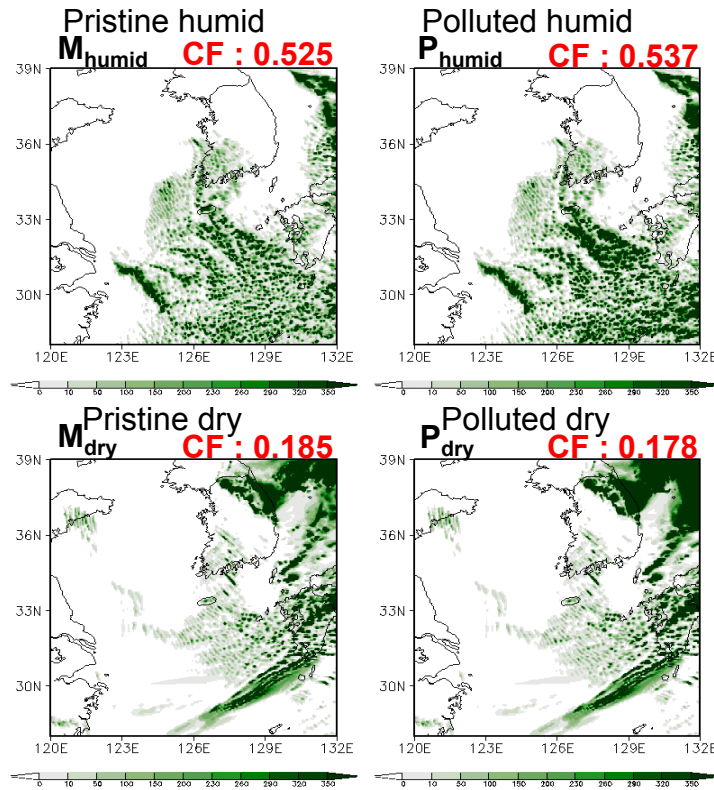
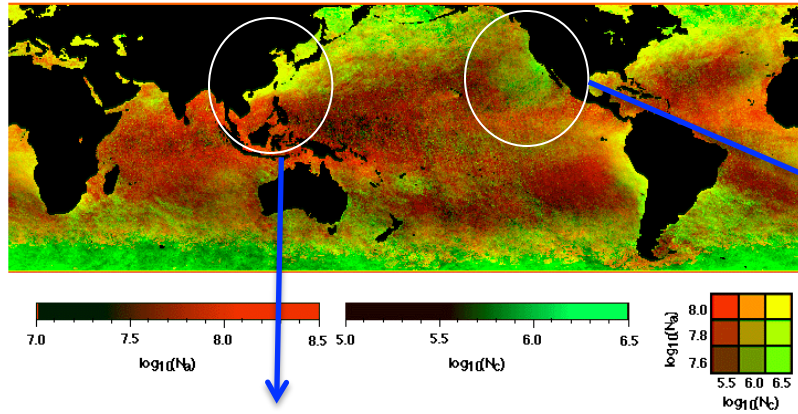


NICAM (1-mom)
3.5 km global
 $R_c(\text{top})$ 15-20micron



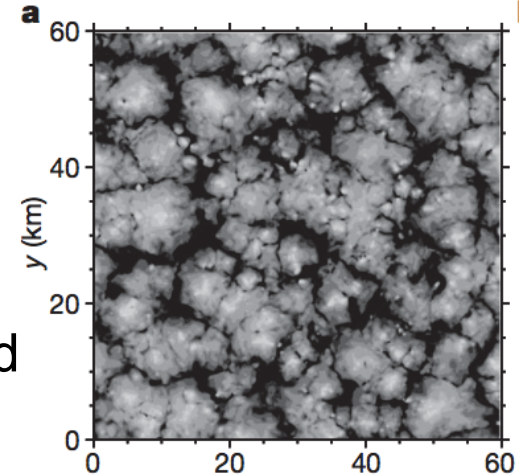
Study of aerosol-cloud-precipitation interaction

Nakajima et al. (GRL '01)

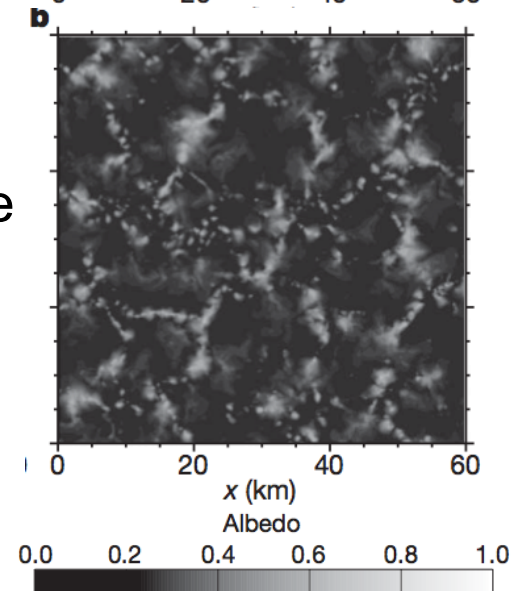


LWP

Turbid



Pristine



Iguchi et al. (JGR 09); I.-J. Choi et al. (APCD 10)

Feingold et al. (Nature10)

to the memory of Y.J. Kaufman



A long time ago in a galaxy far, far away....

***Research was a great adventure of
the mind world...***

***... a series of happenings and dead/alive
battles to save a princess...***

***Now the next generation scientists and
colleagues started new quests...***