International SKYNET DataCenter

The SKYNET network present status and future developments

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Presenter : **M. Momoi**, GRASP SAS

(Algorithm WG member in International SKYNET committee)
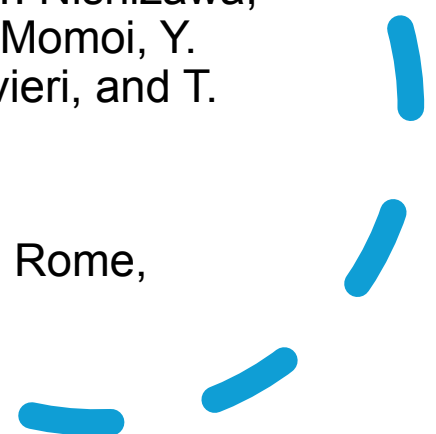
SKYNET: ground-based radiation observation network dedicated to aerosol-cloud-solar radiation interaction

(Nakajima et al. 2020: https://doi.org/10.5194/amt-13-4195-2020).

It consists of more than 100 sites worldwide located, most of them, in Asia where the network originally was born.

Prede-POM is the standard Skynet sun-sky photometer

OpenStreetMap
NASA Satellite

Working (online)
Working (offline)
Stopped
Closed
Belong to RSDC only

In 2020 the creation of an International SKYNET data center (ISDC) set off the new structure of the network:

An ISDC, providing standard aerosol products
(https://www.skynet-isdc.org),
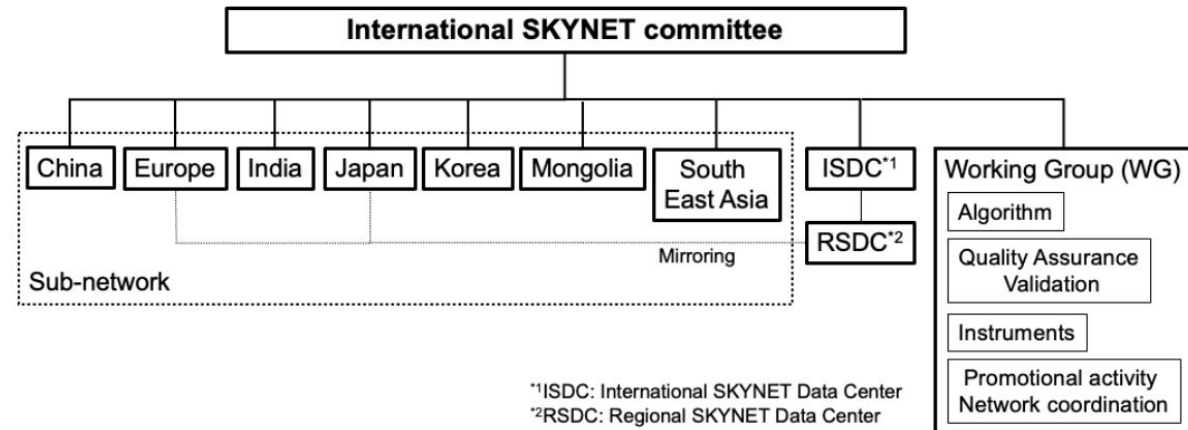

Several regional sub-networks contributing for operation and maintenance of the associated instrumentation and for testing new research products.

SKYNET provides:

Freely downloading of the <u>aerosol products</u> from the web page, for <u>each site</u> of the network <u>in semi-real time</u>

<u>Click to open the link for the QUICKLOOKS of Skynet webpage</u>
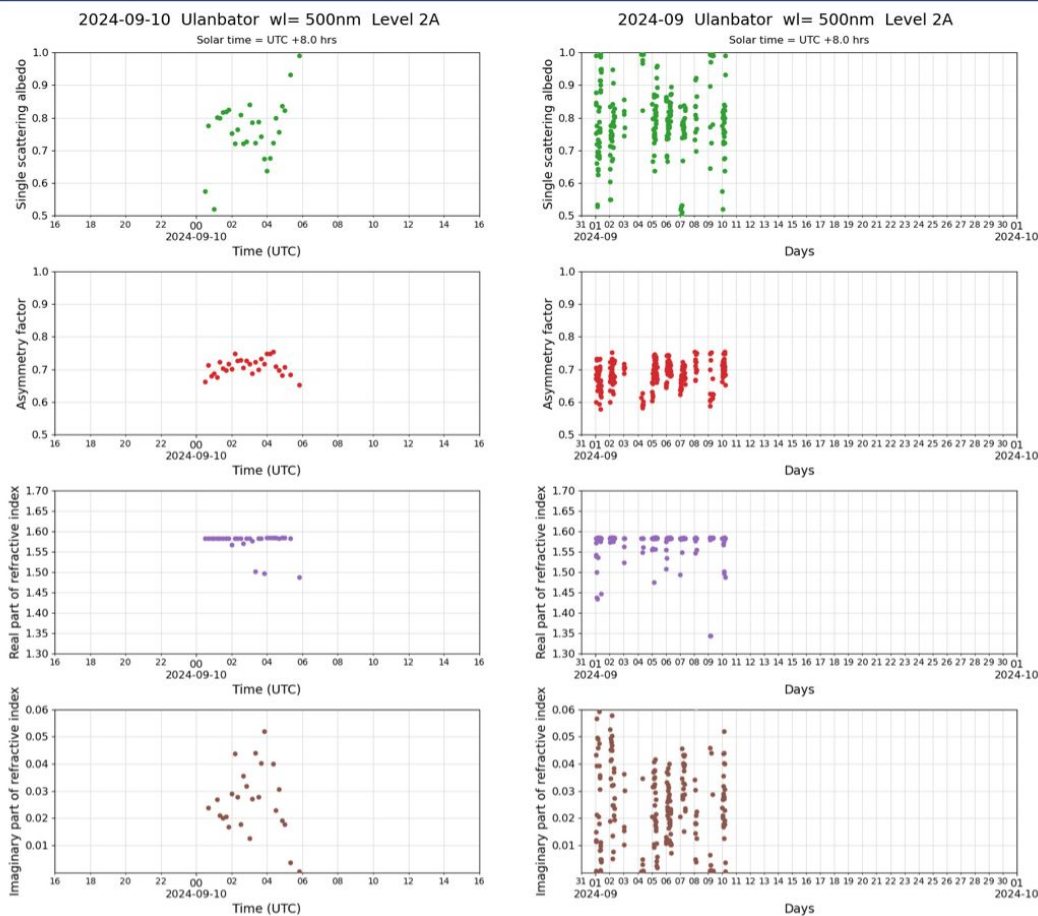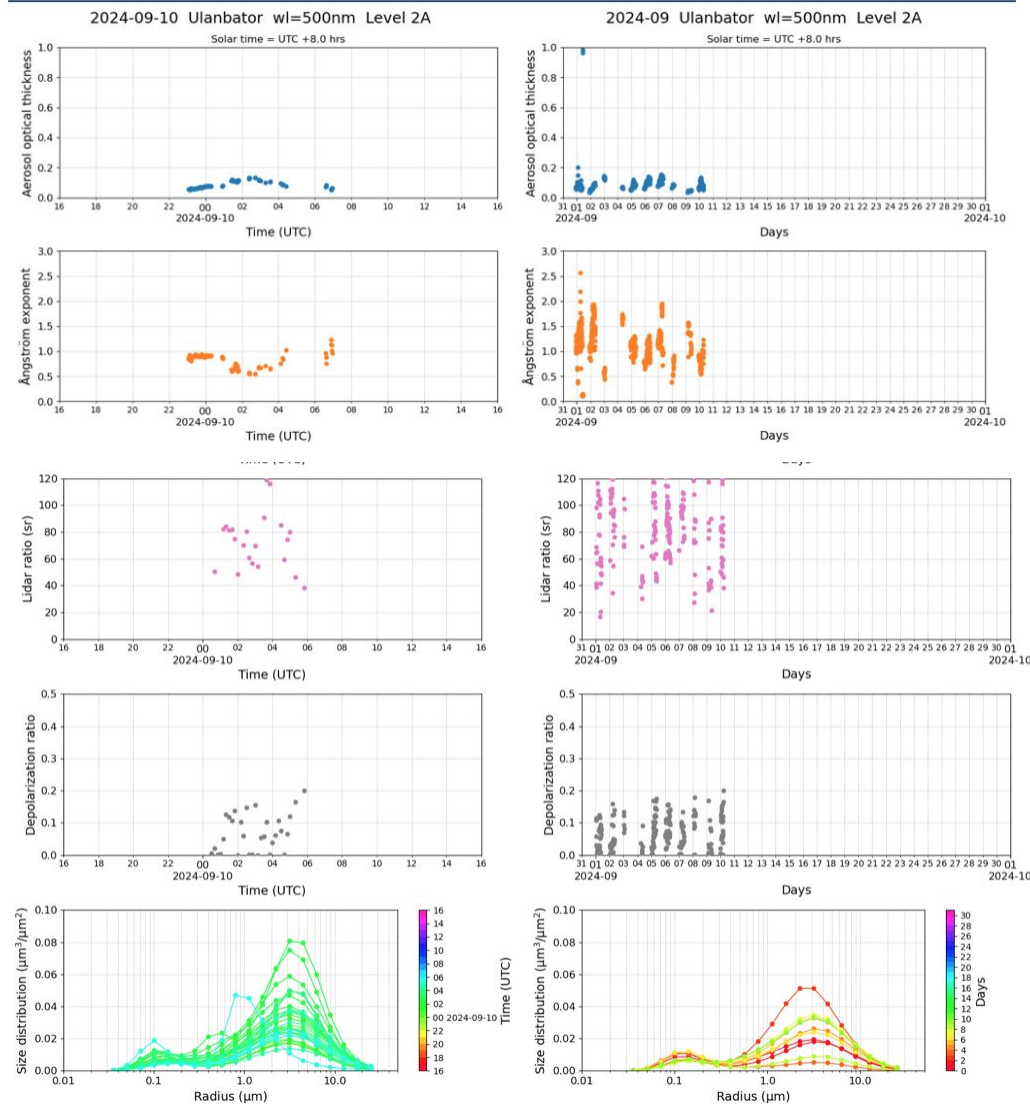
The SKYNET activity is managed by four working groups.

"Algorithm"

PRESENT :

❖ Calibration procedures:
Improved Langley methods and solar disk scanning (Campanelli et al., 2024: https://doi.org/10.5194/amt-17-5029-2024)

❖ Two data analysis flows (SR-CEReS & ESR-MRI) providing standard products for (340-1020 nm)

- Aerosol optical thickness
- Single scattering albedo
- Refractive index (ESR-MRI)
- Volume size distribution
- Angstrom exponent
- Asymmetry factor (ESR-MRI)
- Lidar ratio, depolarization ratio (ESR-MRI)

FUTURE:

- Moon AOD data analysis (340-1020 nm)
- Water vapour retrieval
- Calibration and use of the 1627, 2200 wavelengths
- Uncertainty estimation

"Quality Assurance and Validation"

Projects involvement

❖ H2020 - MAPP: Metrology for aerosol optical properties
- Laboratory calibration of Radiance and Irradiance for 2 Skynet PREDE- POM01
- validation of on site calibration procedures
❖ EUMETSAT –FRM4AER:
- AERONET-SKYNET AOD matrix for ESA satellite validation
❖ EARTHCARE:
- AOD Validation with Skynet sites and shipborne POMs
❖ GOSAT-2 CAI2 validation of aerosol algorithm; extensive use of Skynet SSA,

"Promotional activity and Networking coordination"

❖ HARMONIA cost action (https://harmonia-cost.eu)
International network for harmonisation of atmospheric aerosol retrievals from ground based photometers

"Instruments"

❖ Testing the prototype of PREDE-POM Lunar, Small network mostly in Europe (6)

Skynet and AERONET
... a story tale ....

In spite of the general awareness, the birth of the two networks has a common root
This story is a personal communication
of Prof. Teruyuki Nakajima

In the early 1980s the first prototype of a
sun-sky radiometer ("aureole meter")
was built in Tohoku University
and automated in the mid 1980s
by PREDE company (Nakajima et al 1986).
From 1987-1990 thanks to a collaboration among
T. Nakajiama, Y. Kaufman, B. Holben and
D. Tanre at the NASA Goddard Flight Center,
the idea of a network of instruments was developed

The "first generation" of aerosol standard products
were built with the prototype of the skyrad pack
(Nakajima et al., 1983, 1986, 1996)

In 1993 Prof Nakajima invited Oleg Dubovik to the university of Tokyo.

Around 1995 he joined GSFC and his inversion code

was introduced as the "second generation" software for AERONET data analysis.

For a short period,
the Skyrad inversion was in the AERONET web page,

then their path separated

… and now in 2024 ?.....

SKYNET and AERONET has many sites co-located

☐ SKYNET-AERONET common cal val activities (ESA-JAXA)

☐ SKYNET-AERONET harmonization studies (HARMONIA cost action - https://harmonia-cost.eu)

SKYNET – AERONET future collaboration will improve the quality of aerosol data and create a significant impact on satellite validation and climate studies

SKYNET and AERONET keep their deep relationship until now and hopefully forever!

Prede POM will be installed at the rooftop of **GSFC/NASA** next week!

AERONET website

AERONET RT code has been updated with a technique developed in **SKYNET community**

Original paper, Momoi+22

Efficient calculation of radiative intensity including the polarization effect in moderately thick atmospheres using a truncation approximation

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Poster at

Implementation of the truncation/correction method on the AERONET polarized radiative transfer solver

Masahiro Momoi[1*], Aliaksandr Sinyuk[2,3], Tatyana Lapyonok[4], Elena Lind[2], Oleg Dubovik[4], Sergey V. Korkin[5,2]

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Theoretical design of an efficient method P^n-IMS

➢ P^n-IMS method is based on delta-M method and treats 2 orthogonal photon ray tracing spaces (delta-M and IMS spaces) (Momoi et al. [2022b])

$$u = u^* + \hat{u}$$

Delta-M space (u^*)	IMS space ($\hat{u}$)
⇒ less anisotropic scattering (P*)	⇒ highly anisotropic scattering ($\hat{P}$)

Highlight

➢ Efficient calculation method "P^n-IMS" was implemented into AERONET RTM "SORD" (Korkin et al. [2017]).