Night-time (lunar) aerosol and trace gases columnar observations from Prede-POMs sun-sky radiometers

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State of the art :

❖ Two Prede POMs Moon version available in Rome: model POM01 and model POM02
❖ In BAQUININ sites there are AERONET, SKYNET, and PANDONIA instruments for night time measurements

Objectives

❖ Night-time retrieval of aerosol optical depth and PWV

❖ Development of retrieval techniques for Prede POMs moon data, automatic and in real time

❖ Implementation of on site calibration procedures for lunar measurements

Perspective
Establish the first automatic network of sun-moon photometers within Skynet/Europe ➔
4 sites (3 in Italy: Ciras, Baquinin, to be decided)

Nightime measurements in Rome from photometers and spectrometers

| Half view angle	0.5°											
Min. Scattering angle	0,2,3,4,5,7,10,15,20,25,30,40,50,60,70,80,90・・・180 (°) [*Max. 180°]											
Band width 50%	10nm											
Wavelengths (nm)	Monitor Channel	1	2	3	4	5	6	7	8	9	10	11
	Wavelength (nm)	315	340	380	400	500	675	870	940	1020	1627	2200
	*Channel 0 is a dark value. 940 nm is a water vapor absorption band											
Channel Setting	Filter wheel type											
Detector	Short wave length (315nm～1020nm)			Si Photodiode : Hamamatsu Photonics								
	Long wave length (1627nm, 2200nm)			InGaAs Photodiode : Hamamatsu Photonics								
Range	2.5mA , 125A , 6.25uA , 312.5nA , 15.62nA , 781.2pA , 39pA *Auto Control											
Temperature Control and Measurement	20℃ (heating control only) Measurement range : Short λ : 0 to 50degC, Long λ : 0 to -25degC. Option : Cooling Unit (* λ =Wavelength)											
Control Structure	Stepper motor: Azimuth / Zenith angle-2 axes Motor step: 0.0036° / pulse											
Tracker range of motion	Azimuth	± 300° (0° to the south)										
	Zenith	-60 to 160° (horizontal 0°)										
Position sensor	4-element Si sensor: Made by Hamamatsu Photonics * See attached sheet											
Raind sensor	AKI-1801 * See attached sheet											
Communication	RS-232											
Power consumption	200W （100V/2A）											
Power supply	100 to 240 VAC /2A(50/60Hz)											
Weight	Skyradiometer / Approx. 20kg											
	Cable : Approx. 4kg/20m(Standard)											
Accessories	Power Cable (Standard 20m) Communication cable (20m: standard) * Long-distance transmission cable up to 100m is possible Rain Sensor Shield Tool BOX (equipment fixing bolt screw, hexagon wrench, self-adhesion tape, silica gel) CD-ROM ・CD-ROM (For observation software) Case for Sensor tube											

Type of measurements: **Direct Sun**, **Direct Moon**, **Almucantar and Pricipal plane Sun**, **Almucantar Moon**

The measurement of scattered light around the moon is controlled by Prede software and it is performed when several conditions are respected (altitude of the sun, altitude of the moon, and the output value of the moon sensor).

The maximum scattering angle is user defineble : default maximum value for moon= 30°.

Personal comunication of Dr. Uchiyama: data up to 5° can be used to remove the scattered light of the sun in the background of the moon and it may be used to determine the presence or absence of clouds
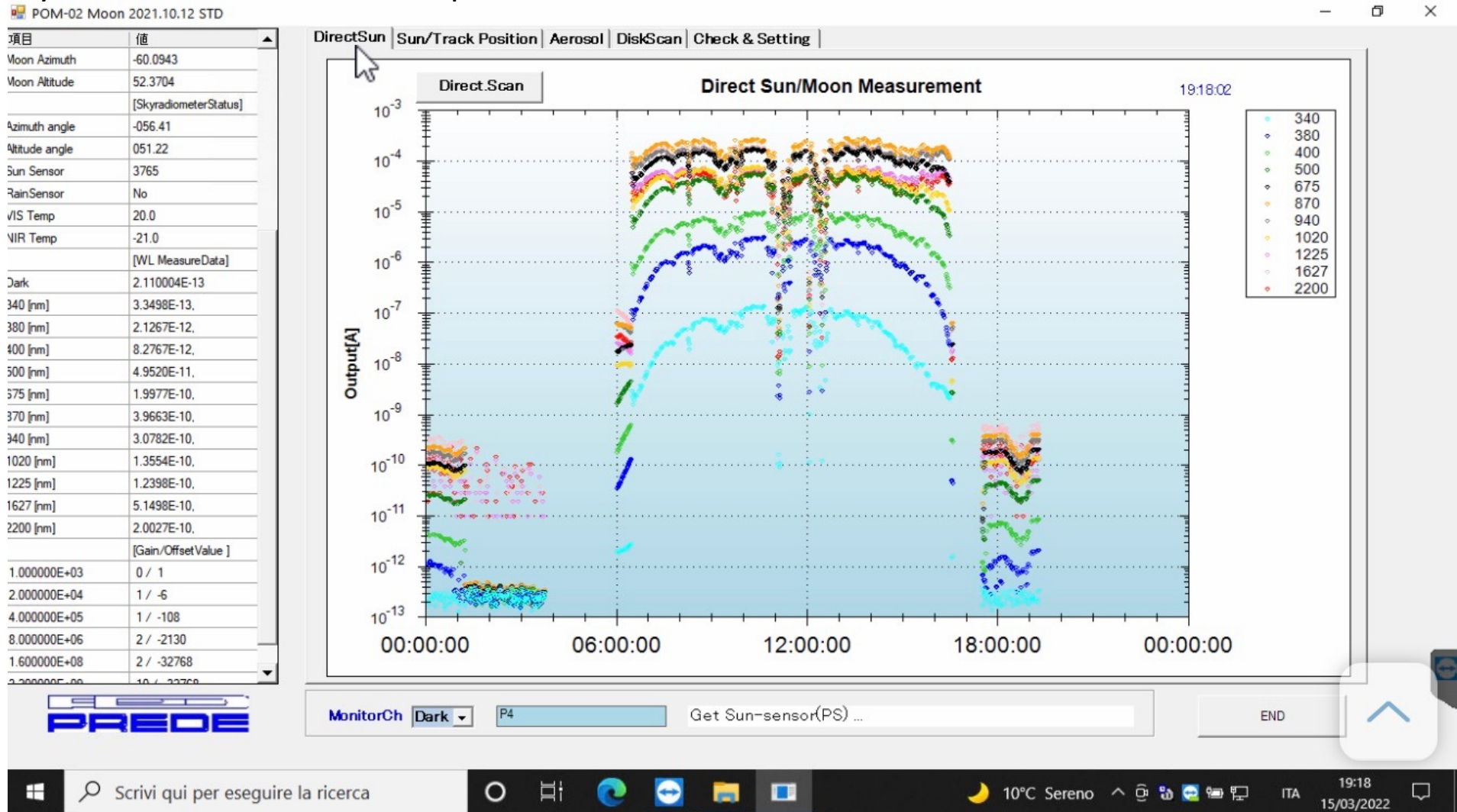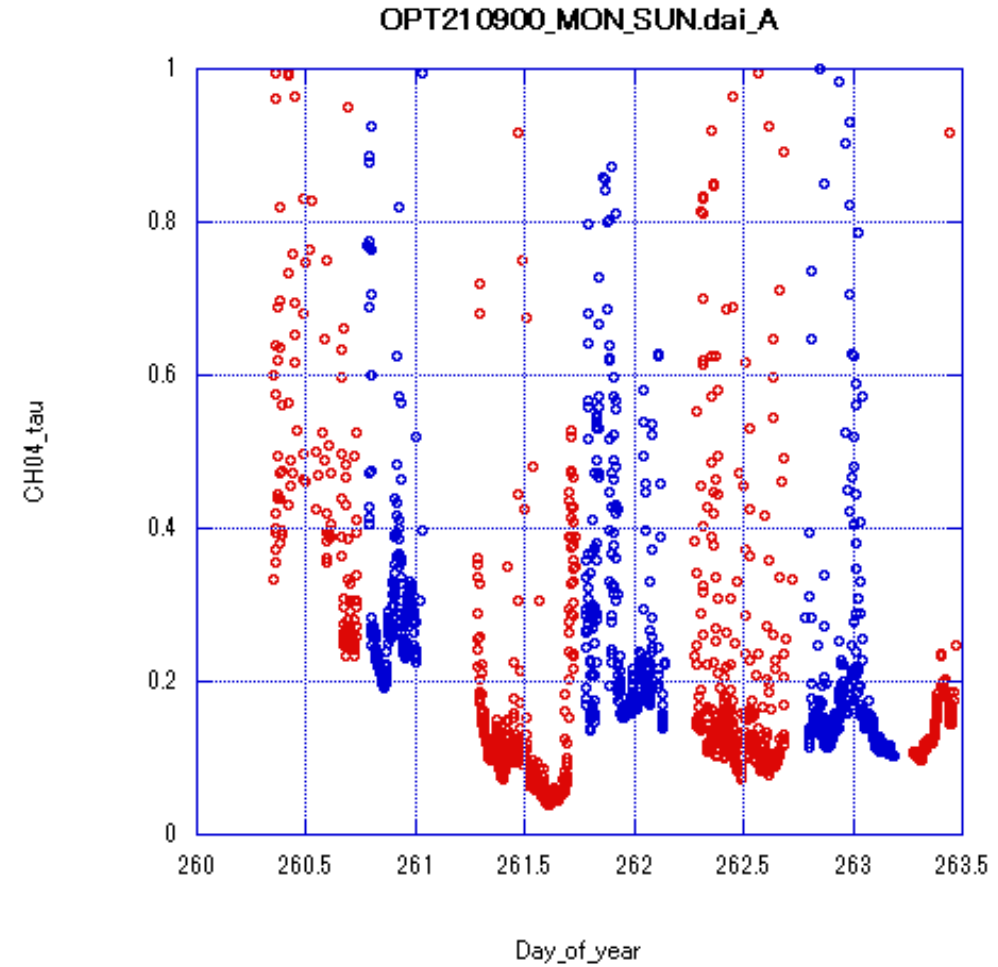
POM01 - processing provided by Dr. Uchiyama

AOD at 500 nm, processed by Dr. Uchiyama (Uchiyama et al. 2019; https://doi.org/10.5194/amt-12-6465-2019)
PWV not yet retrievable because the solar calibration constant at 940 nm is not available
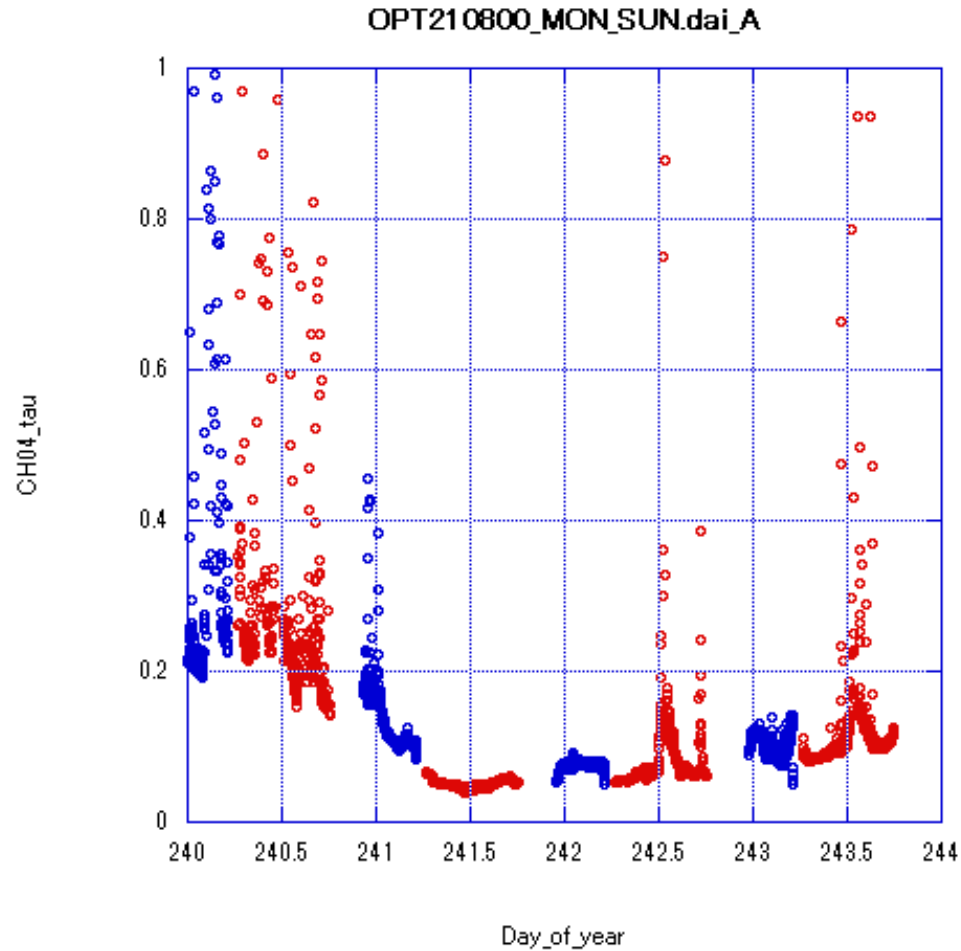
August 28-31, 2021

September 17-20, 2021

MOON, **SUN**, not cloud screened

DONE

- Started a collaboration with Dr. Uchiyama from NIES
- collected the codes and started another collaboration with Mr Gourav Kumar, Phd student (University of Valencia) of Dr. Victor Estelles co-PI or ESR, the European Skynet subnetwork
- started to study the codes; planning to deliver a first processing of moon data in spring – summer 2023

TO BE DONE

1. Finalize the setup of the software for the analysis of the Moon Irradiance
2. Test on site calibration procedures using moon data from the POM02-Moon
3. Schedule a short period at the Izana Observatory for a calibration for the POM01 and transfer the calibration to the POM02 for the common wavelengths