9 years of stratospheric ozone measurements by DIAL at Maïdo observatory in La Réunion island : instrument, algorithm and profiles

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Reunion island

Maïdo Observatory

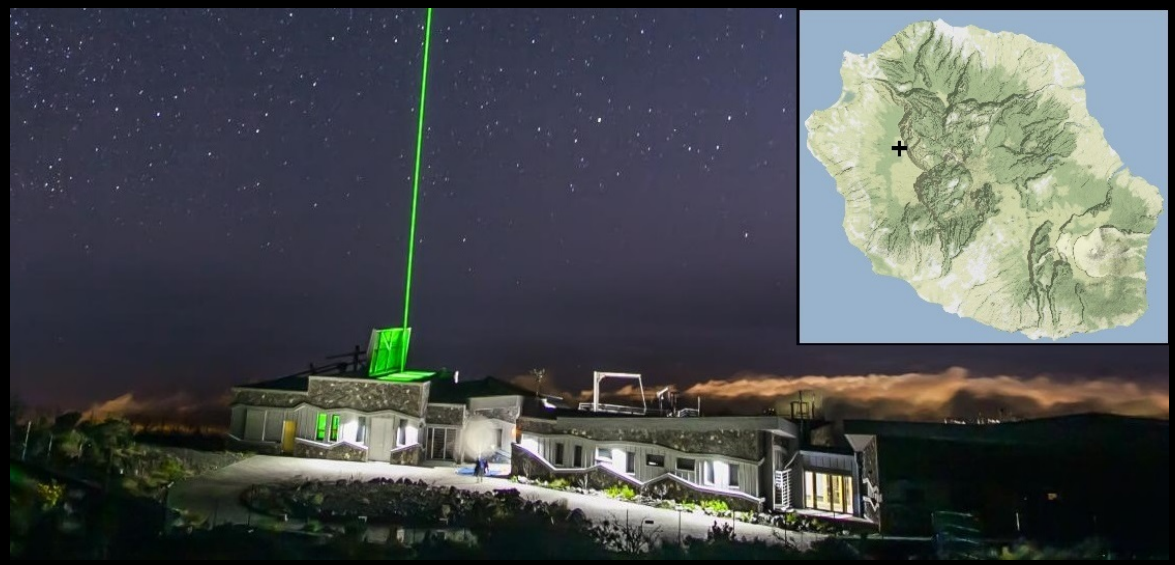

Figure - Laser beams from the Maïdo Observatory, La Réunion. Source : IRD/CNRS - Thibault Vergoz - en.ird.fr

- **Reunion island** is located in the Southwest of Indian Ocean and is well suited to study the tropical atmosphere.
- The **Maïdo Observatory** (picture) was built on the west coast of the island at 2200 m asl, and has been operated since October 2012.
- Stratospheric ozone measurements are regularly performed. A **DIAL system** is routinely used to perform high-resolution vertical profiles of ozone in the 15-45 km altitude range.

DIAL algorithm

Maïdo Observatory

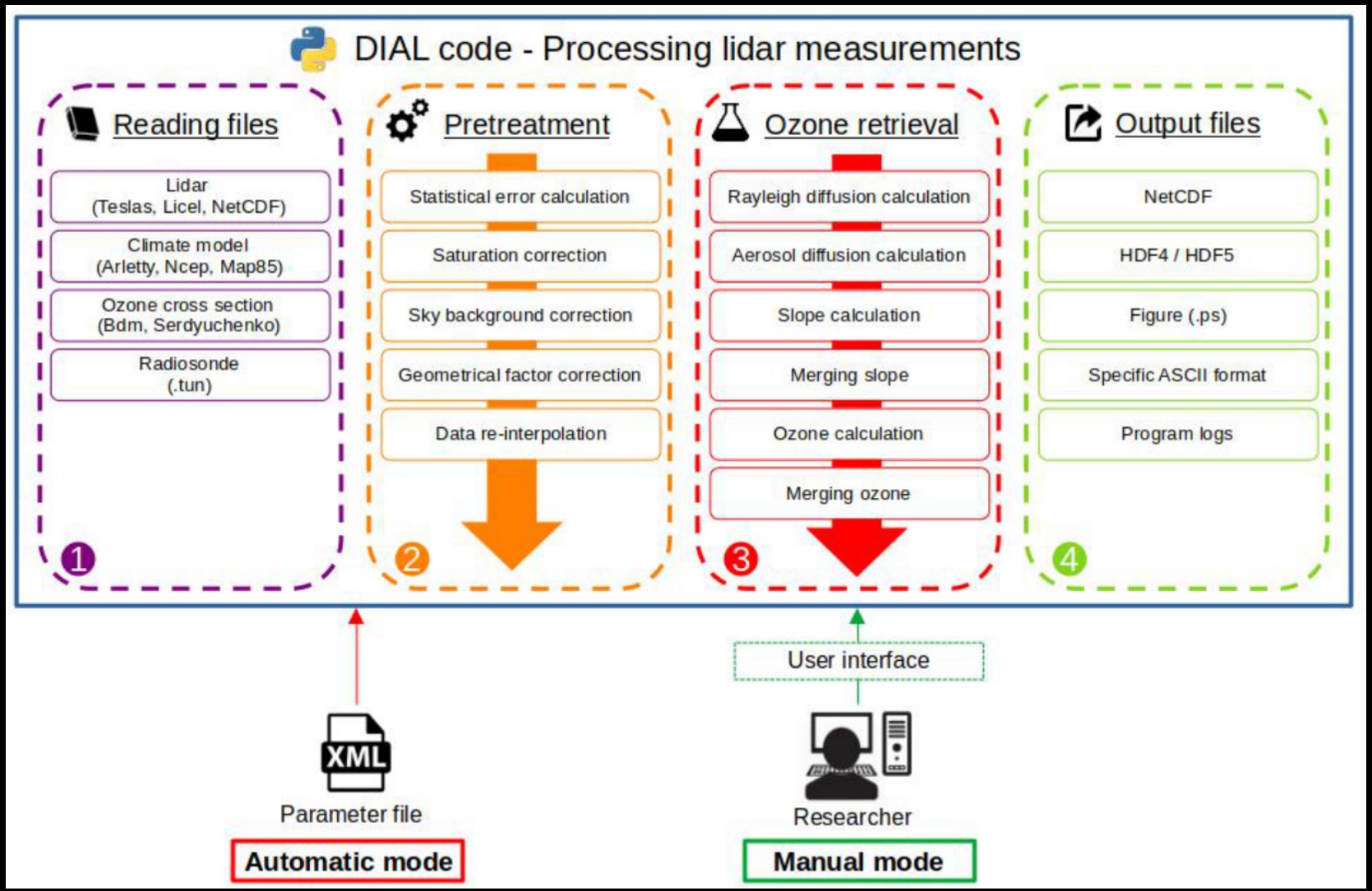

FIGURE – Architecture of the new DIAL data processing program.

Stratospheric ozone time series

Maïdo Observatory

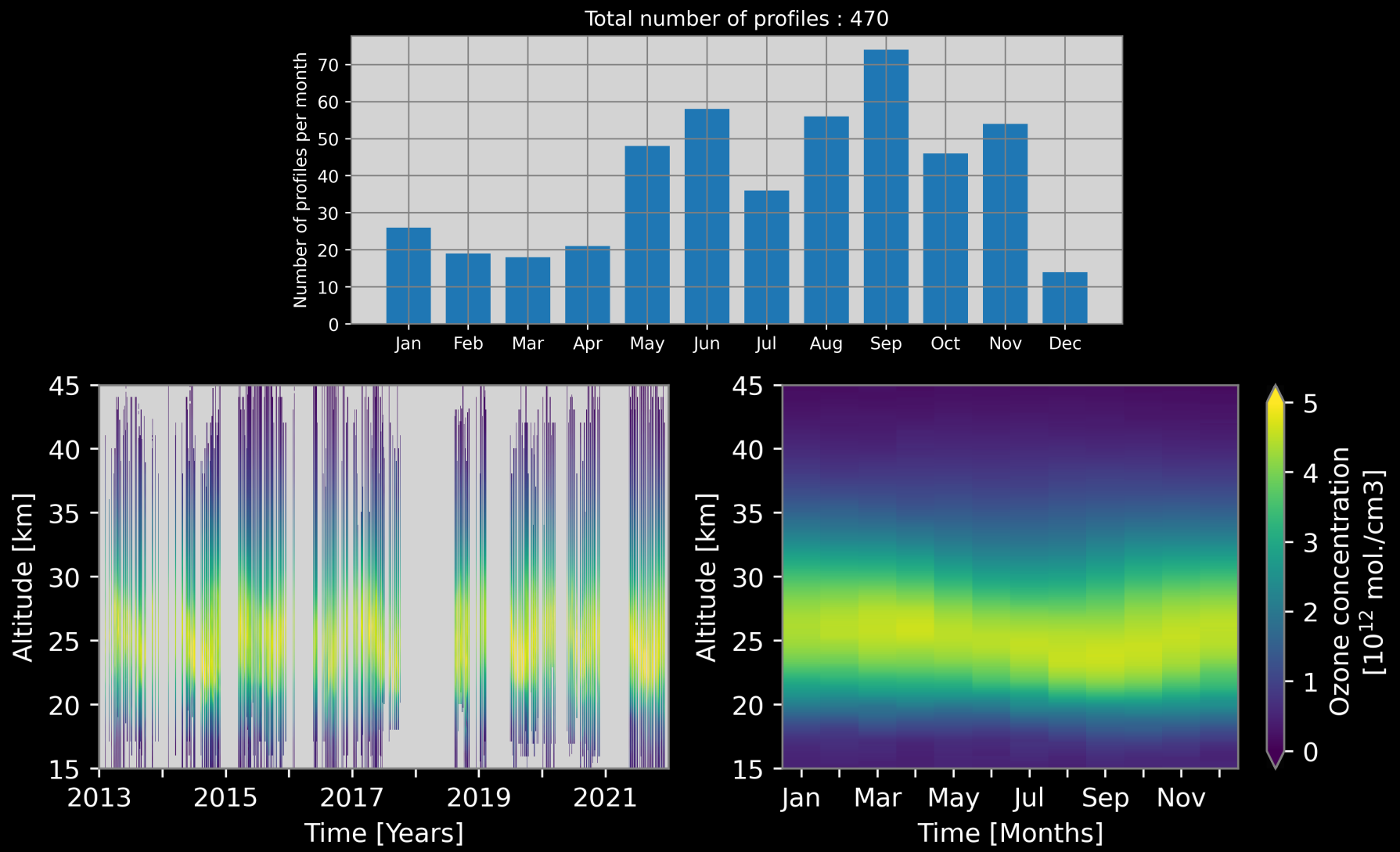

FIGURE – (Top) Monthly distribution of lidar profiles. (Bottom) Time series of the 470 DIAL ozone profiles obtained at Maïdo Observatory and the corresponding climatology.

Profile comparison

LIO3S & MLS

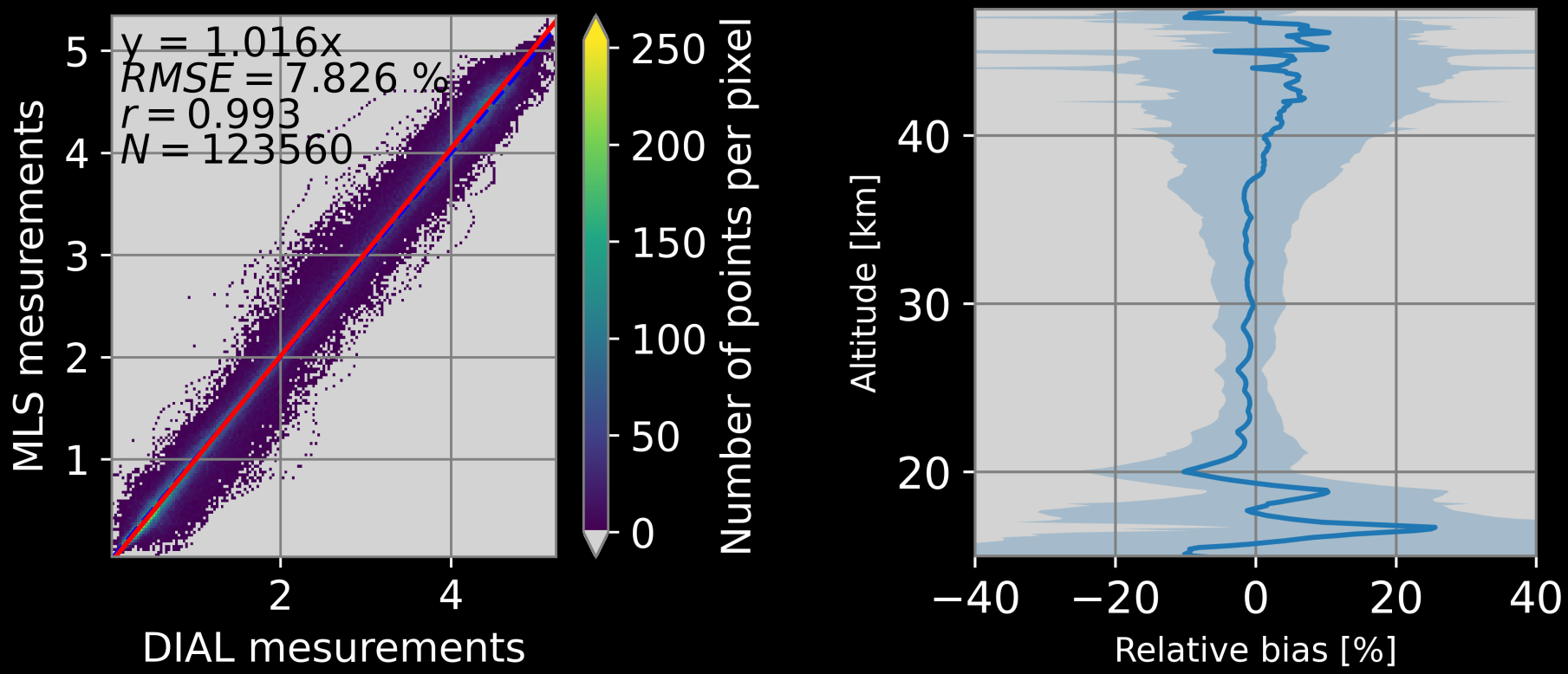

FIGURE – Global comparison between DIAL and MLS measurements in the form of a scatter plot with linear regression and mean profile bias. The dark blue dashed line and the red line represent the 1 : 1 line and the linear regression slope, respectively.

Profile comparison

LIO3S & SHADOZ

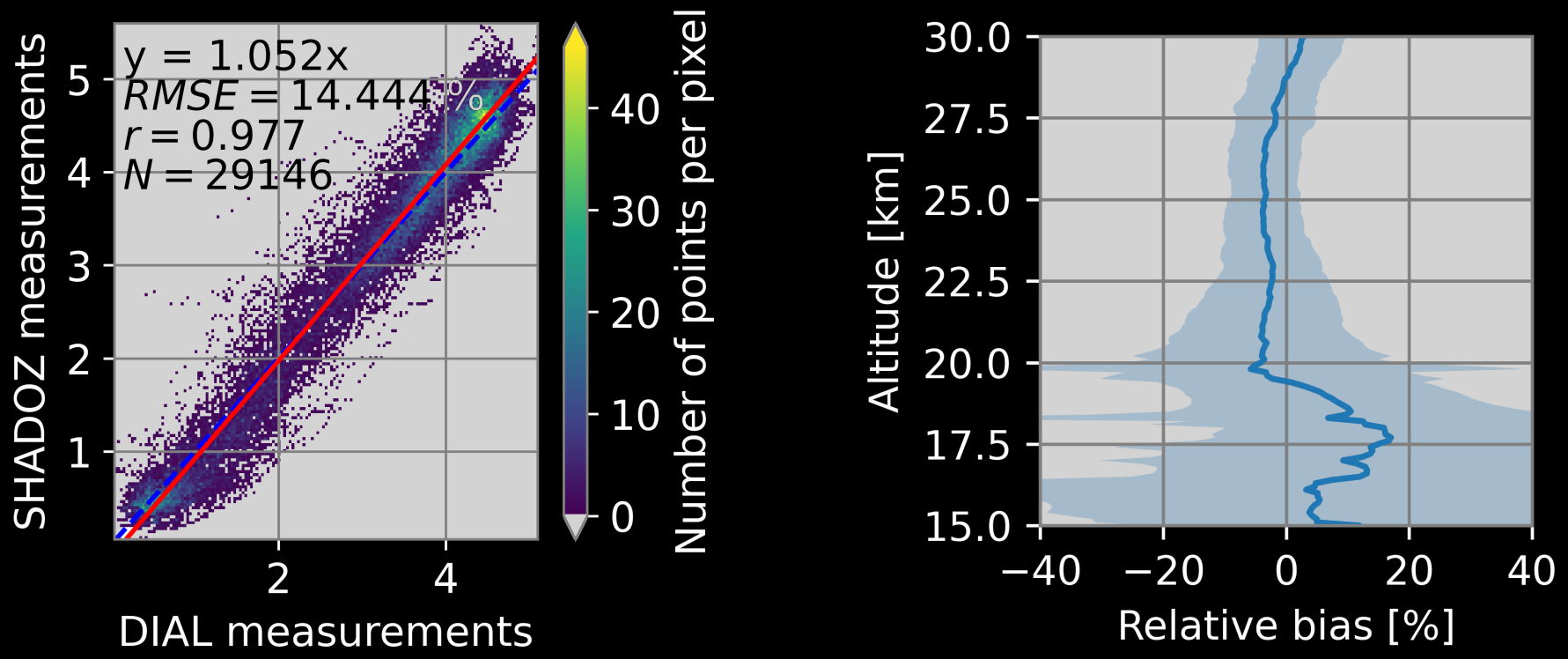

FIGURE – Global comparison between DIAL and SHADOZ measurements in the form of a scatter plot with linear regression and mean profile bias.

Conclusions

Maïdo Observatory

DIAL mesurements at Maïdo Observatory

- ➜ This instrument, which has been installed at Maïdo for 9 years, allows the **precise monitoring** of stratospheric ozone.
- ➜ MLS and DIAL profiles show **good agreement** in the 20-35 km altitude range even though the MLS profiles overestimate Lidar profiles by 1-2%.
- ➜ Linear regressions show an **overall overestimation** from ozonesondes of the order of 5 %, between 20 and 30 km.
- ➜ It is planned to quickly upgrade the DIAL, allowing for the **automation** of the instrument and an **increase** in the number of nights of measurement.