ATLID latest developments and lessons learned for future space lidar missions.

Georgios D. Tzeremes[(1)], Kotska Wallace[(2)], Dirk Bernaerts [(3)],

[(1)] *ESA-ESTEC, Keplerlaan 1,2201 AZ,Noordwijk (The Netherlands), E-mail:Georgios.tzeremes@esa.int*

[(2)] *ESA-ESTEC, Keplerlaan 1,2201 AZ,Noordwijk (The Netherlands), E-mail:Kotska.wallace@esa.int*

[(3)] *ESA-ESTEC, Keplerlaan 1,2201 AZ,Noordwijk (The Netherlands), E-mail:Dirk.bernaerts@esa.int*

ATmospheric LIDar (ATLID) is an active instrument of the EarthCARE mission. EarthCARE constitutes the 6th Earth Explorer mission, and it is a join mission of ESA and JAXA. It contains four instruments, two active ones and two passive. Their synergetic measurements shall enable a better understanding of cloud-aerosol-radiation interactions so that they can be incorporated correctly and reliably in climate and numerical weather prediction models. With expected launch date in August 2023 the satellite is prepared for shipping to ESA-ESTEC for final platform testing before transport to Kourou for start of launch campaign.

ATLID instrument is the second High Spectral Resolution Lidar instrument developed by ESA, following the success of ALADIN instrument onboard the Aeolus mission. Based on the heritage of this past mission and the incorporation of novel techniques and technologies, ATLID instrument carves the path for future space lidar missions based on HSR technique, in UV and with extended longevity (over five years), such as the drafted requirements for the Aeolus Follow On.

This success story was not seamless, both Earth Explorers faced significant delays at the start of their development and significant lessons learned were assimilated in order to ensure their success. In this paper the most important of these lessons shall be presented, collecting over 20 years of experience in the space lidar development.

These lessons learned focus primarily on large complex space lidar instruments (typically atmospheric measuring instruments), as their design and development differs significantly to the more compact imaging –rangefinding systems that are also gaining momentum in space applications.

Some of the key lidar development domains that shall be covered in this paper are: the maturity of technologies used, the variations in the standard space management approach, the scientific and technical requirements overview, the synergy of lidar instruments, the approach to lessons learned and last but not least a generic architecture of future lidar instruments.