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ESA ACTIVITIES IN SPACE LASER SOUNDING AND RANGING

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Laser remote sensing from space is undoubtedly one of the most promising means to obtain essential atmospheric and geophysical parameters on a global scale. Efforts including feasibility assessments, technology developments and mission definition studies are in progress at the European Space Agency (ESA) to prepare for the prospective use of laser remote sensing systems in space. This paper will present an overview of the programs under way and discuss the perspectives of laser remote sensing in the context of ESA's Long-Term European Space Plan.

ESA technological preparation in the field of laser remote sensing is directed towards lidar technology for atmospheric sounding and laser ranging systems for use in solid-earth geophysics. Development efforts in spaceborne laser ranging concentrate on CO_2 laser Doppler systems for precise geoid mapping using satellite-to-satellite tracking, and on dual-wavelength picosecond pulse ranging for accurate distance measurements to ground. Activities in the lidar area focus on the development and early deployment of a direct-detection backscatter lidar which, when combined with passive sensors, can provide valuable data for weather forecasting and climate prediction.

Following the recommendations of an ESA Workshop on Space Laser Applications and Technology (SPLAT), held in March 1984, a Technology Working Group on Space Laser Sounding and Ranging has now been established. The group is composed of scientists, users and laser instrumentation specialists, and its task is to advise ESA on requirements and development priorities in the area of laser remote sensing. The group's charter also includes the elaboration of an implementation plan for spaceborne laser monitoring systems, together with the identification and examination of flight opportunities. Preliminary conclusions of the working group will be presented.

In January 1985, the governments of the ESA member states endorsed the proposal for a Long-Term European Space Plan, opening up new perspectives for satellite-borne laser remote sensing, particularly for what concerns flight opportunities, platform capabilities and funding of relevant development work. An In-Orbit Technology Demonstration Program (TDP) has been approved, providing a suitable framework for the in-orbit verification of laser remote sensing instruments. Using the European Retrievable Carrier (EURECA), demonstration flights of up to 6 months duration will be possible, with adequate platform mass and power resources available. Similarly, the European contribution (COLUMBUS) to the US Space Station might offer a serviceable polar platform which would open up further opportunities for experimental missions involving lidars or other laser remote sensing instruments.