



The Methane Remote Lidar Mission MERLIN

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The mission MERLIN is the French-German climate monitoring initiative on global observations of atmospheric methane (CH₄). In Nov./Dec. 2010, the mission proposal successfully passed the Mission Definition Review (MDR) and was recommended to undergo Phase A studies in 2011. As a novel feature, the selected instrument concept will be based on a narrow-band, two-wavelength, pulsed lidar instrument for the measurement of the column-weighted dry-air mixing ratio of CH₄, commonly referred to as XCH₄. Together with the data from current and forthcoming observational network, MERLIN observations shall allow to constrain further development of models of the terrestrial biosphere and thereby improve the projections of future trends in methane sources significantly. Despite the constraints of a small satellite mission, the results from initial impact studies are very encouraging as they clearly show substantial reduction of the prior methane flux uncertainties in key observational regions when using synthetic MERLIN observations in the flux inversion experiments. In addition, it could be shown that the selected observational instrument will permit high-accurate retrievals of XCH₄ with substantial weight of the low troposphere not only in clear sky conditions but also in the presence of optically thin cirrus or aerosol layers by distinguishing surface from cloud or aerosol backscatter and providing measurement in partly cloudy conditions due to the near-nadir view and the small lidar footprint. Moreover, the proposed active measurement approach provides all-season and all-latitude coverage as it is not relying on sunlight. In this presentation we will give an overview on the mission status and point to key findings from supporting scientific studies helping to quantify the added value of the mission MERLIN for a better understanding of the global methane cycle.