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Oral

The Tropospheric Monitoring Instrument (TROPOMI) is the payload instrument aboard ESA's Sentinel 5 Precursor Satellite (S5-P) that was launched in 2017. One of the main objectives of the mission is to deliver the dry air column mixing ratio XCH<sub>4</sub> with daily global coverage and high-resolution spatial data, reaching up to 5.5x7km<sup>2</sup>. In this contribution, we give a status update on the operational S5-P CH<sub>4</sub> data product and delineate future developments. We introduce an innovative cloud-clearing method, which is independent of SUOMI-NPP VIIRS data. This overcomes the current data dependence between the two missions and so makes it possible to continue the TROPOMI CH<sub>4</sub> data processing after the impending decommissioning of SUOMI-NPP. Our approach leverages machine learning techniques and six years of collocated SUOMI-NPP and TROPOMI data and fortifies the reliability of cloud-clearing procedures. Moreover, we establish an AI-based quality flagging of the data product, enabling users to use TROPOMI CH<sub>4</sub> data based on the user's accuracy requirement, thereby significantly enhancing data coverage depending on the application. Additionally, we present initial findings on a destriping technique for post-correction of TROPOMI CH<sub>4</sub> data. Lastly, we explore the feasibility of delivering a near-real-time TROPOMI CH<sub>4</sub> data product, required for CAMS data assimilation and early event detection.

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