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Ethane pollution in the UTLS observed with the imaging infrared limb sounder GLORIA

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Ethane (C_2H_6) in the atmosphere results from the production and transmission of fossil fuels, biofuel use and biomass burning. Due to its lifetime of 2 - 3 months, ethane is a significant indicator and tracer of industrial pollution and enables investigation of transport and mixing in the UTLS region. During the TACTS/ESMVal flight over Arabian Sea and Arabian Peninsula in summer 2012, GLORIA (Gimballed Limb Observer for Radiance Imaging of the Atmosphere) detected two layers (at 10-12 km and 12-14 km altitude) and two vertical plums of enhanced ethane with mixing ratios of about 1000 ppt. The spatial distribution cross sections of ethane retrieved from GLORIA chemistry mode measurements show good correlation with numerous trace gases sampled with in-situ instruments during the flight. Based on the data and the climatology, we evaluate here the sources of the ethane mixing ratio enhancements with backward trajectory calculations and investigate an impact of outflow of pollutants from the Asian summer monsoon on the composition of the UTLS in the flight region.