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Airborne passive remote sensing of large-scale methane emissions from oil fields in California's San Joaquin Valley and validation by airborne in-situ measurements - Initial results from COMEX

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On several flights performed over the Kern River, Kern Front, and Poso Creek Oil Fields in California between June 3 and September 4, 2014, in the framework of the CO_2 and MEthane Experiment (COMEX) - a NASA and ESA funded campaign in support of the HyspIRI and CarbonSat mission definition activities – the Methane Airborne MAPper (MAMAP) remote sensing instrument (operated by the University of Bremen in cooperation with the German Research Centre for Geosciences - GFZ) detected large-scale, high-concentration, methane plumes. MAMAP was installed for the flights aboard the Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS) Twin Otter aircraft, together with a Picarro fast in-situ greenhouse gas (GHG) analyzer (operated by the NASA Ames Research Center, ARC), a 5-hole turbulence probe and an atmospheric measurement package (operated by CIRPAS), measuring aerosols, temperature, dew-point, and other atmospheric parameters. Some of the flights were accompanied by the next generation of the Airborne Visible InfraRed Imaging Spectrometer (AVIRIS-NG), operated by the Jet Propulsion Laboratory (JPL), California Institute of Technology, installed aboard a second Twin Otter aircraft (operated by Twin Otter International).
Data collected with the in-situ GHG analyzer were used for validation of the MAMAP and AVIRIS-NG remotely sensed data. The in-situ measurements were acquired in vertical cross sections of the discovered plumes at fixed distances downwind of the sources. Emission rates are estimated from both the remote and in-situ data using wind information from the turbulence probe together with ground-based wind data from the nearby airport. Remote sensing and in-situ data as well as initial flux estimates for selected flights will be presented.