

1. Fast-response measurements of organic species during hydraulic fracturing – air quality investigations
2. Flying for research – applications of DLR's smaller aircraft in boundary layer missions

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1. During an air quality study in the Uintah Basin in the rural Northeast of Utah/USA comprehensive measurements (and modelling) of diverse species connected with the exploitation and production of oil and natural gas have been performed. One subproject especially concentrated on characterizing the emissions of organic species (volatile organic compounds - VOC) at hydraulically fractured wells. VOCs have been measured using the Ultra-Light-Weight Proton-Transfer-Reaction Mass Spectrometer (ULW-PTR-MS) that was deployed on a mobile laboratory. This allowed the identification of individual chemical fingerprints of the different sources. At a recently hydraulically re-fractured gas well very high mixing ratios of aromatic hydrocarbons in the range of several ppm (parts per million) were found. These values outnumber typical urban mixing ratios by several orders of magnitude.

The presented results were some of the first measurements using fast-response VOC instruments to study individual emission sources associated with fossil fuel production and demonstrate the applicability of PTR-MS for mobile air quality investigations.

2. The Flight Experiments facility (FX) of the German Aerospace Center (DLR) in Oberpfaffenhofen and Braunschweig plans and executes scientific flight projects including installation of special mission equipment, aircraft maintenance and project management all over the world. For that FX operates the largest civilian fleet of research aircraft (aeroplanes and helicopters) in Europe. The highly modified aircraft are either used as research platforms on which scientific equipment is installed for atmospheric research and observations of the Earth and the sea surface, or for aeronautic research of the aircraft themselves. One of the smaller aircraft of the Oberpfaffenhofen research fleet is a Cessna 208B Grand Caravan, which is particularly used for flight missions in low altitudes and slower speeds compared to other platforms. The aircraft is used for remote sensing applications and as a flying auditorium for students in the fields of meteorology and aeronautics. It is equipped with a specifically developed underwing meteorological sensor package for temperature, pressure

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and humidity that is capable of turbulence measurements. Likewise, an inertial platform provides position data that together with the measured atmospheric parameters allow flight experiments with topics ranging from weather phenomena up to flight mechanics. Current further developments concentrate on the deployment of the aircraft in atmospheric in situ studies using new instruments and a newly installed trace gas inlet.

The talk addresses conceptual and technical aspects of flying in the context of atmospheric and aeronautic research and presents upcoming missions including investigations of methane emissions in Europe (esp. in Poland) and on foehn dynamics in the Inn Valley (Austria).