Estimate of CH_4 Emissions from Oil and Gas Operations in the Uintah Basin Using Airborne CH_4 Measurements and LiDAR Wind Data

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A February 2012 campaign in the Uintah oil and gas basin in Northeastern Utah was focused on studying ozone and particle precursor emissions in the natural gas and oil fields in the basin. The NOAA/ESRL Carbon Cycle Aircraft Program used this campaign as an opportunity to demonstrate the capabilities of light aircraft sampling. Flask measurements and high-resolution (0.5 Hz) observations of carbon dioxide (CO_2) and methane (CH_4) were made during flights on 13 days. We present top-down estimates of the methane flux over the region, using CH_4 measurements from the aircraft and wind measurements from the High-Resolution Doppler LiDAR deployed at a ground site. We include a detailed analysis of the errors associated with this flux estimate. We present evidence that this methane flux is associated with emissions from oil and gas production operations in the basin.

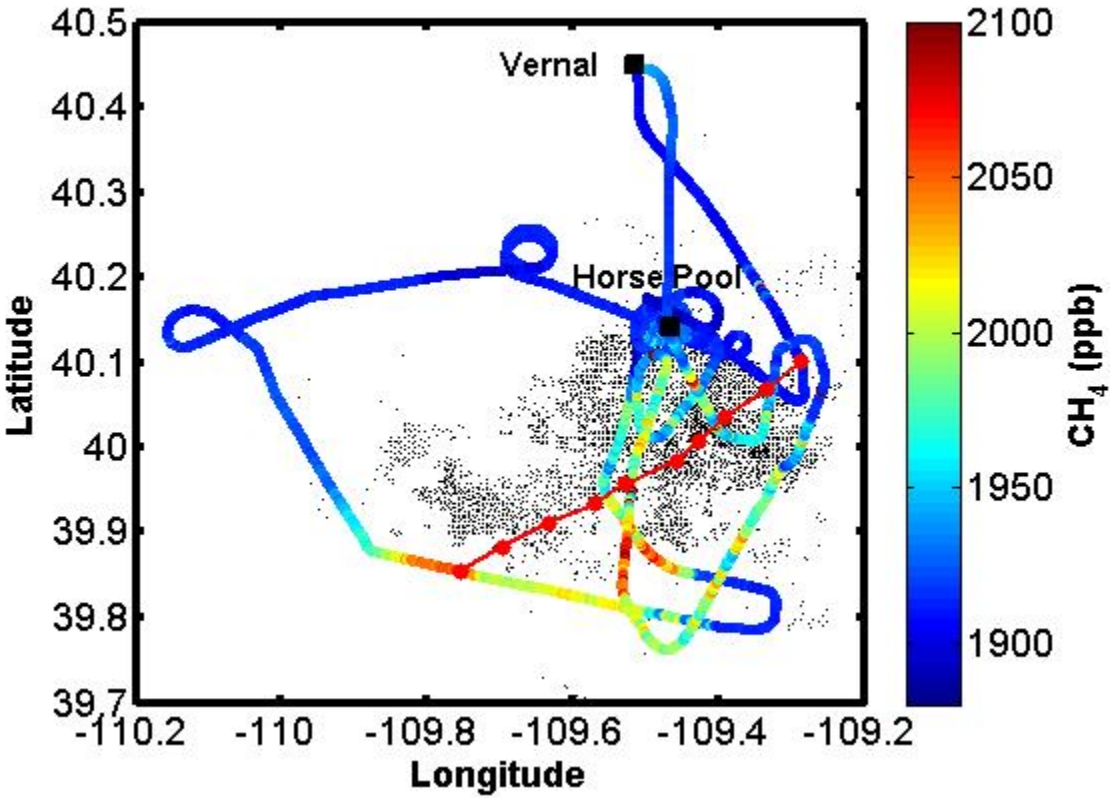

Figure 1. Flight track on 2/3/2012, colored by methane mixing ratio. The red points and line show a back trajectory of an air mass sampled downwind of the gas field, constructed using wind measurements in Horse Pool. Small black points show the locations of gas wells in the Uintah Basin.