**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Characterization of trace gases measured over Alberta oil sands mining operations: 76 speciated C_2–C_{10} volatile organic compounds (VOCs), CO_2, CH_4, CO, NO, NO_2, NO_y, O_3 and SO_2" *by* I. J. Simpson et al.

Anonymous Referee #2

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The authors present a chemically detailed analysis of a full suite of trace gases measured over an oil sands mine in Alberta, Canada. In-situ measurements of CO, CO2, NOx, NOy, O3, SO2, CH4, and speciated VOCs in 17 whole air samples were collected aboard the NASA DC-8 during one leg of an ARCTAS flight in July 2008. While the number of samples is admittedly small, this study provides a useful and important initial characterization of trace gas emissions from oil sands surface mining operations. The importance of oil extraction from oil sands is increasing in the energy market despite the difficulties in extraction and processing. A large number of compounds in

the samples collected over the oil sands were determined to have clear statistical enhancements over measured background BL values. Correlations were used to identify the two main sources of the trace gases measured, which include 1) evaporation from the oil sands or the diluent used to extract the oil or 2) combustion/industrial activities associated with the mining effort. The author's have presented a clear and concise analysis that will be useful to the scientific community. I recommend publication in ACP with minor revisions.

Specific Comments: P18513, L17 and L20: Local times are given in the text, but all figures with timeseries are given in UTC. Please state the conversion and remove the "a.m." on L17.

P18517, L18-23: It would be very useful to the reader if the 1) location of the mine was clearly identified in Fig. 2B and 2) prevailing wind direction was included. It would be useful include the background values from Leg 9 as an additional line at the bottom of Table 2. This way the reader can more easily distinguish which of the 17 samples resembles the background air as the plane maneuvered south of the mine.

P18519, L21-25: More detail should be provided on how the "simple (L12)" and "mutual (L21)" correlations were performed (e.g., linear two-sided fit, etc.). A reference to Table 3 should be included on L21.

P18526, L 28: How well did MVK/MAC correlate with isoprene?

P18552, Fig 2: Panel C is not very useful, especially since the flight track altitude is included in Fig. 4. The pressure level could simply be stated in section 2 when the altitude of legs 7 and 9 are discussed. Otherwise, include "C" in panel C. Add altitude to right axis. Circle markers are confusing/unnecessary. The fact that the numbers refer to the flight legs and not the sample numbers was not immediately clear.

P18554, Fig 4: Panels C-H could have log scales for the hydrocarbon mixing ratios. This way more detail of the timeseries would be evident.

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P18560, Fig 10: Label time as UTC. It should be stated that this is data from leg 7 only.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 18507, 2010.

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