Atmos. Chem. Phys. Discuss., 9, C1581–C1583, 2009
www.atmos-chem-phys-discuss.net/9/C1581/2009/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Physical properties of High Arctic tropospheric particles during winter" *by* L. Bourdages et al.

Anonymous Referee #2

Received and published: 8 June 2009

The authors present a new cloud property data set from a high-latitude Arctic site. The data set is of obvious importance to climate research, particularly given the potential sensitivity of the arctic climate system to changes in cloud cover.

While the data set is of great importance to climate research, the authors do very little beyond presenting the cloud properties as retrieved from the various remote sensing instrumentation. These retrievals are more or less established algorithms. The results constitute new information, and are therefore of value to the general climate community. However, the manuscript reads a bit more like a technical report. Much more could be done with this data set before publication in ACPD.

For example, the authors raise some interesting questions that could be (at least partially) addressed with the data set at hand (e.g. whether or not clouds are responsible

for limiting the minimum temperature in the Arctic). This data set could be used to assess the radiative impact of clouds, rather than just their occurrence, properties, and/or 'type'. Could the data set be composited for the occurrence of warm air advection with cloud, warm air advection without cloud, cold air advection with cloud, and cold air advection without cloud? Which events bring certain 'types' of clouds? What is the cloud frequency at Eureka? How does the cloud frequency differ between the different retrievals?

In fact, table 1 indicates that there was an AERI at the site. The AERI data would be very useful in assessing the radiative impact of clouds. I can only assume that broadband radiation measurements are also made at Eureka. Analyses from ECMWF or something similar could be used to classify weather regimes and composite the cloud data. If ECMWF data becomes involved, why not assess ECMWF over the site?

The cloud 'type' is a particularly troublesome issue in the work. The authors should clearly explain how they set each threshold.

The authors should present some sort of timeline (or freq. dist.) of when the data were collected. The contour plots are for the entire period of Dec-Mar. However, the reader is left wondering whether the data sets represent December-only conditions, or March-only conditions, or some fraction of the three months... I don't think the three months are equivalent climatologically.

I hope that this paper is published in some format very soon. However, in its current state, I recommend rejection.

minor comments:

-remove figure 3, along with the distracting introduction to section 3.

-many figures can be presented as black and white contours, rather than in color.

-I recommend removing OPAL instrumentation from Table 1 that is not used to produce data presented in the work. This is not an advertisement for OPAL (although I think

ACPD

9, C1581–C1583, 2009

OPAL is a very important site in the Arctic Observatory).

-The authors should revisit their vertical averaging algorithm, because some of the step changes (Fig 7, for example) are quite large, yet the contours seem continuous within each km averaging bin. This juxtaposition seems fishy to me.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7781, 2009.