Review of manuscript (Atmospheric Chemistry and Physics Discussions)
"Cirrus cloud radiative effect on surface-level shortwave and longwave irradiances at regional and global scale" By Dupont et al. (MS acpd-9-2677-2009).

After carefully comparing the results in this study with our results at the ARM SGP (Dong et al. 2006, not 2005 in the paper cited) and ARM NSA sites (Dong et al. 2010), I find that the results from this study are consistent to our results. FYI, I attach our abstract and Table 1 if you want to cite or get it from Chuck Long. Based on the comparisons with our results, I trust other results found in this study although I have no other sources to validate them. Therefore I recommend ACPD to accept it with a minor revision. However, the following comments must be addressed before publish it.

Minor comments:

1) CRE: In the paper, you use the Cloud Radiative Effect on the surface, while most of studies used Cloud Radiative Forcing. Although it is not big deal to use CRE or CRF, it is better to consistent with other studies. Also in your Tables 9 and 10, you used CRF.

Tables:
2) Table 2a, After comparing your results with ours I find that your SGP IWV results are nearly the same as ours although the time periods are different from two studies, this is a good sign. However, I find your NSA IWV values a slight off comparing with our 10-yr results as listed in our table 1, especially for Autumn season. Later on I find that you used only Sept value (in your Fig. 1) to represent Autumn, this is not right. You should delele the Autumn value in your Table 2 if you have only one month results.

Also, you need to mention your results are the averaged for all-sky conditions because you study CRF, people may think they are under clear-sky conditions.

3) Table 3: Your average SW CRF at the SGP is -40.9 Wm-2, which is close to ours (37 Wm-2), however, it is inconsistent to the Table 9 value (-33.1 Wm-2). What's different between two tables? You use different data sets or use different methods to average them? I also find the Table 10 (cumulative cirrus CRF) is confusing, what is the cumulative CRF?

4) table 11: Although I do not have global observations to validate your results, I find that your CRFs between 15S to +15N, 15-45N and 45-75N are inconsistent to your Table 9 (ARM TWP and SGP results) and our NSA Table 1 results. Please double check your results.

In general, you have presented too many tables for people to focus on. You may shorten your Tables or condense them into a few.

5) Comparing your Fig. 7 results, they are consistent to our SGP results.

1) Dong, X., B. Xi, and P. Minnis, 2006: A climatology of midlatitude continental clouds from ARM SGP site. Part II: Cloud fraction and surface radiative forcing. *J. Climate*. **19**, 1765-1783.

2) Dong, X., B. Xi, K. Crosby, C.N. Long, R. Stone, and M. Shupe, 2010: A 10-yr Climatology of Arctic Cloud Fraction and Radiative Forcing at Barrow, Alaska J. *Geophys. Res. In press.*

Abstract

A 10-yr record of Arctic cloud fraction and radiative forcing has been generated using data collected at the Atmospheric Radiation Measurement (ARM) North Slope of Alaska (NSA) site and the nearby NOAA Barrow Observatory (BRW) from June 1998 to May 2008. The cloud fractions (CF) derived from ARM radar-lidar and ceilometer measurements increase significantly from March to May (0.57→0.84), remain relatively high (~0.80-0.9) from May to October, and then decrease from November to the following March (0.8→0.57), having an annual average of 0.76. These CFs are comparable to those derived from ground-based radar-lidar observations during the SHEBA experiment and from satellite observations over the Western Arctic regions. The monthly means of estimated clear-sky and measured all-sky SW-down and LW-down fluxes at the two facilities are almost identical with the annual mean differences less than 1.6 Wm^{-2}. Values of LW CRF are minimum (6 Wm^{-2}) in March, then increase monotonically to reach maximum (63 Wm^{-2}) in August, then decrease continuously to the following March. The cycle of SW CRF mirrors its LW counterpart with the greatest negative impact occurring during the snow free months of July and August. On annual average, the negative SW CRFs and positive LW CRFs nearly cancel, resulting in annual average NET CRF of about 3.5 Wm^{-2} on the basis of the combined ARM and BRW analysis. Compared with other studies, we find that LW CRF does not change over the Arctic regions significantly, but NET CRFs change from negative to positive from Alaska to the Beaufort Sea, indicating that Barrow is at a critical latitude for neutral NET CRF. The sensitivity study has shown that LW CRFs increase with increasing cloud fracton, liquid water path, and radiating temperature with high positive correlations (0.8-0.9). Negative correlations are found for SW CRFs but a strong positive correlation between SW CRF and surface albedo exists.

Table 1. The seasonal means of cloud, radiation and surface parameters at Barrow, Alaska, during the 10-yr period (06/1998-05/2008)

Parameter	**Winter**	**Spring**	**Summer**	**Autumn**	**Annual**
CF(radar)	0.683	0.693	0.820	0.911	0.778
CF(ceilo)	0.615	0.663	0.843	0.869	0.748
LWP (gm^{-2})	33.1	51.6	109.3	98.3	73.0
PWV (cm)	0.371	0.554	1.808	0.834	0.829
H_{base} (km)	1.79	1.77	1.20	1.38	1.53
T_{rad} (K)	233.7	241.2	263.7	253.2	247.9
T_{air} (K)	249.4	257.4	276.1	266.6	262.4
$SW^{\downarrow}_{clr}(Wm^{-2})$	5.4	203.0	300.8	50.0	139.8
$SW^{\uparrow}_{clr}(Wm^{-2})$	4.4	162.6	79.6	14.7	65.3
$LW^{\downarrow}_{clr}(Wm^{-2})$	160.7	184.1	255.0	212.8	203.2
$LW^{\uparrow}_{clr}(Wm^{-2})$	200.3	234.0	346.7	279.9	265.2
$SW^{\downarrow}_{all}(Wm^{-2})$	4.8	165.7	193.3	24.0	96.9
$SW^{\uparrow}_{all}(Wm^{-2})$	3.4	132.6	52.1	6.5	48.6
$LW^{\downarrow}_{all}(Wm^{-2})$	183.9	212.1	301.3	262.5	240.0
$LW^{\uparrow}_{all}(Wm^{-2})$	213.9	245.3	339.3	286.8	271.3
$CRF_{SW}(Wm^{-2})$	0.3	-7.2	-80.0	-17.7	-26.2
$CRF_{LW}(Wm^{-2})$	9.6	16.5	53.8	42.8	30.7
$CRF_{net}(Wm^{-2})$	9.9	9.2	-26.2	25.1	4.5
R_{sfc}	0.857	0.819	0.185	0.335	0.549

Note: All values are averaged from June 1998 to May 2008 except for CF(radar) (January 1999- December 2004). All values are from ARM NSA observations except for R_{sfc} from NOAA global SW fluxes. Four seasons are defined as Winter (Dec-Feb), Spring (Mar-May), Summer (Jun-Aug) and Autumn (Sep-Nov).