Atlas and Catalog of Dark Clouds Based on the 2 Micron All Sky Survey (ver 2.0.2, 2017/04/01)

(1) Atlas and Catalog of Dark Clouds Based on the 2 Micron All Sky Survey

We release an atlas and catalog of dark clouds derived based on the 2 Micron All Sky Survey Point Source Catalog (2MASS PSC). Color excess maps of E(J-H) and E(H-K_S) as well as extinction maps of A_J , A_H, and A_{Ks} covering all of the sky have been produced at a grid of 1'. On the basis of the E(J-H) and A_J maps, we have carried out a systematic survey for dark clouds all over the sky. In total, we identified 7614 dark clouds, and measured the coordinates, extents, and A_V values for each of them. These cloud parameters are compiled into a new catalog of dark clouds, which was published in a special issue of the Publications of the Astronomical Society of Japan (PASJ) in 2011 January (Dobashi et al. 2011, PASJ, vol.63 SP1, pp.S1-S362). Electronic version of the paper can be found at http://pasj.asj.or.jp/v63/v63s1.html. Please look into the paper for detailed explanations of the data.

After releasing the extinction and color excess maps on our website in 2010, we found that the maps had some problem in the determination of the background. We later corrected this problem by utilizing the Besançn Galaxy Model (Robin et al. 2003, A&A, vol. 409, p. 523) with a great help of Dr. Douglas J. Marshall, for which our extinction and color excess maps have been improved very much. Details of the correction are fully described in a subsequent publication (Dobashi et al. 2013, PASJ, vol.65 No.2, article No. 31).

The atlas and catalog derived from the 2MASS PSC mainly trace relatively dense regions in dark clouds revealing a number of dense cloud cores leading to star formation, while those we derived previously from the optical database Digitized Sky Survey I (DSS, Dobashi et al. 2005, PASJ, vol.57, SP1, pp.S1-S386) are more suited to trace less dense regions and to reveal the global extents of dark clouds. The two datasets are complementary, and all together, they are useful to picture the structures of dark clouds in various density ranges.

(2) Data released on this website

The atlas and catalog of dark clouds based on the 2MASS PSC are released in FITS and text files on this website. We have drawn maps in the atlas at the 1' and 15' grid. Maps drawn at the 15' grid have a constant angular resolution of 1 degree, while those drawn at the 1' grid have a changing angular resolution from 1' to 12' depending on regions in the sky to achieve a constant noise level over a large region. For details, please see our original paper in PASJ.

As summarized in the following tables, we release the maps drawn at the 1' grid in FITS format on this website together with some other related data such as the angular resolutions and noise levels. They can be found at http://darkclouds.u-gakugei.ac.jp/2MASS/all.html. List of the identified clouds is also released in a text file (ascii) which can be found at http://darkclouds.u-gakugei.ac.jp/2MASS/cloud_list.txt.

(3) Policy and Copyright

Copyright of the text and FITS data on this website entirely belongs to Tokyo Gakugei University. However, the data can be used by anyone for astronomical researches and education purposes.

(4) Additional Information and Request to Users

We request users of the data released on this website to refer to our paper "Dobashi et al. 2011, PASJ, Vol.63 SP1, pp.S1-S362" when they use the data for publications (papers or articles). This is important not only for us but also for users, because your referring to the paper would greatly encourage us to find a financial support to maintain

and develop this website. We would very much appreciate your contribution.

We have done our best to guarantee the high quality of the data, but there might be some errors. If you should find an error, please let us know via e-mail (dobashi@u-gakugei.ac.jp), so that we can revise the data immediately.

(5) Contact Address

If you have a question, suggestion, or request about the data, please send an e-mail to me Kazuhito DOBASHI (dobashi@u-gakugei.ac.jp).

(6) Acknowledgement

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FITS data on this website
(http://darkclouds.u-gakugei.ac.jp/2MASS/all.html)

No.	Data	Unit	Explanation
1	Core Map	mag	Extinction map of A_V derived from E(J-H) and A_J map. Extended dust components are removed in this map, so that one can easily find dense regions in dark clouds (i.e., dense cores). See Section 7 of Dobashi (2011).
2	1 sigma noise	mag	1 sigma noise level map of the Core Map.
3	Core Number	-	Numbers (from 1 to 7614) for clouds identified in the Core Map. See Section 7 of Dobashi (2011).
4	Mask	-	A value 1 or 0 is given. 1 is for the region where we used the A_J map to compose the Core Map, and 0 is for the region where we used the E(J-H) map. See Figs. 30 and 31d of Dobashi (2011).
5	Radius	arcmin	Radius R to include a constant number of stars (N~21) to measure the color excess and extinction. 2R gives the common angular resolution of all of the color excess and extinction maps. See Fig.5 of Dobashi (2011).
6	A_J	mag	Extinction map of A_J. See Equations (9)-(13) of Dobashi (2011).
7	1 sigma noise of A_J	mag	1 sigma noise level of the A_J map. See Section 6.1 of Dobashi (2011).
8	Number of stars in the A_J map	-	Number of stars used to produce the A_J map.
9	J-band star density	arcmin^-2	Star density map used to produce the A_J map. See Fig.14a of Dobashi (2011).
10	A_H	mag	Extinction map of A_H. See Equations (9)-(13) of Dobashi (2011).
11	1 sigma noise of A_H	mag	1 sigma noise level of the A_H map. See Section 6.1 of Dobashi (2011).
12	Number of stars in the A_H map	-	Number of stars used to produce the A_H map.
13	H-band star	arcmin^-2	Star density map used to produce the A_H map. See Fig.14b of Dobashi

	density		(2011).
14	A_K	mag	Extinction map of A_K. See Equations (9)-(13) of Dobashi (2011).
15	1 sigma noise of A_K	mag	1 sigma noise level of the A_K map. See Section 6.1 of Dobashi (2011).
16	Number of stars in the A_K map	-	Number of stars used to produce the A_K map.
17	K-band star density	arcmin^-2	Star density map used to produce the A_K map. See Fig.14c of Dobashi (2011).
18	E(J-H) at X-95%	mag	Color excess map of E(J-H) measured in the (X, 95) % range. See Equation (4) of Dobashi (2011).
19	1 sigma noise of E(J-H)	mag	1 sigma noise level of the E(J-H) map in the (X, 95) % range. See Section 6.1 of Dobashi (2011).
20	Number of stars used in the E(J-H)	-	Number of stars used to produce the E(J-H) map in the (X, 95) % range.
21	J-H at X-95%	mag	Star color of J-H used to produce the E(J-H) map in the (X, 95) % range. See Equation (2) of Dobashi (2011).
22	E(J-H) at X %	mag	Color excess map of E(J-H) measured at X %. See Equation (3) of Dobashi (2011).
23	1 sigma noise of E(J-H)	mag	1 sigma noise level of the E(J-H) map at X %. See Section 6.1 of Dobashi (2011).
24	J-H at X %	mag	Star color of J-H used to produce the E(J-H) map at X %. See Equation (1) of Dobashi (2011).
25	E(H-K) at X-95%	mag	Color excess map of E(H-K) measured in the (X, 95) % range. See Equation (4) of Dobashi (2011).
26	1 sigma noise of E(H-K)	mag	1 sigma noise level of the E(H-K) map in the (X, 95) % range. See Section 6.1 of Dobashi (2011).
27	Number of stars used in the E(H-K)	-	Number of stars used to produce the E(H-K) map in the (X, 95) % range.
28	H-K at X-95%	mag	Star color of H-K used to produce the E(H-K) map in the (X, 95) % range. See Equation (2) of Dobashi (2011).
29	E(H-K) at X %	mag	Color excess map of E(H-K) measured at X %. See Equation (3) of Dobashi (2011).
30	1 sigma noise of E(H-K)	mag	1 sigma noise level of the E(H-K) map at X %. See Section 6.1 of Dobashi (2011).
31	H-K at X %	mag	Star color of H-K used to produce the E(H-K) map at X %. See Equation (1) of Dobashi (2011).
Note. "X" in the above No. 18-31 changes from X=5 % to 90 % with a step of 5%.			

Byte-by-Byte description of the catalog of the dark clouds
(http://darkclouds.u-gakugei.ac.jp/2MASS/cloud_list.txt)

Byte	Format	Unit	Label	Explanation
2-5	I4	-	-	Sequential number for cloud name (from 1 to 7614).
7-9	I3	deg	GLONd	Galactic longitude (degrees) of the clouds.
12-13	I2	min	GLONm	Galactic longitude (minutes) of the clouds.
16	A1	-	GLAT-	Galactic latitude (sign) of the clouds.
20-21	I2	deg	GLATd	Galactic latitude (degrees) of the clouds.
24-25	I2	min	GLATm	Galactic latitude (minutes) of the clouds.
28-34	F7.2	arcmin^2		Surface Surface area of the clouds in square arcmin.
36-40	F5.2	mag	Av	Peak Av value of the clouds in the core map.
43-46	F4.2	mag	dAv	1 sigma noise level of the peak Av.
52-59	F8.2	mag arcmin^2	SAvds	Extinction integrated over the cloud surface.
69-72	F4.2	mag arcmin^2	dSAvds	1 sigma noise level of the extinction integrated over the cloud surface.
77	A1	-	Rank	Rank of reliability in detection (from A to C, see below).
79-85	A7	-	Flag	Flag (from 0 to 8, see below).
87-92	A7	-	TGU	Counterpart in the TGUH catalog, i.e., the number of clouds in Table 7 of Dobashi et al. (2005, PASJ, vol.57, SP1, S1-S386).

Note on Rank (A-C):

A = Clouds having a counterpart in one or more other database, ensuring that the cloud is real. There are 7350 clouds classified Rank A.

B = Clouds falling in the outskirts of the distribution of dense gas or dust found in other database, and their counterpart cannot be identified clearly. There are 210 clouds classified Rank B, and some of them might be fake.

C = Clouds heavily affected by bright stars in the vicinity, and cloud parameters such as A_V cannot be measured reliably. There are 54 clouds classified Rank C, and some of them might be fake.

Note on Flag (0-8):

0 = Clouds originating from the E(J-H) map. There are 5255 clouds assigned this flag.

1 = Clouds originating from the A_J map. There are 2359 clouds assigned this flag.

2 = Distant clouds appearing as a hole in the E(J-H) map, but as a bump in the A_J map (see subsection 6.6 of Dobashi 2011). There are 747 clouds assigned this flag.

3 = Clouds possibly contaminated by IR clusters appearing as a hole in the A_J map, but as a bump in the E(J-H) map (subsection 6.4). There are 543 clouds assigned this flag.

4 = Clouds found in the vicinity of bright stars in the SAO catalog (=< 6 mag), which may affect our estimate of A_V. There are 15 clouds assigned this flag.

5 = Clouds found in the vicinity of bright stars in the 2MASS PSC (=<5 mag either in J, H, or K bands), which may affect our estimates of A_V . There are 40 clouds assigned this flag.

6 = Clouds found within the radii of globular clusters cataloged by Monella (1985), which may affect our estimates of A_V. There is only 1 cloud assigned this flag.

7 = Clouds found in the radii of open clusters cataloged by Dias et al. (2002), which may affect our estimates of Av . There are 48 clouds assigned this flag.

8 = Clouds in M31 and M33 (subsection 6.7). There are 15 clouds assigned this flag.