“Diamond Dust” of a Unusual Crystal Form

by

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Abstract

The author observed “Diamond Dust” or ice crystals in the air of a unusual crystal form at Hailar ($49^{\circ}13'N$, $119^{\circ}44'E$, 619m height). Some microphotographs of these crystal forms are shown in Figures 1, 2,..... and 15.

In previous papers the author described the usual crystal forms of “Diamond Dust” to be hexagonal twin prism, hexagonal plate and long hexagonal prism or needle-like type. Of these the most usual is the hexagonal twin prism type. And in general most faces of these crystals are etched with a skeleton-type figures.

However some unusual forms of “Diamond Dust” were observed at Hailar ($49^{\circ}13'N$, $119^{\circ}44'E$, 619m height) from 11h 45m to 13h 40m on January 23, 1944. On this day from down to eleven o'clock the usual hexagonal twin prism type “Diamond Dusts” had been observed. The weather was clear and calm. From 11h 45m the crystal form of “Diamond Dust” changed suddenly to a unusual crystal form. These “Diamond Dusts” were collected on a slide glass plate, and were photographed under an optical microscope as shown in Figs. 1, 2,..... and 15. At that time the surface air temperature was about $-29^{\circ}C$ and the temperature at 1,000m height above the earth's surface was about $-16^{\circ}C$. Then an extraordinary inversion of air temperature was observed near the surface.

In these figures, we see that the size of these crystals is about 50 microns. The crystal forms are not amorphous but are constructed with distinct crystal faces. Fundamental ice crystal form is hexagonal prism as shown in Fig. 16, which have two base surfaces and six prismatic planes. In this figure A is (0001), B is (10 $\bar{1}$ 0), C is (01 $\bar{1}$ 0), D is (1 $\bar{1}$ 00), etc.

However some ice crystals have pyramidal crystal planes as (1 $\bar{1}$ 01), (11 $\bar{2}$ 2), (10 $\bar{1}$ 1), (11 $\bar{2}$ 1) or of still higher order. It is to be considered that the unusual “Diamond Dusts” are constructed with some fundamental crystal planes and a higher-order plane which is shown in half-tone in Fig. 17.

Further it is apparent that each crystal plane is etched with some skeleton-typed figures as shown in Figs. 1, 2,..... and 15.

Similar figures on ice crystals are studied by HIGUCHI and MUGURUMA (1956) in etch pits figures, and small unusual ice crystals on a coated glass plate with silicone substance were observed by KOBAYASHI (1956). But no further detail on these unusual “Diamond Dusts” can be offered.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 9

Fig. 10

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16. Fundamental ice crystal form.
Hexagonal prism.
cc: Principal axis.
 a_1, a_2, a_3 ; Side axes.
A: Base plane.
B, C, D: Prismatic planes.

Fig. 17. Unusual ice crystals.
Half-tone: Higher order
Pyramidal planes.

References

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ダイヤモンド・ダストの奇形

伊 東 彊 自

ダイヤモンド・ダストは通常六方柱双晶の形をもっているが、1944年1月23日に海拉爾でたまたま将棋の駒状のものを観察し、顕微鏡写真に撮った。結晶形は比較的是つきりしており、形の上から基本形の六方柱を形成するいくつかの面とひとつのピラミッド面とで構成されているのがわかる。なお結晶面は骸晶としての図形を見せている。