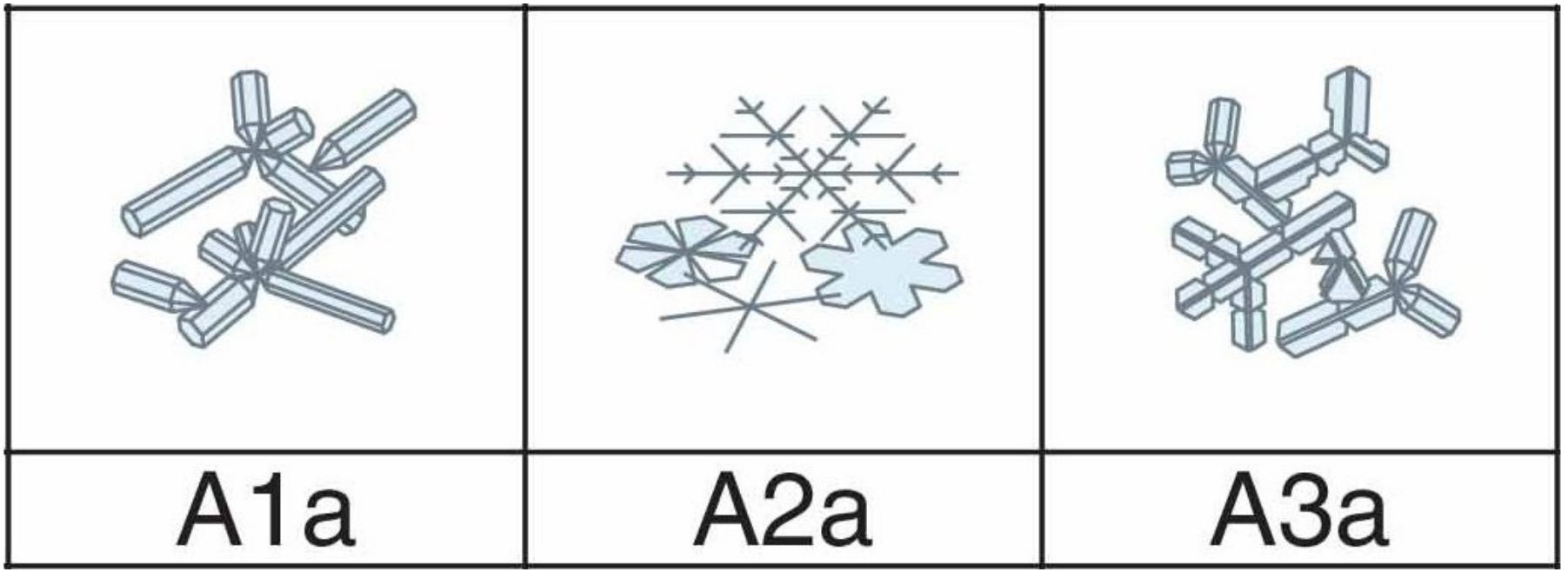
What are the different snow shapes?

4) Aggregate forms (snowflakes)

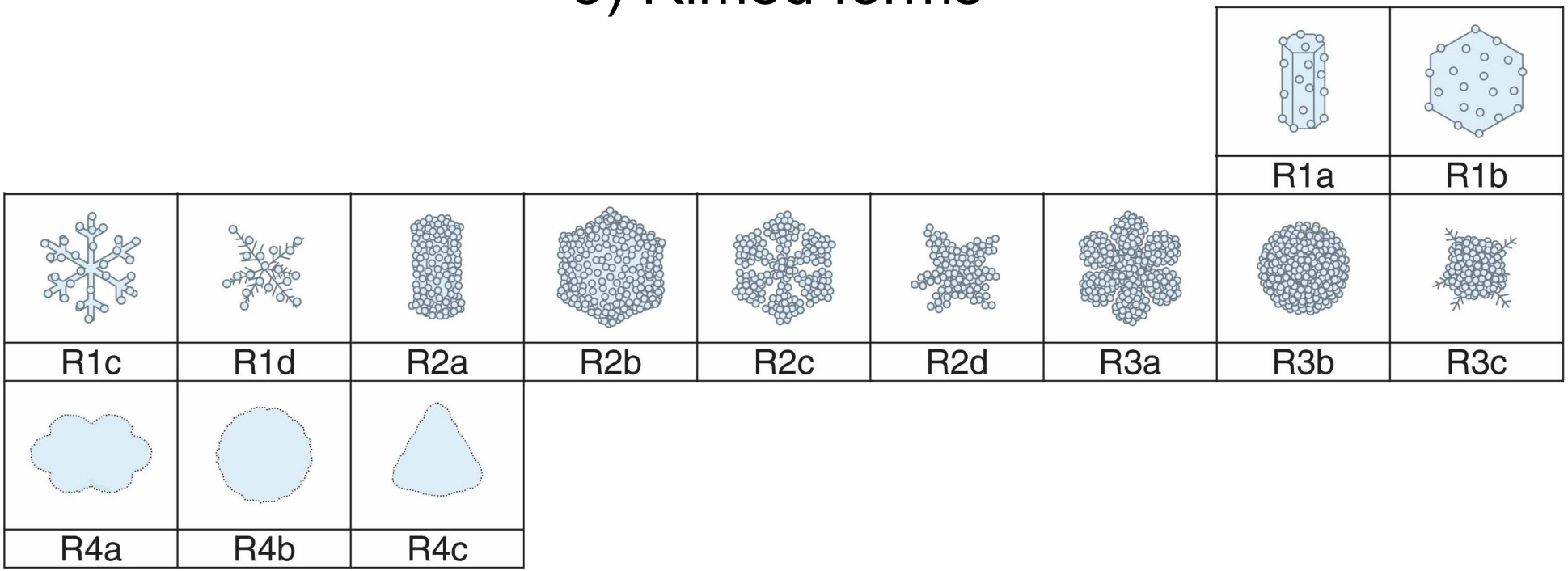


Notes: The most common types in all but the coldest, driest snowfall regions. These are the "snowflakes", which form when single crystals collide and stick. The sticking together is most likely above about -12 C.

From Kikuchi, Kameda, Higuchi, and Yamashita, 2013

What are the different snow shapes?

5) Rimed forms



Notes: These are very common in wetter-snow regions. Riming is when the crystal hits some of the droplets on the way down. The droplets freeze on contact, making little bumps on the crystal. The resulting crystals look very white and thick if they have a lot of riming. R4 types are called graupel.

From Kikuchi, Kameda, Higuchi, and Yamashita, 2013

What are the different snow shapes?

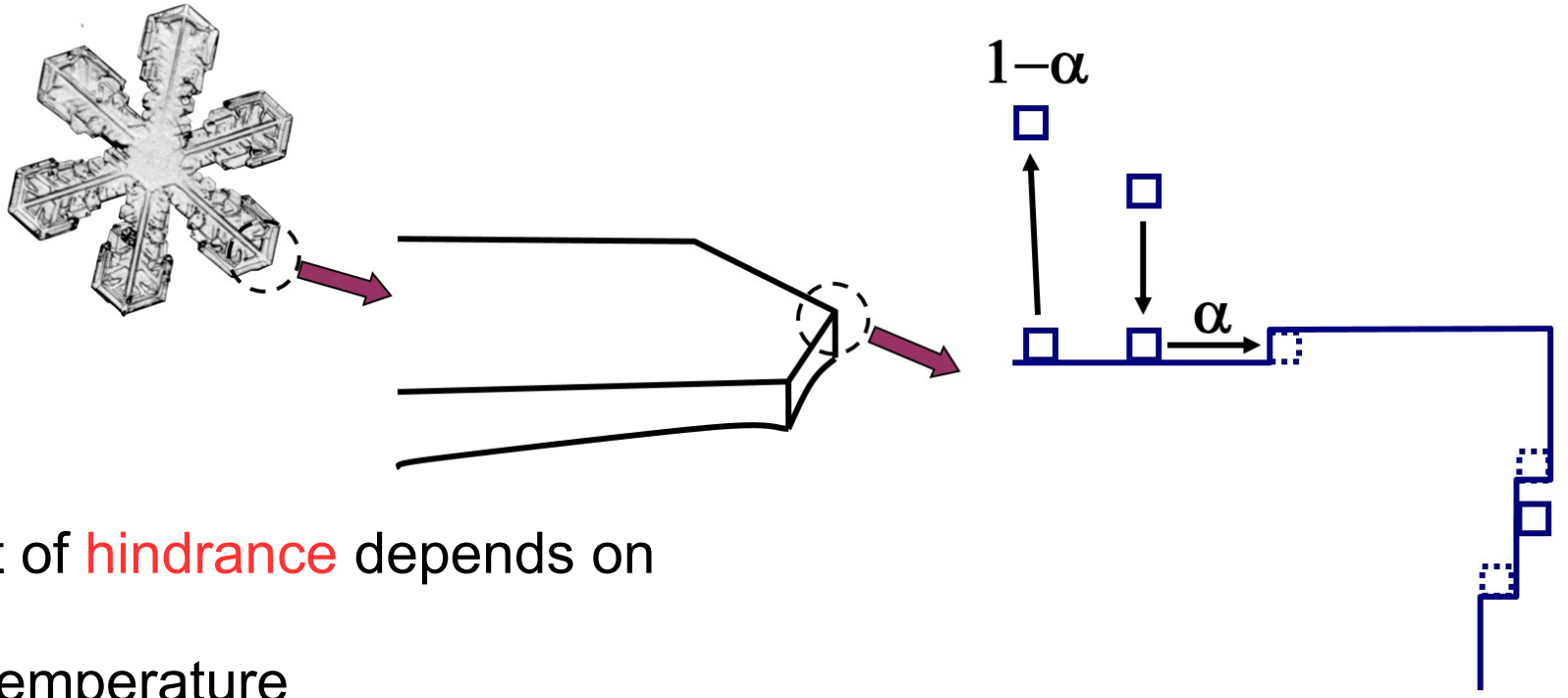
6) Germ and Irregular forms

Notes: Very small crystal forms.

From Kikuchi, Kameda, Higuchi, and Yamashita, 2013

Why do they form different shapes?

Flat crystal faces **reject** some water molecules: Growth is **hindered**.



Amount of hindrance depends on

1) Temperature

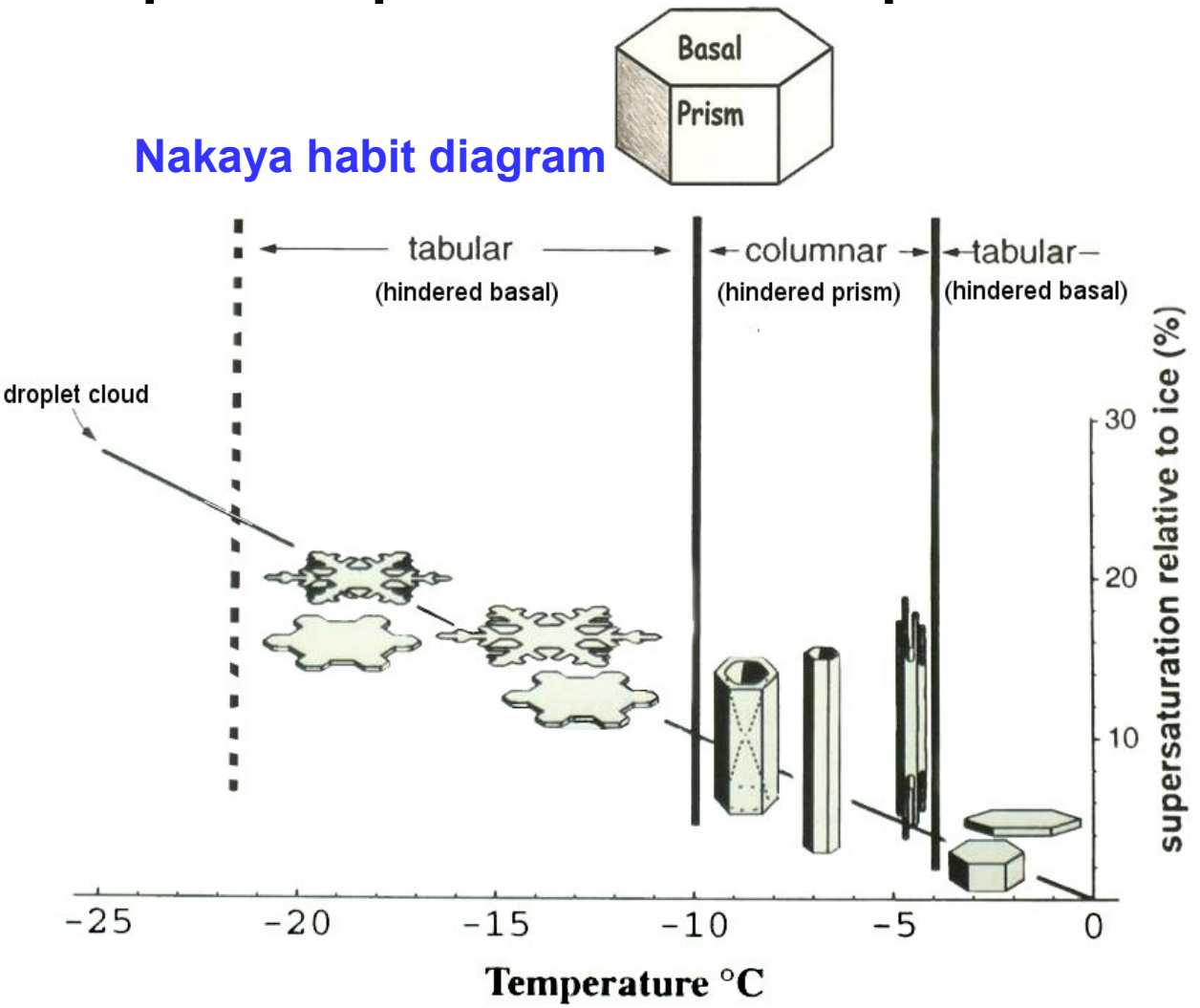
2) Vapor density

3) Face type

Notes: The little squares represent water molecules striking the crystal surface, with some bonding into the "step edges" and some leaving. Here α is the fraction that bond.

How does shape depend on temperature?

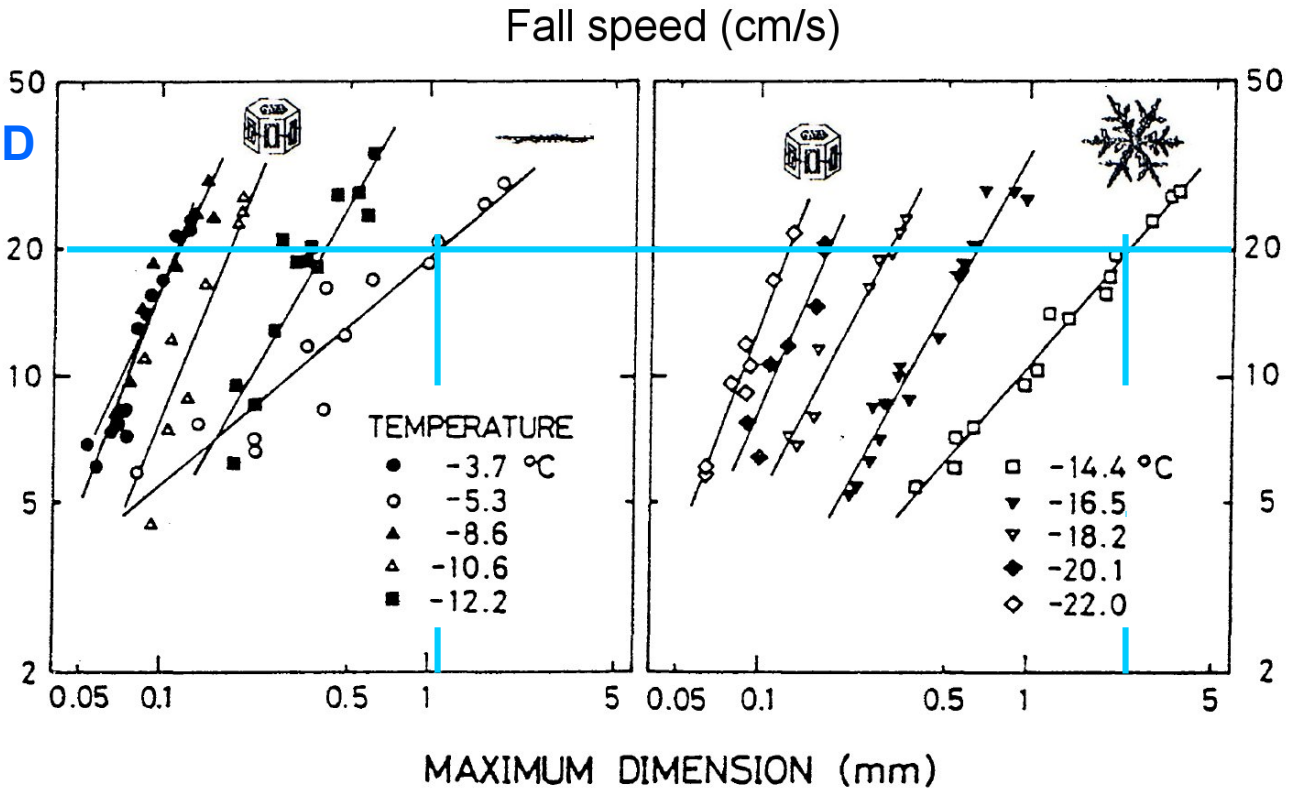
Nakaya habit diagram



Notes: The line marked "droplet cloud" means crystals growing with a lot of water droplets around. These are the ones that tend to reach the ground with significant size. Below the line, the shapes (or "habits") are less exaggerated, that is, more nearly equidimensional, and also more variable. At lower temperatures there is less consensus on the shapes, and there may simply be more variety in basic form for a given condition (unlike the cases along the line above -22 C).

Why are dendrites & needles so common?

FALL SPEED



In air, they fall the **slowest**.

Notes: The crystals that are largest upon reaching the ground, and thus the most noticed, are the needles and dendrites. Why are they so large? Is it because they grow faster? No, it is not, though their fast growth is a factor. The main reason that these are so large at the ground is that they fall the slowest for a given maximum dimension. The needles tend to fall broad-side (as shown), as do the dendrites. The dendrites fall like they are an open parachute. Because they fall slow, they linger and gain greater size in the cloud.

Formless vapor transforms to so many snow-crystal forms because of

1) Dust

2) Air

3) Droplets

4) Growth hindrance of different faces

The END

Have fun with the Snow School