Nacreous Clouds

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The sun was setting as this nacreous cloud glowed with electric colours over Nc England on January 29th 2000. It was likely 15-25 km high, far above the appa close by creamy coloured cirrus cloud. *Photos © Les Cowley.*

Nearly half an hour later the high nacreous clouds were still in sunlight.

These rare clouds are sometimes called **mother-of-pearl clouds** or **Type II Polar Str Clouds**. They are 15 - 25 km high in the stratosphere, far above our ordinary troposp They are much higher and more rare than ordinary iridescent clouds

Nacreous clouds are most often seen in winter at high latitudes, Scandinavia, Alaska, Canada.

They are visible for up to two hours after sunset or before dawn when they remain brig in the sunlit stratosphere. Their unbelievably bright and pure iridescent colours and slc relative to any lower clouds make them an unmistakable and unforgettable sight.

Nacreous clouds often form when there are very high surface winds, particularly down ranges. The turbulence carries water vapour across the tropopause barrier up into the where at minus 85ºC it forms ice particles 10 µm or so across.

The clouds must be composed of similar sized crystals to produce the characteristic b colours by diffraction and interference.

Polar Stratospheric Clouds (PSCs)

Type II
Nacreous clouds as described above and composed of ice crystals with tempe of ~minus 85ºC.

Type I
Less spectacular than nacreous clouds, more diffuse and less bright colours. Sometimes nacreous clouds are embedded in them. Type I clouds are slightly warmer (~ minus 78ºC) than Type II and are composed of exotic solids or liqui droplets.

Type Ia
Crystalline compounds of water and nitric acid - especially NAT, nitric a trihydrate $HNO_3.3H_2O$

Type Ib
Small spherical droplets of a solution of nitric and sulphuric acids.

Type Ic
Small non spherical particles of a metastable nitric acid - water phase

PSCs were long regarded as curiosities and of no real consequence. However, Type I known to play an important role in the harmful destruction of stratospheric ozone over Arctic. Their surfaces act as catalysts which convert more benign forms of manmade active free radicals (for example ClO, chlorine monoxide). During the return of Spring s destroy many ozone molecules in a series of chain reactions. Cloud formation is doub because it also removes gaseous nitric acid from the stratosphere which would otherw ClO to form less reactive forms of chlorine.