
Credit: Kevin Cho

1
00:00:01,530 --> 00:00:05,820
A balloon mission from NASA observed rare electric blue clouds.

2
00:00:05,840 --> 00:00:10,220
These are polar mesospheric clouds, or PMCs.

3
00:00:10,240 --> 00:00:12,380
They are only visible during twilight

4
00:00:12,400 --> 00:00:17,210
and form above Earth’s polar regions at the upper reaches of the atmosphere.

5
00:00:17,230 --> 00:00:20,550
As Earth’s uppermost clouds at around 50 miles high,

6
00:00:20,570 --> 00:00:27,170
PMCs are composed of ice crystals that glow a bright blue or white when reflecting sunlight.

7
00:00:27,190 --> 00:00:32,670
They are extremely sensitive to environmental factors like water vapor and temperature.

8
00:00:32,690 --> 00:00:36,350
Atmospheric motions like airflow over mountains or thunderstorms

9
00:00:36,370 --> 00:00:42,130
can disturb the atmosphere and cause waves that can propagate to very high altitudes.

10
00:00:42,150 --> 00:00:44,730
These waves are known as gravity waves

11
00:00:44,750 --> 00:00:50,360
and although they are invisible, they can be seen as they move through PMCs.

12
00:00:50,380 --> 00:00:52,480
Gravity waves lead to turbulence

13
00:00:52,500 --> 00:00:54,250

- chaotic movement in the atmosphere

14
00:00:54,270 --> 00:00:58,090
that can influence weather and climate, and their predictions.

15
00:00:58,110 --> 00:01:02,830
But the exact causes and effects of turbulence are not well understood.

16
00:01:02,850 --> 00:01:04,630
To better understand this complex process,

17
00:01:04,650 --> 00:01:12,010
scientists sent a giant balloon to observe gravity waves in PMCs.

18
00:01:12,030 --> 00:01:14,650
See you in Canada.

19
00:01:14,670 --> 00:01:17,120
The crewless balloon traveled to 50 miles high

20
00:01:17,140 --> 00:01:22,360
and floated from Sweden to Canada over 5 days, in July 2018.

21
00:01:22,380 --> 00:01:25,820
A laser radar on the balloon measured the PMC altitudes

22
00:01:25,840 --> 00:01:29,790
and the atmospheric temperature that affects their formation and brightness.

23
00:01:29,810 --> 00:01:33,480
And from six million camera images captured from the balloon,

24
00:01:33,500 --> 00:01:38,610
scientists could see both large and small ripples caused by gravity waves.

25
00:01:38,630 --> 00:01:42,980
A better understanding of turbulence can help improve weather forecast models