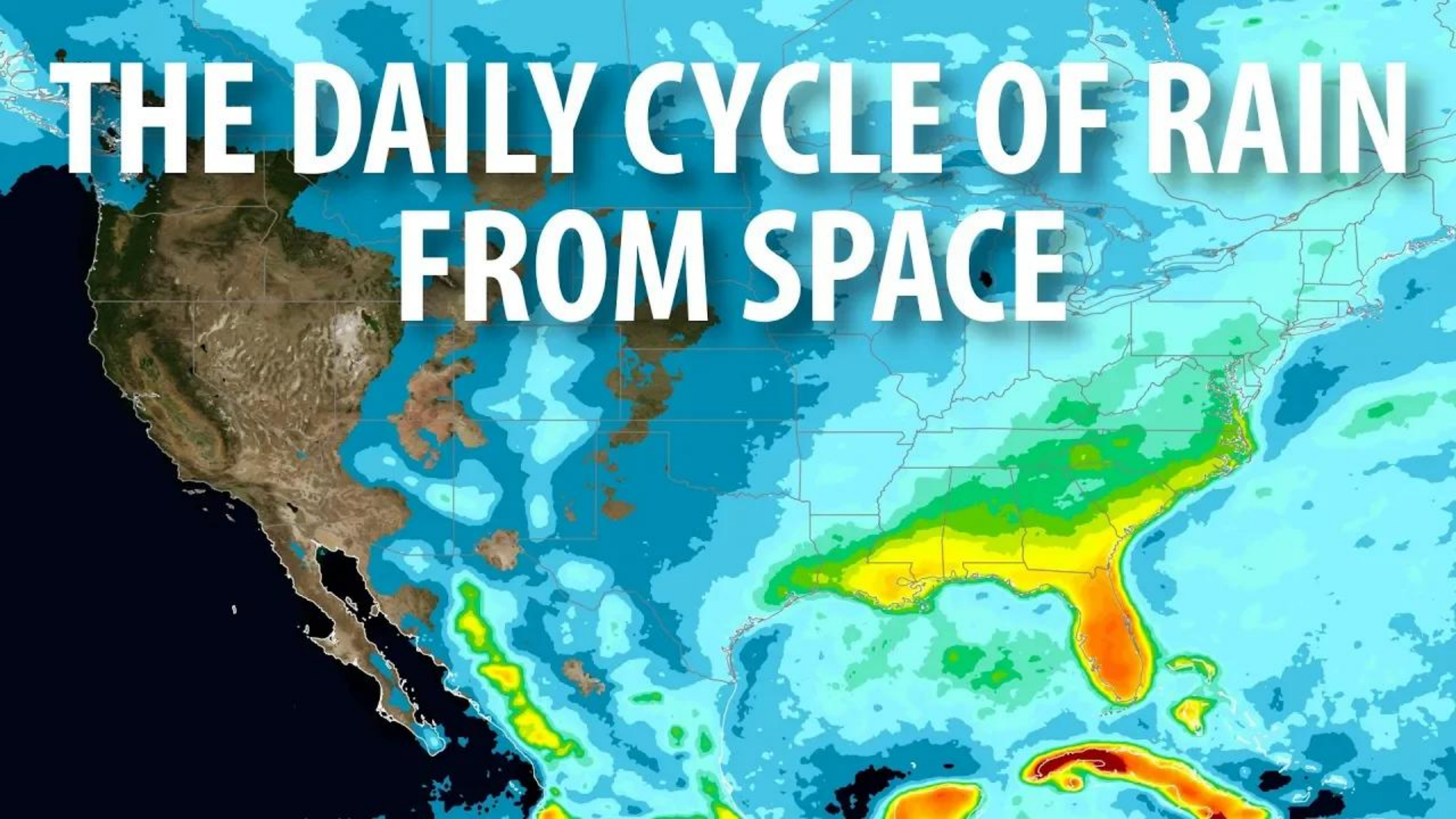
THE DAILY CYCLE OF RAIN
FROM SPACE

1
00:00:00,000 --> 00:00:03,940
Our lives are in sync with Earth's rotation.

2
00:00:03,940 --> 00:00:06,400
As our planet rotates on its axis,

3
00:00:06,400 --> 00:00:09,960
we shift from day to night and warm to cool.\h

4
00:00:09,960 --> 00:00:14,440
As a response, our weather follows a daily cycle.

5
00:00:14,440 --> 00:00:18,080
Now, the most detailed view of our daily weather has been created

6
00:00:18,080 --> 00:00:23,340
using a new NASA record that combines almost 20 years of rain and snow.

7
00:00:23,340 --> 00:00:26,440
By combining these two satellites,

8
00:00:26,440 --> 00:00:32,850
scientists calculated the changes in precipitation every 30 minutes for two decades.

9
00:00:32,850 --> 00:00:36,990
This is part of NASA's newest extended precipitation record

10
00:00:36,990 --> 00:00:43,410
known as the Integrated Multi-satellitE Retrievals for GPM, or IMERG analysis.

11
00:00:43,410 --> 00:00:44,860
From the vantage of space,

12
00:00:44,860 --> 00:00:50,080
IMERG shows the 24-hour pulse in weather known as the diurnal cycle.

13
00:00:50,080 --> 00:00:54,120

This cycle helps shape how and when our weather develops

14
00:00:54,120 --> 00:00:57,450
and is fundamental to regulating our climate.

15
00:00:57,450 --> 00:01:03,190
In the case of precipitation, one of the main questions is — the different main modes of variability.

16
00:01:03,190 --> 00:01:06,560
One main mode of variability is the seasonal variation.

17
00:01:06,560 --> 00:01:11,750
But on a much shorter time scale, the main mode of variability is the so-called diurnal cycle.

18
00:01:11,750 --> 00:01:14,830
That is the variation in precipitation over the day.

19
00:01:14,830 --> 00:01:18,690
IMERG not only shows us how much the rainfall shifts,

20
00:01:18,690 --> 00:01:21,640
it tells us what time it shifts and peaks.

21
00:01:21,640 --> 00:01:25,090
Over the U.S. we see a variety of patterns.

22
00:01:25,090 --> 00:01:33,130
This shows the average amount of rainfall every 30 minutes during the summer months of June, July, and Aug

23
00:01:33,130 --> 00:01:37,300
In Florida, heat from the Sun builds up over the course of the day,

24
00:01:37,300 --> 00:01:39,410
driving rainfall over land.

25
00:01:39,410 --> 00:01:42,830
Sea breezes from the Gulf of Mexico and Atlantic Ocean

26
00:01:42,830 --> 00:01:47,300
feed the storms over land driving storms to peak in the afternoon.

27
00:01:47,300 --> 00:01:50,560
At night, rainfall moves over the ocean.

28
00:01:50,560 --> 00:01:55,430
Storms intensify offshore only to move inland during the day again.

29
00:01:55,430 --> 00:01:58,990
Over the midwest and the Great Plains,

30
00:01:58,990 --> 00:02:03,490
heating over the Rocky mountains forms storm systems during the day,

31
00:02:03,490 --> 00:02:05,770
which then roll eastward overnight.

32
00:02:05,770 --> 00:02:11,840
In the U.S. Northeast, heating over land causes rainfall during the day

33
00:02:11,840 --> 00:02:14,400
that moves over the ocean at night,

34
00:02:14,400 --> 00:02:17,590
because the water doesn’t cool down as quickly as over land.

35
00:02:17,590 --> 00:02:21,670
Due to this, you can clearly see the warm Gulf Stream water

36
00:02:21,670 --> 00:02:25,030
moving past the East Coast, on its way to the North Atlantic.\h

37
00:02:25,030 --> 00:02:29,690
During the winter months of December, January, and February along the West Coast,

38
00:02:29,690 --> 00:02:32,750

the daily patterns of rainfall every 30 minutes

39
00:02:32,750 --> 00:02:38,280
how how the coastal regions generally receive similar amounts of precipitation throughout the day.

40
00:02:38,280 --> 00:02:43,320
In the winter, precipitation is driven less from the daily heating of the Sun

41
00:02:43,320 --> 00:02:47,140
and more from the Pacific Ocean bringing in atmospheric rivers —

42
00:02:47,140 --> 00:02:51,040
corridors of intense water vapor in the atmosphere.

43
00:02:51,040 --> 00:02:54,210
By studying the diurnal variation,

44
00:02:54,210 --> 00:02:57,810
this gives us basic scientific understanding of what the atmosphere is doing,\h

45
00:02:57,810 --> 00:03:03,000
and it prepares us to look at models and understand what the relationship is

46
00:03:03,000 --> 00:03:06,790
between rainfall and these other variables, like air quality.

47
00:03:06,790 --> 00:03:11,180
Current climate models have difficulty accounting for the diurnal cycle,

48
00:03:11,180 --> 00:03:15,140
but the improved detail in IMERG could help fill in the gaps