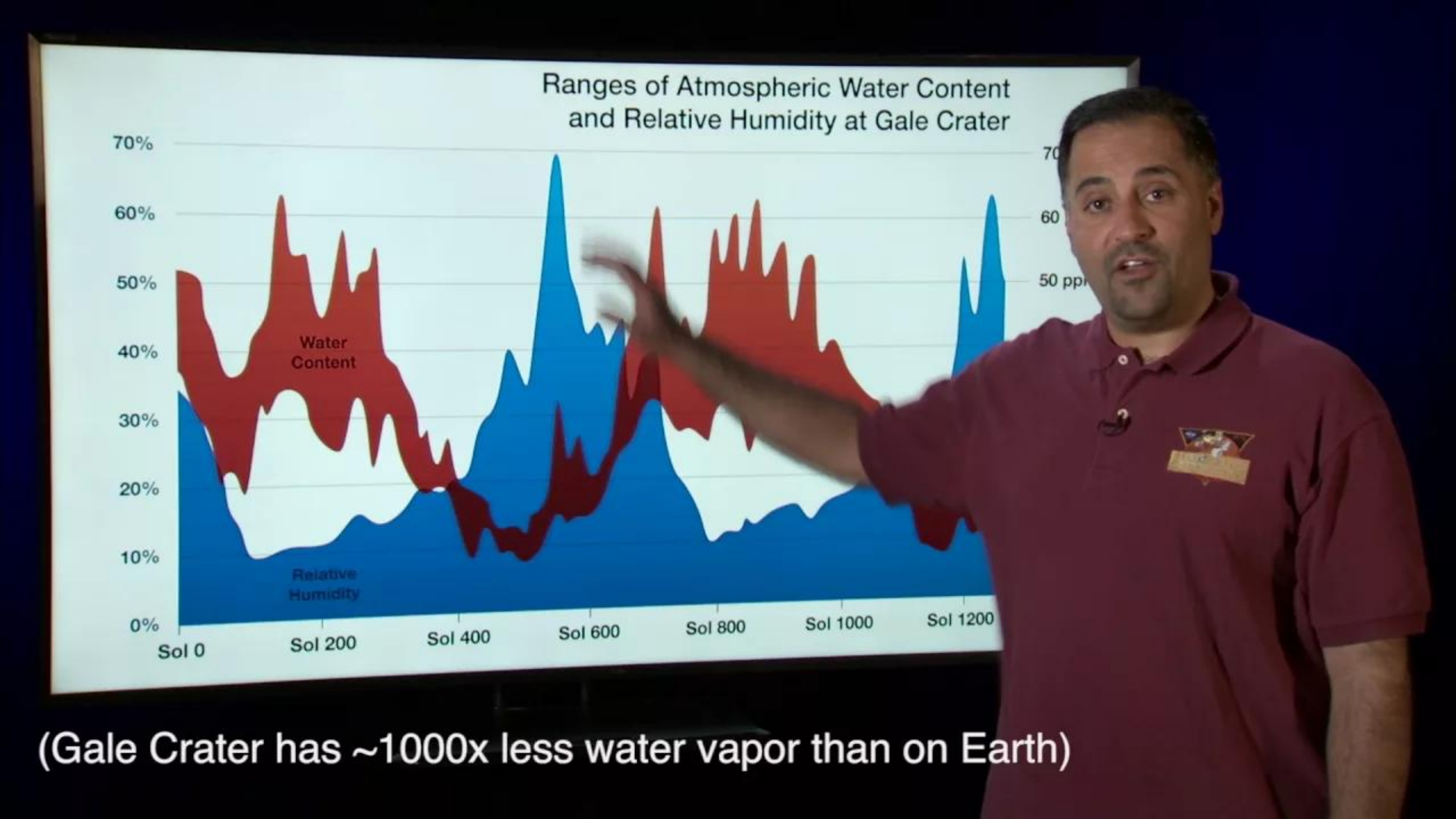
Ranges of Atmospheric Water Content
and Relative Humidity at Gale Crater
70%
60%
50%
40%
30%
20%
10%
0%
Water
Content
Relative
Humidity
Sol 0
Sol 200
Sol 400
Sol 600
Sol 800
Sol 1000
Sol 1200
(Gale Crater has ~1000x less water vapor than on Earth)

1
00:00:00,000 --> 00:00:05,000
(Music)

2
00:00:05,000 --> 00:00:09,000
I'm Ashwin Vasavada, Project Scientist of the Mars Science Laboratory,

3
00:00:09,000 --> 00:00:12,000
and this is your Curiosity Rover Report.

4
00:00:12,000 --> 00:00:16,000
Curiosity has completed its second Mars year since landing at Gale Crater.

5
00:00:16,000 --> 00:00:17,000
(Sound effect)

6
00:00:17,000 --> 00:00:22,000
I know what you're thinking. Didn't Curiosity land four years ago in August 2012?

7
00:00:22,000 --> 00:00:25,000
Well, those were Earth years. Since Mars is farther from the sun,

8
00:00:25,000 --> 00:00:32,000
it takes nearly twice as long to make one circle around the sun. Each Mars year lasts 687 Earth days.

9
00:00:32,000 --> 00:00:37,000
Even though Curiosity may be better known for driving around and drilling into rocks,

10
00:00:37,000 --> 00:00:43,000
it has quietly been compiling a comprehensive almanac of the Martian weather for two full seasonal cycles.

11
00:00:43,000 --> 00:00:48,000
Scientists can figure out which events occur year after year and which ones are unique.

12
00:00:48,000 --> 00:00:50,000
Mars has seasons, just like Earth.

13
00:00:50,000 --> 00:00:55,000

The similar tilts of Earth and Mars give both planets a yearly rhythm of seasons:

14
00:00:55,000 --> 00:01:00,000
spring, summer, fall, and winter. But there are some big differences.

15
00:01:00,000 --> 00:01:03,000
Temperatures in Los Angeles are pretty warm all year long and they don't vary much

16
00:01:03,000 --> 00:01:06,000
between daytime and night time.

17
00:01:06,000 --> 00:01:10,000
But Mars is much farther from the sun and has a very thin atmosphere,

18
00:01:10,000 --> 00:01:13,000
so temperatures at Gale Crater are really cold.

19
00:01:13,000 --> 00:01:17,000
In the middle of summer, they're almost bearable for us human beings.

20
00:01:17,000 --> 00:01:24,000
But in the middle of winter and at night they reach -130 degrees Fahrenheit or -90 Celsius.

21
00:01:24,000 --> 00:01:29,000
Curiosity has measured water content and relative humidity over the Martian seasons.

22
00:01:29,000 --> 00:01:32,000
Even with its tiny amount of water, if temperatures get cold enough,

23
00:01:32,000 --> 00:01:37,000
the relative humidity goes up and you can get clouds in the sky and frost on the ground.

24
00:01:37,000 --> 00:01:42,000
In the middle of winter and at night, relative humidities can reach as high as 70%,

25
00:01:42,000 --> 00:01:46,000
but so far Curiosity has not detected any frost.

26
00:01:46,000 --> 00:01:49,000
Curiosity's long seasonal record also has given scientists

27
00:01:49,000 --> 00:01:52,000
some new clues to understanding methane in the Martian atmosphere.

28
00:01:52,000 --> 00:01:56,000
Curiosity saw a large spike in methane during its first year on Mars.

29
00:01:56,000 --> 00:01:59,000
It didn't repeat the next year, so we can rule out a seasonal cause.

30
00:01:59,000 --> 00:02:04,000
But there is a lower, background level of methane that does seem to vary with the seasons.

31
00:02:04,000 --> 00:02:06,000
Methane may be produced by microbes,

32
00:02:06,000 --> 00:02:09,000
but it may also be produced by a number of non-biological processes.

33
00:02:09,000 --> 00:02:13,000
Other seasonal patterns have now become apparent, as well.

34
00:02:13,000 --> 00:02:16,000
For example, spring and summer at Gale Crater are dusty.

35
00:02:16,000 --> 00:02:20,000
But in the fall and winter, the air gets remarkably clear.

36
00:02:20,000 --> 00:02:24,000
It's been a great two Martian years and we're looking forward to a third.