1
00:00:00,180 --> 00:00:04,190
[rain, thunder]

2
00:00:04,210 --> 00:00:08,220
[thunder, music]

3
00:00:08,240 --> 00:00:12,250
[bugs buzzing]
If we measure the Earth from the ground, we

4
00:00:12,270 --> 00:00:16,280
can a get a good local picture of what is going around us.

5
00:00:16,300 --> 00:00:20,330
But if we want to measure larger portions of the Earth, then we'll need to use

6
00:00:20,350 --> 00:00:24,360
remote sensing. Remote

7
00:00:24,380 --> 00:00:28,400
sensing measures the Earth and its features without making physical contact.

8
00:00:28,420 --> 00:00:32,430
We can gather data from entire continents over longer time

9
00:00:32,450 --> 00:00:36,460
periods so we can look at how the Earth is changing.

10
00:00:36,480 --> 00:00:40,540
NASA uses specialized aircraft and sophisticated satellites to gather

11
00:00:40,560 --> 00:00:44,580
data using both passive and active remote sensing methods.

12
00:00:44,600 --> 00:00:48,700
Passive remote sensing measures the natural energy, or radiation, of the

13

00:00:48,720 --> 00:00:52,810
Earth. Active remote sensing gathers data by actively sending

14
00:00:52,830 --> 00:00:56,870
out signals that interact with the target of interest.

15
00:00:56,890 --> 00:01:00,900
Using both active and passive remote sensing techniques, NASA can look at

16
00:01:00,920 --> 00:01:04,960
soil moisture maps to monitor drought, estimate

17
00:01:04,980 --> 00:01:09,030
snowpack in areas where snow is crucial for freshwater,

18
00:01:09,050 --> 00:01:13,090
measure the change in ice sheets and sea level, tracking

19
00:01:13,110 --> 00:01:17,140
storms that could impact human lives, and observing how

20
00:01:17,160 --> 00:01:21,200
precipitation changes affect where we get our freshwater. The Global

21
00:01:21,220 --> 00:01:25,230
Precipitation Measurement mission helps fill in the gaps where ground measurement

22
00:01:25,250 --> 00:01:29,260
isn't enough. Places with rugged terrain can block the signals from ground

23
00:01:29,280 --> 00:01:33,310
radars. The oceans are too vast to cover with enough

24
00:01:33,330 --> 00:01:37,340
ships and measurement stations on the surface, and places

25
00:01:37,360 --> 00:01:41,390
without the network of instruments needed to measure freshwater for people and agriculture.

26
00:01:41,410 --> 00:01:45,450
We can then unify the measurements to create a consistent and

27
00:01:45,470 --> 00:01:49,510
accurate picture no matter where we are. Because satellites get

28
00:01:49,530 --> 00:01:53,560
more complete coverage than ground-based instruments, we can use remote sensing

29
00:01:53,580 --> 00:01:57,600
to better see how the whole Earth is changing over time.

30
00:01:57,620 --> 00:02:01,720
With a long data record we can make better predictions about the water cycle, the climate,

31
00:02:01,740 --> 00:02:05,830
and the impact on humans.
[wind, thunder, rain]

32
00:02:05,850 --> 00:02:09,900
[wind, debris flying]

33
00:02:09,920 --> 00:02:13,970
[tree splitting, insects swarming]

34
00:02:13,990 --> 00:02:18,020
[debris falling, bubbling, airplanes]

35
00:02:18,040 --> 00:02:22,050
[music]

36
00:02:22,070 --> 00:02:26,100
By observing our Earth from above, we get a much better understanding of what is happening

37
00:02:26,120 --> 00:02:30,160
on the surface, in the atmosphere,

38
00:02:30,180 --> 00:02:34,200
underground, over the globe, and in our own