
L
North Atlantic
Oscillation
EUROPE
H
North Atlantic
Ocean
AFRICA

1
00:00:05,349 --> 00:00:02,950
[Music]

2
00:00:07,510 --> 00:00:05,359
for decades nasa researchers have helped

3
00:00:08,870 --> 00:00:07,520
refine our understanding of hurricanes

4
00:00:10,470 --> 00:00:08,880
and tropical cyclones

5
00:00:12,390 --> 00:00:10,480
[Music]

6
00:00:13,990 --> 00:00:12,400
among their tools are computer models

7
00:00:15,669 --> 00:00:14,000
that can help distinguish the roles

8
00:00:17,510 --> 00:00:15,679
played by sea surface temperature

9
00:00:19,510 --> 00:00:17,520
pressure and wind speed

10
00:00:22,070 --> 00:00:19,520
these model studies show that what makes

11
00:00:26,470 --> 00:00:22,080
a busy or slow atlantic hurricane season

12
00:00:28,470 --> 00:00:26,480
largely relies on three ocean patterns

13
00:00:31,269 --> 00:00:28,480

these three factors contribute to either

14
00:00:34,229 --> 00:00:31,279
a strong or a weak hurricane season each

15
00:00:36,630 --> 00:00:34,239
acting a little like an on off switch

16
00:00:40,069 --> 00:00:36,640
first the el nino southern oscillations

17
00:00:41,910 --> 00:00:40,079
two phases el nino and la nina affect

18
00:00:44,310 --> 00:00:41,920
sea surface temperature in the pacific

19
00:00:45,990 --> 00:00:44,320
ocean which then alters wind strength in

20
00:00:48,310 --> 00:00:46,000
the atlantic

21
00:00:49,990 --> 00:00:48,320
during el nino years pacific sea surface

22
00:00:51,910 --> 00:00:50,000
temperatures near the equator are

23
00:00:53,670 --> 00:00:51,920
generally warmer than average which

24
00:00:55,670 --> 00:00:53,680
drive winds that shear the tops off

25
00:00:56,549 --> 00:00:55,680
hurricanes making it harder for them to

26
00:00:58,630 --> 00:00:56,559
form

27
00:01:00,630 --> 00:00:58,640
cooler pacific water during la nina

28
00:01:02,549 --> 00:01:00,640
years creates more favorable hurricane

29
00:01:04,310 --> 00:01:02,559
wind conditions

30
00:01:07,190 --> 00:01:04,320
the north atlantic oscillations two

31
00:01:08,789 --> 00:01:07,200
phases positive and negative describe

32
00:01:10,710 --> 00:01:08,799
the difference in pressure between two

33
00:01:12,550 --> 00:01:10,720
poles of a pressure system

34
00:01:15,030 --> 00:01:12,560
low pressure near iceland and high

35
00:01:16,310 --> 00:01:15,040
pressure near the azores islands

36
00:01:18,550 --> 00:01:16,320
when the pressure difference between

37
00:01:20,550 --> 00:01:18,560
them is lower than average hurricanes

38
00:01:22,390 --> 00:01:20,560

are more likely to form when the two

39
00:01:24,230 --> 00:01:22,400
pressure systems are more intense than

40
00:01:26,710 --> 00:01:24,240
average wind conditions are not

41
00:01:28,630 --> 00:01:26,720
conducive to hurricane formation

42
00:01:30,550 --> 00:01:28,640
further south the two phases of the

43
00:01:32,789 --> 00:01:30,560
atlantic meridianal mode describe sea

44
00:01:34,789 --> 00:01:32,799
surface temperatures either warmer or

45
00:01:36,630 --> 00:01:34,799
cooler when the area north of the

46
00:01:39,109 --> 00:01:36,640
equator is warmer than average

47
00:01:41,429 --> 00:01:39,119
hurricanes are more likely to form

48
00:01:43,270 --> 00:01:41,439
when the same area is cooler hurricanes

49
00:01:45,670 --> 00:01:43,280
are less likely to form

50
00:01:47,510 --> 00:01:45,680
together these factors can make or break

51
00:01:49,510 --> 00:01:47,520
a strong hurricane season and

52
00:01:51,350 --> 00:01:49,520
understanding how they interact can help

53
00:01:54,310 --> 00:01:51,360
better predict the number and strength

54
00:01:57,030 --> 00:01:54,320
of hurricanes seen throughout the season

55
00:01:59,190 --> 00:01:57,040
for example in 2005 the pacific sea

56
00:02:01,190 --> 00:01:59,200
surface temperatures were average so the

57
00:02:02,310 --> 00:02:01,200
el nino southern oscillation played very

58
00:02:03,910 --> 00:02:02,320
little role

59
00:02:06,230 --> 00:02:03,920
the north atlantic oscillation was

60
00:02:08,389 --> 00:02:06,240
mildly negative which influenced winds

61
00:02:10,070 --> 00:02:08,399
more favorably for hurricanes

62
00:02:12,309 --> 00:02:10,080
the atlantic meridianal mode was the

63
00:02:14,309 --> 00:02:12,319

strongest influencer this season with

64
00:02:16,630 --> 00:02:14,319
very warm atlantic water temperatures

65
00:02:19,190 --> 00:02:16,640
leading to a busy and powerful hurricane

66
00:02:22,720 --> 00:02:19,200
season which included hurricanes katrina

67
00:02:24,150 --> 00:02:22,730
rita and wilma

68
00:02:27,110 --> 00:02:24,160
[Music]

69
00:02:28,710 --> 00:02:27,120
in 2013 the el nino southern oscillation

70
00:02:30,710 --> 00:02:28,720
favored hurricane formation at the

71
00:02:32,550 --> 00:02:30,720
beginning of the season with a weak la

72
00:02:34,790 --> 00:02:32,560
nina contributing cool water in the

73
00:02:36,550 --> 00:02:34,800
pacific a neutral atlantic meridianal

74
00:02:38,229 --> 00:02:36,560
mode and a negative north atlantic

75
00:02:40,229 --> 00:02:38,239
oscillation setting up favorable

76
00:02:42,630 --> 00:02:40,239
hurricane conditions

77
00:02:44,309 --> 00:02:42,640
however in mid-july the north atlantic

78
00:02:46,710 --> 00:02:44,319
oscillation suddenly changed to a

79
00:02:48,869 --> 00:02:46,720
strongly positive intensity creating

80
00:02:51,650 --> 00:02:48,879
unfavorable wind conditions and limiting