

A satellite with solar panels is shown in silhouette against a vibrant orange and red sunset sky. The bottom of the image features a dark silhouette of a mountain range.

EPISODE FOUR

PLAYS WELL WITH OTHERS

1
00:00:05,670 --> 00:00:04,550
when you think of a healthy tropical

2
00:00:09,830 --> 00:00:05,680
forest

3
00:00:12,070 --> 00:00:09,840
you think of a cacophony of bird sounds

4
00:00:13,669 --> 00:00:12,080
at dawn and dusk

5
00:00:15,509 --> 00:00:13,679
i i don't know if you know if you've

6
00:00:17,830 --> 00:00:15,519
been to one of those really deafening

7
00:00:19,990 --> 00:00:17,840
tropical forests where you can't really

8
00:00:26,870 --> 00:00:20,000
hear yourself think

9
00:00:31,189 --> 00:00:29,109
and so i think the you know one thing

10
00:00:33,350 --> 00:00:31,199
that that's so powerful about acoustic

11
00:00:34,229 --> 00:00:33,360
data is kind of the visceral

12
00:00:37,270 --> 00:00:34,239
um

13
00:00:39,430 --> 00:00:37,280

appreciation for how for change

14

00:00:41,750 --> 00:00:39,440

when you can actually hear

15

00:00:43,750 --> 00:00:41,760

the silence

16

00:00:45,990 --> 00:00:43,760

dr danielle rappaport is a forest

17

00:00:47,510 --> 00:00:46,000

ecologist who uses nature sounds to

18

00:00:49,590 --> 00:00:47,520

measure the health of the amazon

19

00:00:52,470 --> 00:00:49,600

rainforest

20

00:00:55,830 --> 00:00:52,480

landsat has allowed us to

21

00:00:58,790 --> 00:00:55,840

map those changing dynamics and get a

22

00:01:01,750 --> 00:00:58,800

really wonderful objective

23

00:01:04,149 --> 00:01:01,760

annual time series of how

24

00:01:05,429 --> 00:01:04,159

humans have been modifying the amazon

25

00:01:07,030 --> 00:01:05,439

forest

26

00:01:09,270 --> 00:01:07,040

landsat helped danielle and her team

27

00:01:11,429 --> 00:01:09,280

target areas of human activity bumping

28

00:01:13,190 --> 00:01:11,439

up against the amazon forest a region

29

00:01:15,109 --> 00:01:13,200

known as the frontier

30

00:01:16,870 --> 00:01:15,119

from there she used bioacoustics to

31

00:01:19,190 --> 00:01:16,880

assess the effects of human activity on

32

00:01:21,030 --> 00:01:19,200

wildlife

33

00:01:22,310 --> 00:01:21,040

landsat was really the

34

00:01:23,749 --> 00:01:22,320

backbone

35

00:01:25,190 --> 00:01:23,759

of this study

36

00:01:27,350 --> 00:01:25,200

danielle is one of thousands of

37

00:01:29,429 --> 00:01:27,360

scientists that has paired landsat data

38

00:01:31,270 --> 00:01:29,439

with an entirely different data set to

39
00:01:32,390 --> 00:01:31,280
uncover a more nuanced understanding of

40
00:01:34,550 --> 00:01:32,400
the world

41
00:01:36,710 --> 00:01:34,560
in many cases one set of data can tell

42
00:01:38,530 --> 00:01:36,720
you what is happening while landsat can

43
00:01:39,749 --> 00:01:38,540
tell you why it's happening

44
00:01:42,550 --> 00:01:39,759
[Music]

45
00:01:44,789 --> 00:01:42,560
the case that we always look at is is

46
00:01:47,510 --> 00:01:44,799
the middle east where the irrigation has

47
00:01:49,510 --> 00:01:47,520
led to a depletion of groundwater

48
00:01:51,109 --> 00:01:49,520
basically what that means is the nasa

49
00:01:52,630 --> 00:01:51,119
satellite grace picked up some strange

50
00:01:54,389 --> 00:01:52,640
readings in the middle east that

51
00:01:56,550 --> 00:01:54,399
indicated their groundwater had suddenly

52
00:01:58,550 --> 00:01:56,560
decreased by an alarming amount

53
00:02:00,709 --> 00:01:58,560
landsat later revealed the cause via

54
00:02:02,950 --> 00:02:00,719
images of the land surface over the past

55
00:02:04,630 --> 00:02:02,960
several decades saudi arabia had begun

56
00:02:07,109 --> 00:02:04,640
to employ a method of irrigation that

57
00:02:09,109 --> 00:02:07,119
was so water intensive it literally

58
00:02:11,270 --> 00:02:09,119
changed earth's gravitational pull in

59
00:02:12,790 --> 00:02:11,280
that particular region

60
00:02:15,270 --> 00:02:12,800
these partnerships between satellites

61
00:02:17,030 --> 00:02:15,280
sound great after all teamwork makes the

62
00:02:18,470 --> 00:02:17,040
dream work but how do you make two

63
00:02:21,190 --> 00:02:18,480

different data sets from two different

64

00:02:22,869 --> 00:02:21,200

satellites sing here's the secret

65

00:02:25,670 --> 00:02:22,879

different data sets are complementary

66

00:02:27,589 --> 00:02:25,680

and not in competition

67

00:02:29,750 --> 00:02:27,599

see landsat data tells us about local

68

00:02:31,910 --> 00:02:29,760

conditions on the land surface forests

69

00:02:34,630 --> 00:02:31,920

neighborhoods farms deserts farms in

70

00:02:35,990 --> 00:02:34,640

deserts meanwhile grace gives a broad

71

00:02:37,110 --> 00:02:36,000

regional view of water levels

72

00:02:38,710 --> 00:02:37,120

underground

73

00:02:40,309 --> 00:02:38,720

using the two together deepens our

74

00:02:42,949 --> 00:02:40,319

understanding of the world letting us

75

00:02:44,710 --> 00:02:42,959

see what causes led to which effects but

76

00:02:47,270 --> 00:02:44,720

grace is not the only partner for

77

00:02:48,869 --> 00:02:47,280

landsat the european sentinel one uses

78

00:02:50,470 --> 00:02:48,879

radar to see through the clouds that

79

00:02:52,229 --> 00:02:50,480

block landsat's view

80

00:02:54,229 --> 00:02:52,239

while landsat reveals the colors and

81

00:02:56,470 --> 00:02:54,239

characteristics of the surface and

82

00:02:58,390 --> 00:02:56,480

nasa's jedi uses laser pulses to measure

83

00:03:00,710 --> 00:02:58,400

the height of trees and help map the

84

00:03:02,470 --> 00:03:00,720

biomass of a forest this nicely

85

00:03:04,149 --> 00:03:02,480

complements landsat's view of the canopy

86

00:03:05,110 --> 00:03:04,159

top which assesses the health of the

87

00:03:06,869 --> 00:03:05,120

trees

88

00:03:09,350 --> 00:03:06,879

not to mention the long data record that

89

00:03:11,430 --> 00:03:09,360

lets us track changes over decades

90

00:03:13,910 --> 00:03:11,440

landsat is also a great complement to

91

00:03:15,589 --> 00:03:13,920

other similar land imagers in fact our

92

00:03:18,309 --> 00:03:15,599

friend jeff has done a lot of work to

93

00:03:20,390 --> 00:03:18,319

harmonize landsat and sentinel-2 data

94

00:03:22,550 --> 00:03:20,400

back to you jeff central 2 is very much

95

00:03:24,789 --> 00:03:22,560

like landsat it's a landsat like system

96

00:03:27,750 --> 00:03:24,799

that the european union

97

00:03:29,270 --> 00:03:27,760

has fielded since 2015 and so the real

98

00:03:30,630 --> 00:03:29,280

key there is putting landsat and

99

00:03:32,789 --> 00:03:30,640

sentinel together

100

00:03:35,430 --> 00:03:32,799

because uh increasingly what people are

101
00:03:36,880 --> 00:03:35,440
looking for is a daily observation at

102
00:03:39,190 --> 00:03:36,890
that kind of resolution

103
00:03:40,789 --> 00:03:39,200
[Music]

104
00:03:42,869 --> 00:03:40,799
you know there's been a

105
00:03:44,470 --> 00:03:42,879
almost an explosion in the number of

106
00:03:46,470 --> 00:03:44,480
earth resources satellites earth

107
00:03:49,350 --> 00:03:46,480
observation satellites that are out

108
00:03:51,670 --> 00:03:49,360
there in the international community

109
00:03:52,869 --> 00:03:51,680
in addition to signal two

110
00:03:54,070 --> 00:03:52,879
india

111
00:03:55,990 --> 00:03:54,080
brazil

112
00:03:57,190 --> 00:03:56,000
china thailand

113
00:03:59,270 --> 00:03:57,200

they all have their own earth

114

00:04:00,710 --> 00:03:59,280

observation programs

115

00:04:02,949 --> 00:04:00,720

increasingly

116

00:04:05,429 --> 00:04:02,959

it's about putting all of that

117

00:04:06,949 --> 00:04:05,439

together and harmonizing the data or at

118

00:04:10,710 --> 00:04:06,959

least using them

119

00:04:17,509 --> 00:04:10,720

in time series kinds of ways to really

120

00:04:20,629 --> 00:04:19,270

what does it mean to be worthy of a

121

00:04:22,790 --> 00:04:20,639

legacy

122

00:04:25,110 --> 00:04:22,800

eight generations of landsat satellites

123

00:04:29,590 --> 00:04:25,120

have quietly observed a changing earth

124

00:04:31,670 --> 00:04:29,600

from 438 miles above for almost 50 years

125

00:04:33,749 --> 00:04:31,680

like most things worth doing it hasn't

126

00:04:35,189 --> 00:04:33,759

been easy i think the landsat program

127

00:04:38,790 --> 00:04:35,199

today is probably healthier than it's

128

00:04:41,749 --> 00:04:38,800

been in a very long time we have two

129

00:04:45,350 --> 00:04:41,759

operational satellites on orbit now

130

00:04:47,189 --> 00:04:45,360

landsat 9 will join the fleet in 2021

131

00:04:49,350 --> 00:04:47,199

and then in the late 2020s we'll have

132

00:04:50,710 --> 00:04:49,360

the landsat next system coming up we

133

00:04:51,990 --> 00:04:50,720

don't exactly know what that's going to

134

00:04:53,749 --> 00:04:52,000

look like yet

135

00:04:55,590 --> 00:04:53,759

but the planning is in place

136

00:04:57,350 --> 00:04:55,600

and i'm confident that it's going to be

137

00:04:59,749 --> 00:04:57,360

there

138

00:05:02,070 --> 00:04:59,759

born during a time of limited technology

139

00:05:04,469 --> 00:05:02,080

landsat's founders were dreamers who

140

00:05:06,070 --> 00:05:04,479

laid the foundation for limitless future

141

00:05:08,790 --> 00:05:06,080

innovation

142

00:05:10,870 --> 00:05:08,800

as we change so do our forests farms

143

00:05:13,029 --> 00:05:10,880

cities and suburbs it's a mission that

144

00:05:14,870 --> 00:05:13,039

spans generations and one that we can

145

00:05:16,870 --> 00:05:14,880

rely on to tell us what's actually going

146

00:05:19,270 --> 00:05:16,880

on when the surface of our planet goes

147

00:05:21,270 --> 00:05:19,280

through transformations

148

00:05:24,070 --> 00:05:21,280

now we're launching landsat 9 the

149

00:05:25,990 --> 00:05:24,080

continuation of that dream

150

00:05:28,390 --> 00:05:26,000

we've enlisted our best and brightest to

151

00:05:30,950 --> 00:05:28,400

work on this decades-long mission and we

152

00:05:32,790 --> 00:05:30,960

will for decades to come

153

00:05:34,070 --> 00:05:32,800

50 more years of earth data in the

154

00:05:43,110 --> 00:05:34,080

future