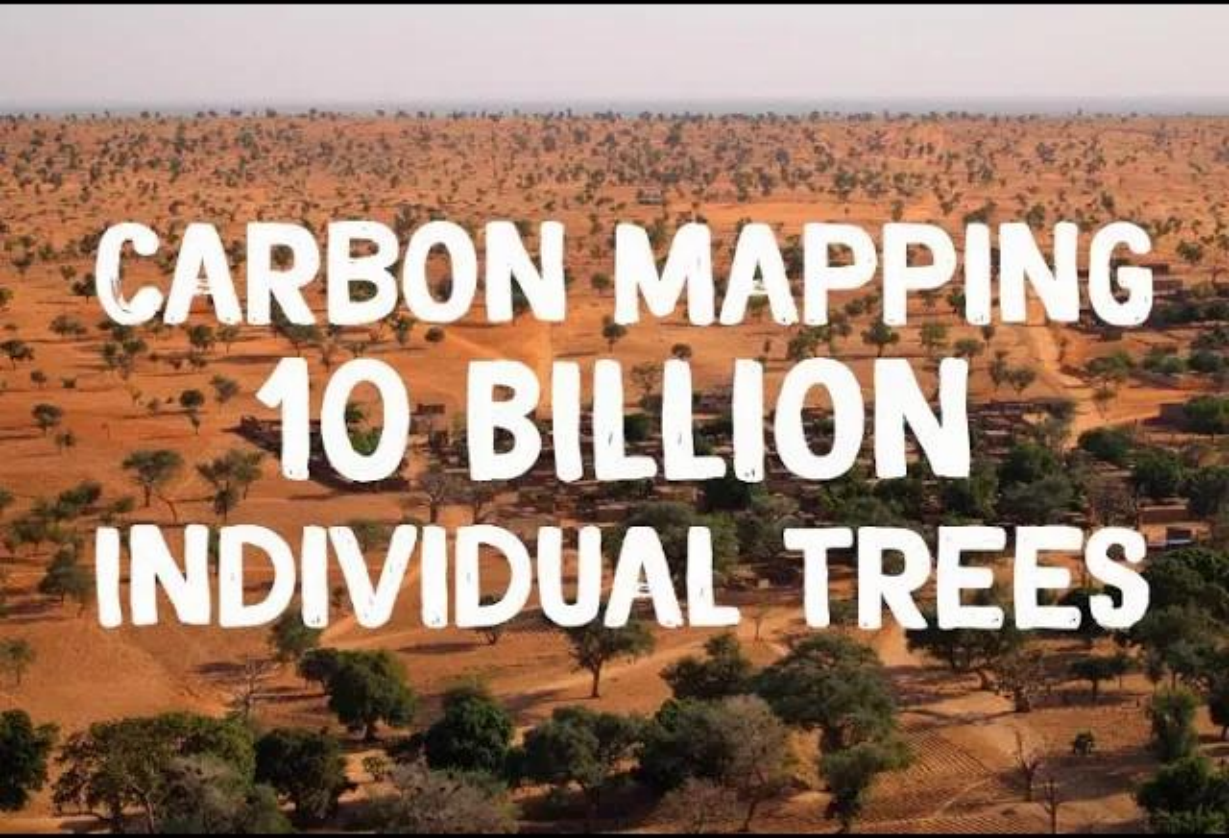
CARBON MAPPING
10 BILLION
INDIVIDUAL TREES

1
00:00:00,299 --> 00:00:02,949
foreign

2
00:00:08,990 --> 00:00:06,349
James Tucker and I am a Scientist at The

3
00:00:12,350 --> 00:00:09,000
Goddard space flight center we're very

4
00:00:14,930 --> 00:00:12,360
interested to improve our knowledge of

5
00:00:17,450 --> 00:00:14,940
the carbon cycle globally where is

6
00:00:19,070 --> 00:00:17,460
carbon going in vegetation and how long

7
00:00:22,010 --> 00:00:19,080
does it persist

8
00:00:24,490 --> 00:00:22,020
in the study we use the large volume of

9
00:00:26,330 --> 00:00:24,500
commercial satellite data

10
00:00:29,029 --> 00:00:26,340
hundreds of thousands of commercial

11
00:00:32,930 --> 00:00:29,039
satellite images at the 50 centimeter

12
00:00:35,209 --> 00:00:32,940
scale to map trees to identify trees in

13
00:00:38,450 --> 00:00:35,219

a semi-arid region from the Atlantic

14
00:00:40,550 --> 00:00:38,460
Ocean to the Red Sea in Africa what we

15
00:01:05,509 --> 00:00:40,560
actually mapped were tree crowns

16
00:01:05,519 --> 00:01:12,969
thank you

17
00:01:19,550 --> 00:01:16,670
we then use our tree Crown data to make

18
00:01:22,070 --> 00:01:19,560
predictions from the elometry which was

19
00:01:25,070 --> 00:01:22,080
also collected in the same region and

20
00:01:27,170 --> 00:01:25,080
the data are very important the the

21
00:01:29,630 --> 00:01:27,180
processing code is important the

22
00:01:32,030 --> 00:01:29,640
training data is important the alometry

23
00:01:35,510 --> 00:01:32,040
is important and then understanding the

24
00:01:39,230 --> 00:01:35,520
results that come out of those four

25
00:01:43,670 --> 00:01:39,240
components in the study this study has

26
00:01:46,370 --> 00:01:43,680
been in the works since 2015 or 2016. I

27
00:01:48,950 --> 00:01:46,380
started five or six years ago draining

28
00:01:50,510 --> 00:01:48,960
the archive of all of the data from

29
00:01:52,969 --> 00:01:50,520
Africa

30
00:01:54,289 --> 00:01:52,979
this has taken me three or four years to

31
00:01:55,510 --> 00:01:54,299
get all the data

32
00:01:56,770 --> 00:01:55,520
secondly

33
00:02:00,590 --> 00:01:56,780
[Music]

34
00:02:03,530 --> 00:02:00,600
nkit who's one of our team members as a

35
00:02:06,170 --> 00:02:03,540
graduate student in computer science he

36
00:02:08,150 --> 00:02:06,180
wrote Our processing code

37
00:02:10,190 --> 00:02:08,160
and it's highly optimized neural net

38
00:02:12,350 --> 00:02:10,200

code it works very well

39
00:02:15,050 --> 00:02:12,360
he worked on that for two or three years

40
00:02:17,630 --> 00:02:15,060
then you need the training data to go

41
00:02:19,250 --> 00:02:17,640
with the processing code when you use

42
00:02:21,830 --> 00:02:19,260
machine learning or artificial

43
00:02:24,650 --> 00:02:21,840
intelligence you need to train on

44
00:02:25,970 --> 00:02:24,660
something so you have confidence that

45
00:02:27,470 --> 00:02:25,980
that's what you're measuring the

46
00:02:30,530 --> 00:02:27,480
training data is where you go out and

47
00:02:33,050 --> 00:02:30,540
you select all different types of trees

48
00:02:35,089 --> 00:02:33,060
and they have to have a green tree crown

49
00:02:37,910 --> 00:02:35,099
and an Associated Shadow to be a tree

50
00:02:41,089 --> 00:02:37,920
and and Martin Brandt did this over

51
00:02:43,130 --> 00:02:41,099
three or four months and selected nine

52
00:02:50,690 --> 00:02:43,140
eighty nine thousand or ninety thousand

53
00:02:55,009 --> 00:02:53,210
now there are people like Pierre or no

54
00:02:56,809 --> 00:02:55,019
one of our co-authors who go out and

55
00:02:58,970 --> 00:02:56,819
they sample trees and they measure the

56
00:03:01,910 --> 00:02:58,980
tree Crown they then cut the tree down

57
00:03:03,729 --> 00:03:01,920
they then measure the volume of leaves

58
00:03:06,110 --> 00:03:03,739
in the tree crew

59
00:03:07,190 --> 00:03:06,120
the same for the wood and the same for

60
00:03:11,030 --> 00:03:07,200
the roots

61
00:03:14,270 --> 00:03:11,040
so we then convert the tree Crown data

62
00:03:18,410 --> 00:03:14,280
which we measure into the predicted Leaf

63
00:03:22,190 --> 00:03:18,420

mass or carbon the root carbon and the

64
00:03:26,330 --> 00:03:22,200
wood carbon of every individual tree

65
00:03:27,490 --> 00:03:26,340
no individual Tree Crown is probably the

66
00:03:32,089 --> 00:03:27,500
highest

67
00:03:35,110 --> 00:03:32,099
resolution you're going to get and

68
00:03:38,630 --> 00:03:35,120
like knowing the

69
00:03:40,630 --> 00:03:38,640
exact number of trees and also when they

70
00:03:43,250 --> 00:03:40,640
have leaves throughout the year

71
00:03:47,089 --> 00:03:43,260
it's going to be really really important

72
00:03:49,850 --> 00:03:47,099
for improving our climate models

73
00:03:52,550 --> 00:03:49,860
then you put all this together and you

74
00:03:54,970 --> 00:03:52,560
run it on a supercomputer so we would

75
00:03:58,070 --> 00:03:54,980
run the data this way run it that way

76
00:04:00,770 --> 00:03:58,080
then you take the results that's really

77
00:04:02,630 --> 00:04:00,780
the fun part seeing what you did how

78
00:04:03,949 --> 00:04:02,640
well you did it and what it can be used

79
00:04:09,589 --> 00:04:03,959
for

80
00:04:12,410 --> 00:04:09,599
ngos that are interested in

81
00:04:15,710 --> 00:04:12,420
understanding if there are three

82
00:04:17,930 --> 00:04:15,720
restoration programs have paid off but

83
00:04:20,030 --> 00:04:17,940
it can also be used for the local farmer

84
00:04:23,150 --> 00:04:20,040
who would be interested in knowing how

85
00:04:26,570 --> 00:04:23,160
many trees are standing on the fields

86
00:04:28,670 --> 00:04:26,580
and are they alive are they dead Etc and

87
00:04:30,890 --> 00:04:28,680
the viewer you can zoom into individual

88
00:04:33,350 --> 00:04:30,900

trees and see how much carbon is there

89
00:04:35,870 --> 00:04:33,360
and the leaves and the wood and The

90
00:04:37,030 --> 00:04:35,880
Roots and the specific location of that

91
00:04:40,249 --> 00:04:37,040
tree

92
00:04:42,710 --> 00:04:40,259
or you can aggregate the data up to an

93
00:04:44,150 --> 00:04:42,720
area of 100 meters by 100 meters or one

94
00:04:46,909 --> 00:04:44,160
hectare

95
00:04:48,050 --> 00:04:46,919
he planned to expand our work next to

96
00:04:49,790 --> 00:04:48,060
Australia

97
00:04:53,450 --> 00:04:49,800
and then maybe to Eastern Africa