1
00:00:08,419 --> 00:00:06,680
there's a controversy about earth it's a

2
00:00:10,070 --> 00:00:08,429
controversy about a process that may

3
00:00:13,330 --> 00:00:10,080
affect the quality of life in the United

4
00:00:15,470 --> 00:00:13,340
States and in every other nation

5
00:00:17,420 --> 00:00:15,480
scientists don't agree on its impact

6
00:00:19,700 --> 00:00:17,430
because it's evidence is complex

7
00:00:22,939 --> 00:00:19,710
disturbing and filled with conflicting

8
00:00:34,400 --> 00:00:22,949
information that process is called

9
00:00:36,560 --> 00:00:34,410
global warming your national and

10
00:00:39,410 --> 00:00:36,570
international initiative is needed to

11
00:00:42,380 --> 00:00:39,420
seek new solutions for ozone depletion

12
00:00:44,540 --> 00:00:42,390
in global warming and acid rain and this

13
00:00:46,729 --> 00:00:44,550

initiative global warming is the phrase

14
00:00:48,860 --> 00:00:46,739
used to describe the heating up of the

15
00:00:51,740 --> 00:00:48,870
Earth's atmosphere why is this an

16
00:00:54,770 --> 00:00:51,750
important issue if the atmosphere heats

17
00:00:58,310 --> 00:00:54,780
up by only a few degrees wind rain and

18
00:01:03,889 --> 00:00:58,320
heat patterns change damaging vital

19
00:01:06,320 --> 00:01:03,899
agricultural areas the impact natural

20
00:01:08,440 --> 00:01:06,330
resources would alter the geopolitical

21
00:01:10,520 --> 00:01:08,450
assets of the earth would shift a

22
00:01:12,890 --> 00:01:10,530
different climate would change the

23
00:01:17,719 --> 00:01:12,900
forestry food and water supply of each

24
00:01:19,670 --> 00:01:17,729
nation dr. Anthony del genio from NASA's

25
00:01:23,060 --> 00:01:19,680
Goddard Institute for Space Studies New

26
00:01:26,899 --> 00:01:23,070
York by the time we get into the middle

27
00:01:29,149 --> 00:01:26,909
of the next century a magnitude of heat

28
00:01:32,420 --> 00:01:29,159
wave or drought that we might have only

29
00:01:34,399 --> 00:01:32,430
experienced once in the 20th century we

30
00:01:37,100 --> 00:01:34,409
might be experiencing once every 10

31
00:01:39,170 --> 00:01:37,110
years in order to acquire the

32
00:01:41,630 --> 00:01:39,180
information necessary to answer global

33
00:01:43,850 --> 00:01:41,640
warming issues a number of scientific

34
00:01:46,520 --> 00:01:43,860
instruments are needed including an

35
00:01:50,330 --> 00:01:46,530
imaging instrument called SAR synthetic

36
00:01:52,730 --> 00:01:50,340
aperture radar SAR as planned as a part

37
00:01:57,490 --> 00:01:52,740
of a mission to Planet Earth NASA's

38
00:02:01,340 --> 00:01:57,500

series of Earth observing satellites in

39
00:02:03,590 --> 00:02:01,350
1981 and 1984 dr. Charles elachi and his

40
00:02:04,790 --> 00:02:03,600
colleagues sent an imaging radar into

41
00:02:08,180 --> 00:02:04,800
space

42
00:02:10,219 --> 00:02:08,190
they received astonishing data the radar

43
00:02:13,280 --> 00:02:10,229
penetrated the dry sands of the Sahara

44
00:02:15,350 --> 00:02:13,290
and discovered ancient riverbeds this is

45
00:02:18,410 --> 00:02:15,360
the most arid region on earth and it

46
00:02:19,790 --> 00:02:18,420
trains once every 40 to 60 years however

47
00:02:21,740 --> 00:02:19,800
when we look at the radar image which is

48
00:02:23,690 --> 00:02:21,750
moving in front of you you see what

49
00:02:25,370 --> 00:02:23,700
seemed to be drainage channels and these

50
00:02:27,770 --> 00:02:25,380
are the remnant rivers which have dried

51
00:02:29,540 --> 00:02:27,780
up because of climatic change at so we

52
00:02:32,180 --> 00:02:29,550
know that as recent as a time of the

53
00:02:35,680 --> 00:02:32,190
pyramids that region was not as drawing

54
00:02:38,960 --> 00:02:35,690
as arid as it is at the present time

55
00:02:40,910 --> 00:02:38,970
radar can see through vegetation as well

56
00:02:43,130 --> 00:02:40,920
as through clouds it's as if we could

57
00:02:49,460 --> 00:02:43,140
take an x-ray of the inaccessible areas

58
00:02:51,110 --> 00:02:49,470
of the earth the belts of rain forests

59
00:02:53,420 --> 00:02:51,120
around the earth are critical

60
00:02:55,910 --> 00:02:53,430
storehouses of vegetation and thus

61
00:02:58,220 --> 00:02:55,920
carbon some researchers believe that

62
00:03:02,180 --> 00:02:58,230
deforestation is causing significant

63
00:03:05,470 --> 00:03:02,190

damage to the Earth's biosphere however

64
00:03:08,170 --> 00:03:05,480
rain forests are difficult to measure

65
00:03:11,060 --> 00:03:08,180
they are difficult to access and the

66
00:03:16,160 --> 00:03:11,070
great bulk of their biomass is hidden by

67
00:03:18,340 --> 00:03:16,170
their canopy of tall trees dr. Joe bway

68
00:03:20,900 --> 00:03:18,350
from nasa's jet propulsion laboratory

69
00:03:23,750 --> 00:03:20,910
scientists know very well today that

70
00:03:25,310 --> 00:03:23,760
atmospheric carbon dioxide is increasing

71
00:03:27,500 --> 00:03:25,320
very significantly and we have

72
00:03:29,990 --> 00:03:27,510
successfully been able to map the areal

73
00:03:33,560 --> 00:03:30,000
extent of deforestation we have never

74
00:03:36,260 --> 00:03:33,570
attempted to measure anything about the

75
00:03:39,410 --> 00:03:36,270
forest itself biomass or its water

76
00:03:41,600 --> 00:03:39,420
properties that will disappear when you

77
00:03:43,910 --> 00:03:41,610
get into the account view pressure the

78
00:03:46,190 --> 00:03:43,920
radar however can penetrate the entire

79
00:03:47,900 --> 00:03:46,200
biomass of in the lower understory you

80
00:03:50,210 --> 00:03:47,910
see as you look behind here that there's

81
00:03:55,070 --> 00:03:50,220
quite a bit of action going on below

82
00:03:56,840 --> 00:03:55,080
this canopy raid art may be tuned to

83
00:03:59,360 --> 00:03:56,850
look at different levels of the biomass

84
00:04:01,190 --> 00:03:59,370
thus electronically penetrating tree

85
00:04:09,550 --> 00:04:01,200
tops that have veiled the rainforests

86
00:04:15,350 --> 00:04:13,160
at the other extreme of the earth the

87
00:04:22,760 --> 00:04:15,360
icy oceans of the planet are powerful

88
00:04:25,550 --> 00:04:22,770

drivers of global climate the exchange

89
00:04:29,510 --> 00:04:25,560
of heat gases and energy at the polar

90
00:04:31,850 --> 00:04:29,520
regions is immense essentially all of

91
00:04:34,310 --> 00:04:31,860
the uncertainties in predicting future

92
00:04:37,100 --> 00:04:34,320
climate have to do in one way or another

93
00:04:39,290 --> 00:04:37,110
with the hydrologic cycle anything that

94
00:04:41,360 --> 00:04:39,300
involves water and how it changes phase

95
00:04:42,590 --> 00:04:41,370
and goes from one form to another is

96
00:04:44,210 --> 00:04:42,600
something that we need to know

97
00:04:45,500 --> 00:04:44,220
desperately to predict future climate

98
00:04:49,760 --> 00:04:45,510
and for which we don't have adequate

99
00:04:51,440 --> 00:04:49,770
data sets right now sea ice is an

100
00:04:54,590 --> 00:04:51,450
important modifier of the Earth's energy

101
00:04:57,920 --> 00:04:54,600
it insulates the warmer ocean below from

102
00:05:00,380 --> 00:04:57,930
the freezing winter atmosphere in cloud

103
00:05:02,000 --> 00:05:00,390
free seasons it dramatically increases

104
00:05:05,210 --> 00:05:02,010
the amount of solar energy reflected

105
00:05:08,330 --> 00:05:05,220
back to space the heat flux through an

106
00:05:12,140 --> 00:05:08,340
open area of Arctic Ocean is 100 times

107
00:05:14,030 --> 00:05:12,150
more than in an ice-covered area we know

108
00:05:16,040 --> 00:05:14,040
that the polar masses are laced with

109
00:05:18,860 --> 00:05:16,050
cracks that expose ocean areas of the

110
00:05:21,770 --> 00:05:18,870
air however there's a problem at the

111
00:05:24,080 --> 00:05:21,780
poles how do we monitor an area that is

112
00:05:28,670 --> 00:05:24,090
obscured with clouds and in darkness for

113
00:05:31,040 --> 00:05:28,680

six months of the year SAR can

114
00:05:33,530 --> 00:05:31,050
investigate ice concentration and motion

115
00:05:36,200 --> 00:05:33,540
during the long polar night period and

116
00:05:37,850 --> 00:05:36,210
through extensive cloud cover being able

117
00:05:39,950 --> 00:05:37,860
to get that continuous monitoring and

118
00:05:42,350 --> 00:05:39,960
the extent of the ice cover and the age

119
00:05:44,570 --> 00:05:42,360
of the ice and possibly the thickness of

120
00:05:46,280 --> 00:05:44,580
it is a key scientific parameter in that

121
00:05:50,210 --> 00:05:46,290
heat exchange between the ocean and the

122
00:05:52,520 --> 00:05:50,220
atmosphere we know with certainty that

123
00:05:53,990 --> 00:05:52,530
the burning of fossil fuels is causing

124
00:05:57,380 --> 00:05:54,000
significant damage to the Earth's

125
00:05:59,690 --> 00:05:57,390
biosphere the concentration of carbon

126
00:06:01,820 --> 00:05:59,700
dioxide in the air has increased by over

127
00:06:04,670 --> 00:06:01,830
ten percent since nineteen fifty eight

128
00:06:06,770 --> 00:06:04,680
and by nearly twenty five percent since

129
00:06:09,560 --> 00:06:06,780
the Industrial Revolution

130
00:06:12,410 --> 00:06:09,570
heat from the Sun flows past nitrogen

131
00:06:16,190 --> 00:06:12,420
and oxygen molecules but is absorbed by

132
00:06:19,250 --> 00:06:16,200
co2 heat from the earth is also kept in

133
00:06:22,550 --> 00:06:19,260
by co2 creating an atmospheric blanket

134
00:06:25,990 --> 00:06:22,560
the result the greenhouse effect the

135
00:06:28,700 --> 00:06:26,000
increased warming of the earth however

136
00:06:31,490 --> 00:06:28,710
scientists disagree on whether it will

137
00:06:34,879 --> 00:06:31,500
get warmer because global processes are

138
00:06:36,710 --> 00:06:34,889

complex sunshine land masses vegetation

139
00:06:38,330 --> 00:06:36,720
the oceans and the atmosphere are

140
00:06:42,140 --> 00:06:38,340
intricately bound in a climatological

141
00:06:45,710 --> 00:06:42,150
dance the earth is a closed system a

142
00:06:48,800 --> 00:06:45,720
huge global system

143
00:06:50,810 --> 00:06:48,810
NASA's mission to Planet Earth a program

144
00:06:52,790 --> 00:06:50,820
to use satellites for the analysis of

145
00:06:55,040 --> 00:06:52,800
our own environment will address

146
00:06:57,860 --> 00:06:55,050
questions of potentially great impact to

147
00:07:01,460 --> 00:06:57,870
our future is global warming occurring

148
00:07:03,890 --> 00:07:01,470
how fast is it occurring how do man's

149
00:07:07,520 --> 00:07:03,900
actions today relate to our past and

150
00:07:09,410 --> 00:07:07,530
future climate yasar will explore the

151
00:07:12,340 --> 00:07:09,420
dynamics of the earth as a fragile

152
00:07:22,629 --> 00:07:12,350
system in a search for answers to