



1  
00:00:08,030 --> 00:00:05,930  
when it comes to learning about stars

2  
00:00:11,900 --> 00:00:08,040  
there is no closer classroom than our

3  
00:00:13,970 --> 00:00:11,910  
Sun that's why NASA began an in-depth

4  
00:00:16,570 --> 00:00:13,980  
study of the Sun and Earth relationship

5  
00:00:19,040 --> 00:00:16,580  
in a program dubbed living with a star

6  
00:00:20,840 --> 00:00:19,050  
the first mission in the space weather

7  
00:00:24,019 --> 00:00:20,850  
program is the Solar Dynamics

8  
00:00:25,910 --> 00:00:24,029  
Observatory or sdo scheduled to launch

9  
00:00:35,270 --> 00:00:25,920  
from Cape Canaveral Air Force Station in

10  
00:00:39,170 --> 00:00:35,280  
Florida welcome to the Solar Dynamics

11  
00:00:41,840 --> 00:00:39,180  
Observatory webcast I'm Tiffany now with

12  
00:00:44,600 --> 00:00:41,850  
NASA's launch services program in the

13  
00:00:48,020 --> 00:00:44,610

next few minutes we'll tell you what sdo

14

00:00:50,750 --> 00:00:48,030

might uncover about the Sun and how all

15

00:00:53,779 --> 00:00:50,760

of us on earth can benefit from finding

16

00:00:57,380 --> 00:00:53,789

out more about that bright orange disk

17

00:01:00,080 --> 00:00:57,390

in the sky but sdo is not NASA's first

18

00:01:02,500 --> 00:01:00,090

mission to study the Sun several of

19

00:01:05,630 --> 00:01:02,510

NASA's past missions focused on the Sun

20

00:01:08,300 --> 00:01:05,640

pioneer 5 was the first it launched in

21

00:01:11,090 --> 00:01:08,310

1960 with instruments to study the solar

22

00:01:12,890 --> 00:01:11,100

wind and other phenomena the instruments

23

00:01:15,590 --> 00:01:12,900

are primitive by today's standards but

24

00:01:19,880 --> 00:01:15,600

back then pioneer gave researchers their

25

00:01:22,399 --> 00:01:19,890

first up-close look at a star in 1973

26  
00:01:25,130 --> 00:01:22,409  
NASA made observing the Sun a central

27  
00:01:27,170 --> 00:01:25,140  
goal of the skylab space station the

28  
00:01:28,969 --> 00:01:27,180  
agency's first space station included a

29  
00:01:31,429 --> 00:01:28,979  
telescope designed to look closely at

30  
00:01:33,170 --> 00:01:31,439  
the Sun astronauts living on the station

31  
00:01:36,469 --> 00:01:33,180  
spent hours making specialized

32  
00:01:39,289 --> 00:01:36,479  
observations what they found on Skylab

33  
00:01:41,359 --> 00:01:39,299  
with what we call coronal holes and we

34  
00:01:43,789 --> 00:01:41,369  
did not know about coronal holes until

35  
00:01:46,160 --> 00:01:43,799  
they started taking these images I would

36  
00:01:50,330 --> 00:01:46,170  
say thats Skylab coming out with that

37  
00:01:53,149 --> 00:01:50,340  
type of photography was one of its most

38  
00:01:54,950 --> 00:01:53,159

important things SDO is cutting edge

39

00:01:57,499 --> 00:01:54,960

instruments offer researchers an

40

00:01:59,600 --> 00:01:57,509

unprecedented opportunity to examine the

41

00:02:02,330 --> 00:01:59,610

star at the center of our solar system

42

00:02:04,370 --> 00:02:02,340

in fact the readings are expected to be

43

00:02:06,980 --> 00:02:04,380

precise enough for researchers to

44

00:02:09,770 --> 00:02:06,990

forecast solar weather and predict when

45

00:02:11,900 --> 00:02:09,780

satellites in space and even electronics

46

00:02:16,370 --> 00:02:11,910

on earth will be endangered by a storm

47

00:02:19,070 --> 00:02:16,380

on the Sun we had 15 years of fairly

48

00:02:21,680 --> 00:02:19,080

constant industry and we've taken that

49

00:02:24,950 --> 00:02:21,690

data and designed us do to improve the

50

00:02:27,980 --> 00:02:24,960

ability to do science and to the ability

51  
00:02:29,990 --> 00:02:27,990  
to predict space weather we measure not

52  
00:02:32,900 --> 00:02:30,000  
just a strength of the magnetic field we

53  
00:02:35,360 --> 00:02:32,910  
measure also its direction and we think

54  
00:02:37,880 --> 00:02:35,370  
that the how much the magnetic field

55  
00:02:40,550 --> 00:02:37,890  
direction changes over a small part of

56  
00:02:42,500 --> 00:02:40,560  
the Sun is probably related to whether

57  
00:02:44,990 --> 00:02:42,510  
or not space weather things are going to

58  
00:02:47,600 --> 00:02:45,000  
happen solar flares can cause power

59  
00:02:49,520 --> 00:02:47,610  
surges on earth and wreak havoc on space

60  
00:02:52,310 --> 00:02:49,530  
stations and satellites orbiting the

61  
00:02:54,110 --> 00:02:52,320  
planet so researchers want to find out

62  
00:02:56,330 --> 00:02:54,120  
what makes solar flares and other

63  
00:02:58,580 --> 00:02:56,340

turbulent events occur on the Sun and

64

00:03:00,620 --> 00:02:58,590

then find out if there's a pattern or

65

00:03:04,310 --> 00:03:00,630

signs that we could use on earth to

66

00:03:07,010 --> 00:03:04,320

predict future flares sto will look at

67

00:03:09,680 --> 00:03:07,020

the Sun and try to understand where the

68

00:03:11,690 --> 00:03:09,690

magnetic field comes from when we talk

69

00:03:14,690 --> 00:03:11,700

about flares and coronal mass ejections

70

00:03:17,120 --> 00:03:14,700

that's the Sun getting rid of stuff that

71

00:03:19,370 --> 00:03:17,130

magnetic field is no longer in the Sun

72

00:03:22,270 --> 00:03:19,380

it wants it gone and it gets rid of the

73

00:03:25,430 --> 00:03:22,280

energy by having magnetic flares that

74

00:03:27,350 --> 00:03:25,440

release bright flashes of light and it

75

00:03:29,600 --> 00:03:27,360

gets rid of the leftover magnetic field

76

00:03:31,580 --> 00:03:29,610

by just throwing it off the spacecraft

77

00:03:33,470 --> 00:03:31,590

will use three instruments to examine

78

00:03:35,600 --> 00:03:33,480

the Sun including one that will take

79

00:03:38,060 --> 00:03:35,610

pictures rivaling the resolution of an

80

00:03:41,210 --> 00:03:38,070

IMAX movie another instrument called the

81

00:03:43,580 --> 00:03:41,220

helioseismic and magnetic imager or hmi

82

00:03:45,860 --> 00:03:43,590

will measure the sound waves bouncing

83

00:03:48,260 --> 00:03:45,870

around inside the Sun to construct an

84

00:03:50,420 --> 00:03:48,270

image of the stars inner workings the

85

00:03:53,150 --> 00:03:50,430

data could reveal why the Sun operates

86

00:03:55,160 --> 00:03:53,160

in an 11-year cycle of activity the

87

00:03:57,080 --> 00:03:55,170

extreme ultraviolet variability

88

00:03:59,030 --> 00:03:57,090

experiment will monitor the sun's

89

00:04:01,729 --> 00:03:59,040

brightness in the extreme ultraviolet

90

00:04:04,699 --> 00:04:01,739

wavelength which changes constantly are

91

00:04:07,430 --> 00:04:04,709

three instruments on here are really new

92

00:04:09,979 --> 00:04:07,440

and improved versions of some other

93

00:04:12,020 --> 00:04:09,989

instruments that have flown and of

94

00:04:14,540 --> 00:04:12,030

course we have a lot more data and we

95

00:04:16,039 --> 00:04:14,550

take a lot more pictures so then that's

96

00:04:18,110 --> 00:04:16,049

one thing the scientist love because as

97

00:04:19,310 --> 00:04:18,120

they say the Sun changes time it changes

98

00:04:21,860 --> 00:04:19,320

every second and we're going to be

99

00:04:24,920 --> 00:04:21,870

imaging it every second and we image the

100

00:04:26,120 --> 00:04:24,930

full disk of the Sun taken together the

101  
00:04:28,100 --> 00:04:26,130  
information s do

102  
00:04:30,050 --> 00:04:28,110  
collects could give scientists ways to

103  
00:04:32,570 --> 00:04:30,060  
predict future solar disturbances and

104  
00:04:34,850 --> 00:04:32,580  
help developers on earth come up with

105  
00:04:37,940 --> 00:04:34,860  
ways to protect sensitive electronics in

106  
00:04:39,590 --> 00:04:37,950  
space and on the planet while the work

107  
00:04:41,390 --> 00:04:39,600  
from s do is expected to be

108  
00:04:42,980 --> 00:04:41,400  
groundbreaking it took a lot of

109  
00:04:45,440 --> 00:04:42,990  
researchers and several previous

110  
00:04:47,090 --> 00:04:45,450  
missions to show scientist what kind of

111  
00:04:49,910 --> 00:04:47,100  
instruments they would need to put on

112  
00:04:52,100 --> 00:04:49,920  
the spacecraft solar studies have relied

113  
00:04:53,950 --> 00:04:52,110

on data from a host of missions looking

114

00:04:56,710 --> 00:04:53,960

at the Sun from different perspectives

115

00:04:59,330 --> 00:04:56,720

the solar maximum mission launched in

116

00:05:01,700 --> 00:04:59,340

1982 look at solar flares and other

117

00:05:04,610 --> 00:05:01,710

events the mission was extended by

118

00:05:07,040 --> 00:05:04,620

shuttle astronauts in 1984 who repaired

119

00:05:10,490 --> 00:05:07,050

the spacecraft in orbit solar max

120

00:05:12,680 --> 00:05:10,500

operated until nineteen eighty nine NASA

121

00:05:14,750 --> 00:05:12,690

and the European Space Agency jointly

122

00:05:17,380 --> 00:05:14,760

developed the Ulysses spacecraft which

123

00:05:20,570 --> 00:05:17,390

launched on shuttle discovery in 1990

124

00:05:23,990 --> 00:05:20,580

allessi k researchers unique looks at the

125

00:05:26,360 --> 00:05:24,000

sun's North and South Poles the Solar

126

00:05:30,430 --> 00:05:26,370

and Heliospheric Observatory known as

127

00:05:33,350 --> 00:05:30,440

Soho launched in 1995 aboard an atlas to

128

00:05:36,320 --> 00:05:33,360

sohos observations are similar to those

129

00:05:38,990 --> 00:05:36,330

in vision for s do although s do is

130

00:05:41,840 --> 00:05:39,000

carrying more advanced instruments well

131

00:05:44,450 --> 00:05:41,850

the big challenge of this mission is its

132

00:05:47,810 --> 00:05:44,460

data rate it's a hundred and 50 megabits

133

00:05:51,500 --> 00:05:47,820

per second 24 hours a day it's

134

00:05:53,360 --> 00:05:51,510

relentless most of the astronomical

135

00:05:54,650 --> 00:05:53,370

spacecraft are looking at sort of faint

136

00:05:56,450 --> 00:05:54,660

sources so they don't have that much

137

00:05:59,150 --> 00:05:56,460

like we're looking at the Sun right a

138

00:06:00,740 --> 00:05:59,160

lot of photons come off the Sun and we

139

00:06:03,410 --> 00:06:00,750

gotta process those and get them down to

140

00:06:05,500 --> 00:06:03,420

the ground but before SDO can start its

141

00:06:08,420 --> 00:06:05,510

observations it has to get into space

142

00:06:11,660 --> 00:06:08,430

that's the job of a powerful Atlas 5

143

00:06:13,450 --> 00:06:11,670

rocket the Atlas will lift the 6800

144

00:06:17,210 --> 00:06:13,460

pound spacecraft to an orbit about

145

00:06:19,220 --> 00:06:17,220

22,000 miles above Earth the Atlas 5 is

146

00:06:21,590 --> 00:06:19,230

one of the largest boosters available to

147

00:06:23,270 --> 00:06:21,600

NASA and was used to launch the lunar

148

00:06:26,720 --> 00:06:23,280

reconnaissance orbiter and moon

149

00:06:28,310 --> 00:06:26,730

impacting el crossface craft sto is one

150

00:06:30,680 --> 00:06:28,320

of the largest solar observatories we've

151  
00:06:32,690 --> 00:06:30,690  
ever launched it had a heavy lift

152  
00:06:33,270 --> 00:06:32,700  
requirement so we chose the Atlas 5 is

153  
00:06:36,930 --> 00:06:33,280  
the rocket

154  
00:06:39,510 --> 00:06:36,940  
this mission the Atlas 5 is unique for

155  
00:06:41,670 --> 00:06:39,520  
its launch structure Alice fire has been

156  
00:06:44,129 --> 00:06:41,680  
a very reliable rocket we've used it on

157  
00:06:46,530 --> 00:06:44,139  
a couple of NASA missions it's unique in

158  
00:06:49,140 --> 00:06:46,540  
that it's chosen a clean pad concept for

159  
00:06:50,640 --> 00:06:49,150  
it so launch processing the Rockets

160  
00:06:52,680 --> 00:06:50,650  
actually built on a mobile launch

161  
00:06:54,510 --> 00:06:52,690  
platform in the vehicle behind me the

162  
00:06:56,250 --> 00:06:54,520  
vertical integration facility and then

163  
00:06:59,100 --> 00:06:56,260

rolled out with rail cars out to the pad

164

00:07:01,050 --> 00:06:59,110

the day of launch one advantage of this

165

00:07:03,450 --> 00:07:01,060

clean pad concept that they chose is

166

00:07:05,340 --> 00:07:03,460

that the rocket is processed safe and

167

00:07:07,440 --> 00:07:05,350

secure in a building and then it rolls

168

00:07:09,180 --> 00:07:07,450

out the day of launch and that way if

169

00:07:10,409 --> 00:07:09,190

they have a problem a storm or something

170

00:07:12,090 --> 00:07:10,419

like that they can roll back in the

171

00:07:14,520 --> 00:07:12,100

facility it's not exposed to the

172

00:07:15,600 --> 00:07:14,530

elements for very long it just gives

173

00:07:16,980 --> 00:07:15,610

them a lot of flexibility in the

174

00:07:19,680 --> 00:07:16,990

processing a lot of protection for the

175

00:07:21,930 --> 00:07:19,690

rock as well as the spacecraft the day

176  
00:07:23,850 --> 00:07:21,940  
before launch technicians will roll the

177  
00:07:25,950 --> 00:07:23,860  
rocket out of his protective service

178  
00:07:28,409 --> 00:07:25,960  
structure they'll fuel the first stage

179  
00:07:31,170 --> 00:07:28,419  
and the Centaur upper stage as the Atlas

180  
00:07:32,940 --> 00:07:31,180  
stands on the pad the spacecraft was

181  
00:07:35,490 --> 00:07:32,950  
built in Maryland at NASA's Goddard

182  
00:07:39,090 --> 00:07:35,500  
Space Flight Center and it arrived in

183  
00:07:40,830 --> 00:07:39,100  
florida in august two thousand nine it

184  
00:07:43,320 --> 00:07:40,840  
went through a number of comprehensive

185  
00:07:46,860 --> 00:07:43,330  
tests including deploying the spacecraft

186  
00:07:48,930 --> 00:07:46,870  
solar arrays technicians install stos

187  
00:07:51,000 --> 00:07:48,940  
batteries and loaded fuel into the

188  
00:07:53,880 --> 00:07:51,010

spacecraft before it was trucked to the

189

00:07:55,409 --> 00:07:53,890

launch complex spacecraft typically

190

00:07:57,630 --> 00:07:55,419

spend several months in launch

191

00:07:59,310 --> 00:07:57,640

integration and testing because the

192

00:08:01,590 --> 00:07:59,320

machines are designed to work in such a

193

00:08:03,659 --> 00:08:01,600

harsh place that technicians and

194

00:08:06,570 --> 00:08:03,669

scientists want to make sure everything

195

00:08:08,790 --> 00:08:06,580

is just right before launch the Sun is

196

00:08:11,250 --> 00:08:08,800

our Astrophysical laboratory this is the

197

00:08:13,260 --> 00:08:11,260

place where we look at the Sun and stop

198

00:08:16,350 --> 00:08:13,270

calling it the Sun when we look at the

199

00:08:17,940 --> 00:08:16,360

Sun it's just an average star when we

200

00:08:20,430 --> 00:08:17,950

look out in the universe and we plot

201  
00:08:23,040 --> 00:08:20,440  
star stuff up the sun's always right in

202  
00:08:26,520 --> 00:08:23,050  
the middle it's like the perfect average

203  
00:08:28,190 --> 00:08:26,530  
star and if our average star has solar

204  
00:08:33,350 --> 00:08:28,200  
activity

205  
00:08:35,270 --> 00:08:33,360  
and indeed we do you know we need to

206  
00:08:38,930 --> 00:08:35,280  
know when a solar event is going to

207  
00:08:41,510 --> 00:08:38,940  
happen we can save a life a day before

208  
00:08:43,700 --> 00:08:41,520  
the Solar Dynamics Observatory begins

209  
00:08:46,580 --> 00:08:43,710  
its mission the excitement is reaching a

210  
00:08:49,130 --> 00:08:46,590  
crescendo here at NASA's Kennedy Space

211  
00:08:50,990 --> 00:08:49,140  
Center we hope you've enjoyed this look

212  
00:08:53,680 --> 00:08:51,000  
at the mission and found out a little

213  
00:08:56,240 --> 00:08:53,690

more about our closest star the Sun