1
00:00:01,400 --> 00:00:03,969
>> Well, today is Earth
Day, it's an observance

2
00:00:03,969 --> 00:00:06,405
that was originated in 1970

3
00:00:06,405 --> 00:00:09,675
by then Wisconsin Senator
Gaylord Nelson who wanted

4
00:00:09,675 --> 00:00:12,945
to raise public consciousness
about air and water pollution.

5
00:00:12,945 --> 00:00:15,347
A lot of people look at
that Earth Day as the start

6
00:00:15,347 --> 00:00:17,550
of the modern environmental
movement.

7
00:00:17,550 --> 00:00:21,253
Well, since 1970,
actually since before 1970,

8
00:00:21,253 --> 00:00:23,856
NASA has had any number
of missions that have been

9
00:00:23,856 --> 00:00:26,258
up taking pictures
of planet Earth.

10
00:00:26,258 --> 00:00:30,329
One particular accomplishment
has been the literally millions

11

00:00:30,329 --> 00:00:33,232
of images that have been
gathered by the men and women

12
00:00:33,232 --> 00:00:35,468
who have had the
rare opportunity

13
00:00:35,468 --> 00:00:39,672
to be seeing the Earth from
that unique point of view.

14
00:00:39,672 --> 00:00:44,143
Joining us on this Earth Day is
one of those astronauts to talk

15
00:00:44,143 --> 00:00:47,947
about the point of view,
Don Petit is a veteran

16
00:00:47,947 --> 00:00:49,548
of almost more than year,

17
00:00:49,548 --> 00:00:53,819
onboard the International Space
Station, 161 days as a member

18
00:00:53,819 --> 00:00:59,725
of Expedition 6, 193 days as a
member of Expeditions 30 and 31,

19
00:00:59,725 --> 00:01:02,061
plus another 16 days
in space as a member

20
00:01:02,061 --> 00:01:05,865
of Shuttle Mission STS126.

21
00:01:05,865 --> 00:01:08,634
Just a guess, Don,

how many photographs

22
00:01:08,634 --> 00:01:11,137
of earth did you take
in a year up there?

23
00:01:11,137 --> 00:01:15,207
>> Oh gosh, as a crew
on Expedition 30,

24
00:01:15,207 --> 00:01:18,744
we took about a half
a million pictures

25
00:01:18,744 --> 00:01:23,415
and that doesn't count
20,000 some pictures we took

26
00:01:23,415 --> 00:01:26,152
as a crew on STS126.

27
00:01:26,152 --> 00:01:29,388
So in 16 days, we took
over 20,000 pictures.

28
00:01:29,388 --> 00:01:30,623
And then I think we took

29
00:01:30,623 --> 00:01:34,160
about 50,000 pictures during
Expedition 6 as a crew.

30
00:01:34,160 --> 00:01:37,163
>> Did you have an interest in
photography before you flew?

31
00:01:37,163 --> 00:01:38,998
>> Oh, I've been
interested in photography

32
00:01:38,998 --> 00:01:43,702
since about the sixth grade when
I got my first Brownie camera

33
00:01:43,702 --> 00:01:49,842
that shot 120 film and I spent
all my allowance doing film work

34
00:01:49,842 --> 00:01:55,414
in a dark room so I could see
these mysterious images appear

35
00:01:55,414 --> 00:02:00,319
when you ran this film
through the chemistry.

36
00:02:00,319 --> 00:02:03,989
>> We've heard you and
many of your colleagues try

37
00:02:03,989 --> 00:02:06,692
to express what it
is like to see earth

38
00:02:06,692 --> 00:02:09,628
from that vantage point; I'm
going to ask you to try to --

39
00:02:09,628 --> 00:02:12,731
one more time, describe the
view of earth that you get

40
00:02:12,731 --> 00:02:14,500
from floating above it.

41
00:02:14,500 --> 00:02:19,471
>> Okay, earth from space,
you have the vantage point

42

00:02:19,471 --> 00:02:24,443
of seeing detail on the length
scale of half a continent

43
00:02:24,443 --> 00:02:27,079
so you could be over
Central Australia

44
00:02:27,079 --> 00:02:30,249
and you could see both the
East Coast and the West Coast

45
00:02:30,249 --> 00:02:33,552
at the same time, that's the
length scale that you could see.

46
00:02:33,552 --> 00:02:35,821
You can't quite see that
with the United States 'cause

47
00:02:35,821 --> 00:02:37,756
that continent is stretched
out a little bit more

48
00:02:37,756 --> 00:02:41,360
but certainly the metaphor of
being able to see structure

49
00:02:41,360 --> 00:02:43,529
on the length scale of
half a continent allows you

50
00:02:43,529 --> 00:02:47,967
to see things that you can't see
with your feet on the ground,

51
00:02:47,967 --> 00:02:52,471
that you can't see from
being in an airplane and from

52

00:02:52,471 --> 00:02:55,407
that vantage point, you
see different patterns,

53
00:02:55,407 --> 00:03:02,715
different structure that is not
visible when you get closer.

54
00:03:02,715 --> 00:03:06,585
>> What parts of it, when
you try to take all that in,

55
00:03:06,585 --> 00:03:09,788
what are the parts of that view
that attract your attention,

56
00:03:09,788 --> 00:03:12,224
do you like to try to capture?

57
00:03:12,224 --> 00:03:17,296
>> I like personally to use
a wide angle lens on cameras

58
00:03:17,296 --> 00:03:19,298
and do wide angle
photography simply

59
00:03:19,298 --> 00:03:22,501
because it takes advantage
of being able to see earth

60
00:03:22,501 --> 00:03:24,570
on the length scale
of half a continent.

61
00:03:24,570 --> 00:03:28,641
You can use our telephoto
lenses, we've got a number

62
00:03:28,641 --> 00:03:32,811

of them from 800 millimeters to
1200 millimeter telephoto lenses

63
00:03:32,811 --> 00:03:35,381
and if you're really, really
good, you can get pictures

64
00:03:35,381 --> 00:03:39,051
that are almost as good as what
you can get off of Google Earth.

65
00:03:39,051 --> 00:03:45,291
And so from my perspective, I
like to do the wide angle views

66
00:03:45,291 --> 00:03:47,226
because I think that
has the most

67
00:03:47,226 --> 00:03:51,730
of what this particular
view point has to offer.

68
00:03:51,730 --> 00:03:54,833
>> Well, I asked you to
share with us a couple

69
00:03:54,833 --> 00:03:57,236
of your favorite shots so
that we could share them

70
00:03:57,236 --> 00:04:00,072
with everybody else and take
a look at what they are.

71
00:04:00,072 --> 00:04:02,274
The first of these,
if I could get you

72
00:04:02,274 --> 00:04:04,009

to describe what
it is we're seeing;

73
00:04:04,009 --> 00:04:06,312
I see a coastline
and maybe a volcano.

74
00:04:06,312 --> 00:04:10,249
>> Okay, this is in
Guatemala and this is taken

75
00:04:10,249 --> 00:04:14,186
with infrared photography,
near infrared photography

76
00:04:14,186 --> 00:04:16,255
and we have not been
able to do this

77
00:04:16,255 --> 00:04:20,859
since around 2002,
2003, after Columbia.

78
00:04:20,859 --> 00:04:24,163
We quit flying film
and we lost our ability

79
00:04:24,163 --> 00:04:26,565
to do color infrared
photography 'cause at that time,

80
00:04:26,565 --> 00:04:28,667
it was all done with
color infrared film

81
00:04:28,667 --> 00:04:31,637
and now we have modified
digital cameras

82
00:04:31,637 --> 00:04:36,475

that give us back the
color infrared capability

83
00:04:36,475 --> 00:04:37,476
in digital form.

84
00:04:37,476 --> 00:04:39,912
So this is an infrared picture

85
00:04:39,912 --> 00:04:43,148
where plant material
is bright red

86
00:04:43,148 --> 00:04:44,616
and you can see there's
jungles there

87
00:04:44,616 --> 00:04:46,318
and there are volcanoes
poking up

88
00:04:46,318 --> 00:04:47,486
and this is a little different

89
00:04:47,486 --> 00:04:49,588
than satellite infrared
photography

90
00:04:49,588 --> 00:04:50,889
in that it's oblique.

91
00:04:50,889 --> 00:04:54,259
You're looking off
axis and human beings

92
00:04:54,259 --> 00:04:59,098
in station can take pictures
of objects and at angles

93

00:04:59,098 --> 00:05:03,969
that a preprogrammed satellite
typically is outside the --

94
00:05:03,969 --> 00:05:06,805
its event horizon
for programming.

95
00:05:06,805 --> 00:05:12,978
>> Let me move on to one other
which is clouds of some kind

96
00:05:12,978 --> 00:05:15,414
of way but framed by
black on both sides.

97
00:05:15,414 --> 00:05:17,783
>> Okay, this is an image

98
00:05:17,783 --> 00:05:20,853
of polar mesonephric [assumed
spelling] clouds or also known

99
00:05:20,853 --> 00:05:23,255
as noctilucent clouds.

100
00:05:23,255 --> 00:05:26,158
And these are clouds that are
right on the fringes of space,

101
00:05:26,158 --> 00:05:31,063
they are around 82 to 84
kilometers in altitude

102
00:05:31,063 --> 00:05:33,832
and space is defined about
at 100 kilometer altitudes

103
00:05:33,832 --> 00:05:37,736
so they're right on that fringes

of space and primarily seen

104
00:05:37,736 --> 00:05:40,506
in polar regions
during the summertime.

105
00:05:40,506 --> 00:05:43,942
And they're allusive,
they're the willow, the wisp

106
00:05:43,942 --> 00:05:47,379
and we're trying to understand
more about these clouds

107
00:05:47,379 --> 00:05:50,315
and space is a great
place to observe these.

108
00:05:50,315 --> 00:05:53,852
>> And in this other, in this
next image, we see a portion

109
00:05:53,852 --> 00:05:56,655
of the station from
where you do that.

110
00:05:56,655 --> 00:06:00,092
>> Yes, this is a picture of
what I like to call the view

111
00:06:00,092 --> 00:06:03,028
of my view and it
highlights the Cupola

112
00:06:03,028 --> 00:06:06,765
which is this wonderful
module filled with windows,

113
00:06:06,765 --> 00:06:11,103
seven windows looking Nadir

at earth and you can open

114
00:06:11,103 --> 00:06:15,307
up the shutters and you can
do marvelous photography

115
00:06:15,307 --> 00:06:19,445
of daytime earth and nighttime
earth and the transition

116
00:06:19,445 --> 00:06:21,747
of day night terminator regions.

117
00:06:21,747 --> 00:06:24,483
>> Now on your last trip,
you also figured out a way

118
00:06:24,483 --> 00:06:29,221
to take images that have come
to be called star trails images

119
00:06:29,221 --> 00:06:30,889
and we're going to show a couple

120
00:06:30,889 --> 00:06:32,257
of them while you
talk 'cause I want

121
00:06:32,257 --> 00:06:35,093
to know what was your
inspiration for doing this

122
00:06:35,093 --> 00:06:37,896
and maybe more importantly,

123
00:06:37,896 --> 00:06:40,532
how did you accomplish what
we're about to see here?

124

00:06:40,532 --> 00:06:42,601
>> Well, star trail
pictures is something

125
00:06:42,601 --> 00:06:46,238
that amateur astronomers do,
you put a camera on a tripod,

126
00:06:46,238 --> 00:06:48,674
you point it up at the sky
and you open the shutter

127
00:06:48,674 --> 00:06:52,144
and as earth turns, it makes
the stars into streaks.

128
00:06:52,144 --> 00:06:54,213
And you could do
this on space station

129
00:06:54,213 --> 00:06:56,782
and your orbital
motion will make the --

130
00:06:56,782 --> 00:06:59,451
not only the star
streaks but the cities

131
00:06:59,451 --> 00:07:01,653
down below will also
be streaking

132
00:07:01,653 --> 00:07:04,022
and if there are thunderstorms,
they are flashing off

133
00:07:04,022 --> 00:07:06,258
like flashbulbs in a dark room.

134
00:07:06,258 --> 00:07:09,094

I first started doing
this during Expedition 6,

135
00:07:09,094 --> 00:07:14,166
back in 2002 with film 'cause
the digital cameras back then

136
00:07:14,166 --> 00:07:16,134
wouldn't allow a
long enough exposure

137
00:07:16,134 --> 00:07:19,538
without getting a write error
to disk and you don't like that

138
00:07:19,538 --> 00:07:22,107
when you're taking a picture
but film would allow us

139
00:07:22,107 --> 00:07:26,178
to take these star trail
pictures and then I continued

140
00:07:26,178 --> 00:07:32,484
that on STS126 and then I
really had the time to zero

141
00:07:32,484 --> 00:07:35,687
in on this during
Expedition 30, 31.

142
00:07:35,687 --> 00:07:37,122
>> Those are some
remarkable images;

143
00:07:37,122 --> 00:07:39,525
they're really, really
quite special.

144
00:07:39,525 --> 00:07:41,126

From the time you first flew

145
00:07:41,126 --> 00:07:44,730
on Expedition 6 till
the time you came home

146
00:07:44,730 --> 00:07:48,700
from Expedition 31 is
about 10 years in between,

147
00:07:48,700 --> 00:07:52,838
from your [inaudible] personal
view, can you see a difference

148
00:07:52,838 --> 00:07:55,741
in the earth over that
10 year hunk of time?

149
00:07:55,741 --> 00:08:00,212
>> The basic earth looks the
same and earth is happy to go

150
00:08:00,212 --> 00:08:03,582
on with or without
us as human beings

151
00:08:03,582 --> 00:08:08,086
and I think it's important for
us to realize this and make sure

152
00:08:08,086 --> 00:08:11,290
that earth goes on
with us as riders.

153
00:08:11,290 --> 00:08:14,059
One of the more obvious effects

154
00:08:14,059 --> 00:08:17,963
over the last 10 years has been
the display of cities at night,

155
00:08:17,963 --> 00:08:22,401
how we sprinkle as human beings
the lights from our cities

156
00:08:22,401 --> 00:08:27,239
and there's this amazing display
of lights that are dictated

157
00:08:27,239 --> 00:08:32,444
by geography, by cultural
choice of lighting

158
00:08:32,444 --> 00:08:34,413
and by the technology used.

159
00:08:34,413 --> 00:08:37,482
And just as an example, if
you're next to a coastline,

160
00:08:37,482 --> 00:08:38,850
you'll see all these lights

161
00:08:38,850 --> 00:08:41,887
and then it gets dark really
quick right at the coastline.

162
00:08:41,887 --> 00:08:46,458
Some cultures use mercury vapor
lighting and there are cities

163
00:08:46,458 --> 00:08:49,361
that have this blue green
cast from the mercury vapor.

164
00:08:49,361 --> 00:08:52,297
Others use sodium vapor
lighting and you can see that.

165

00:08:52,297 --> 00:08:55,467
Some cities, the older
parts of town are blue green

166
00:08:55,467 --> 00:08:58,670
and the new burrows
are the yellow orange

167
00:08:58,670 --> 00:09:02,808
and so you can see the
extent of technology.

168
00:09:02,808 --> 00:09:04,910
You can see the extent
of geography

169
00:09:04,910 --> 00:09:07,446
and you can see the
extent of cultural choice.

170
00:09:07,446 --> 00:09:10,916
Sometimes the lighting
produce less light pollution

171
00:09:10,916 --> 00:09:12,517
and you can see the countries

172
00:09:12,517 --> 00:09:15,988
that don't have any light
pollution technology

173
00:09:15,988 --> 00:09:19,524
and their cities are lit up
in a different way than cities

174
00:09:19,524 --> 00:09:22,728
where they follow a
light pollution doctrine.

175
00:09:22,728 --> 00:09:25,697

>> That's fascinating and
on behalf of everybody

176
00:09:25,697 --> 00:09:28,100
who hasn't had the opportunity
to see what you've seen,

177
00:09:28,100 --> 00:09:30,135
thanks for telling us about it.

178
00:09:30,135 --> 00:09:32,137
Thanks for sharing some
of these great pictures.

179
00:09:32,137 --> 00:09:33,739
>> It's my pleasure.

180
00:09:33,739 --> 00:09:37,042
Recording what we see
as astronauts from space

181
00:09:37,042 --> 00:09:41,780
of earth is one way of sharing
this experience to folks

182
00:09:41,780 --> 00:09:44,316
on earth that don't get a
chance to get into space.

183
00:09:44,316 --> 00:09:45,884
>> Another way of sharing it is

184
00:09:45,884 --> 00:09:47,619
that there are astronaut
photographs of earth

185
00:09:47,619 --> 00:09:49,721
that are posted on
a special website

186
00:09:49,721 --> 00:09:53,291
at earthobservatory.nasa.gov
and for Earth Day

187
00:09:53,291 --> 00:09:58,397
at this special URL right
down here, you can see images

188
00:09:58,397 --> 00:10:00,666
of the day, maps and features

189
00:10:00,666 --> 00:10:03,835
that will excite the
geography enthusiast.

190
00:10:03,835 --> 00:10:06,471
There are tens and tens of
thousands of photographs