
Okavango River
Okavango delta
fault-line boundary
Boteti River
dry lake floors
N

1
00:00:04,789 --> 00:00:03,030
capturing an array of pre-identified

2
00:00:06,869 --> 00:00:04,799
spots for earth

3
00:00:09,750 --> 00:00:06,879
scientific observation is one example of

4
00:00:11,830 --> 00:00:09,760
this science the station crew does these

5
00:00:13,830 --> 00:00:11,840
crew earth observations allow the crew

6
00:00:17,109 --> 00:00:13,840
to observe and photograph natural and

7
00:00:18,950 --> 00:00:17,119
human-made changes on earth they provide

8
00:00:21,109 --> 00:00:18,960
researchers with key data to better

9
00:00:24,150 --> 00:00:21,119
understand the planet on which we live

10
00:00:25,109 --> 00:00:24,160
one of these images taken from the crew

11
00:00:36,310 --> 00:00:25,119
the

12
00:00:37,670 --> 00:00:36,320
sun's reflection point in this panorama

13
00:00:40,310 --> 00:00:37,680

taken from the international space

14
00:00:42,549 --> 00:00:40,320
station using the sun gland technique

15
00:00:45,029 --> 00:00:42,559
astronauts can image fine detail of

16
00:00:47,270 --> 00:00:45,039
water bodies here the bright line of the

17
00:00:49,350 --> 00:00:47,280
okabanga river shows the annual summer

18
00:00:52,470 --> 00:00:49,360
flood advancing from the well-watered

19
00:00:54,869 --> 00:00:52,480
angolan highlands to the delta

20
00:00:55,590 --> 00:00:54,879
most of the water of this river is used

21
00:00:57,750 --> 00:00:55,600
up

22
00:00:58,869 --> 00:00:57,760
by the forest or evaporates in the dry

23
00:01:00,310 --> 00:00:58,879
air

24
00:01:02,950 --> 00:01:00,320
part of one of the

25
00:01:06,310 --> 00:01:02,960
space station solar arrays is visible at

26
00:01:08,469 --> 00:01:06,320
the image upper right

27
00:01:10,710 --> 00:01:08,479
many of those images of earth are

28
00:01:12,870 --> 00:01:10,720
gathered as part of an experiment

29
00:01:14,950 --> 00:01:12,880
on the station known as crew earth

30
00:01:18,390 --> 00:01:14,960
observations which has been in

31
00:01:21,109 --> 00:01:18,400
operations since expedition one today

32
00:01:22,550 --> 00:01:21,119
we're going to learn more about it from

33
00:01:24,109 --> 00:01:22,560
dr justin

34
00:01:27,030 --> 00:01:24,119
wilkinson the principal

35
00:01:28,789 --> 00:01:27,040
geoscientist right correct and from

36
00:01:30,630 --> 00:01:28,799
jacobs engineering thank you so much for

37
00:01:32,310 --> 00:01:30,640
joining us today so we can talk about

38
00:01:33,910 --> 00:01:32,320

these beautiful photos that we always

39
00:01:35,830 --> 00:01:33,920
you and all about but there is some real

40
00:01:37,990 --> 00:01:35,840
science behind

41
00:01:40,789 --> 00:01:38,000
absolutely photographs lots of science

42
00:01:42,630 --> 00:01:40,799
so let's first talk about why why is

43
00:01:44,389 --> 00:01:42,640
earth observation mission or what is the

44
00:01:45,510 --> 00:01:44,399
earth observation mission for the space

45
00:01:47,990 --> 00:01:45,520
station

46
00:01:49,990 --> 00:01:48,000
well our little group is there to help

47
00:01:52,950 --> 00:01:50,000
astronauts take photographs and then to

48
00:01:55,830 --> 00:01:52,960
make them available to uh two big groups

49
00:01:58,310 --> 00:01:55,840
of users the first group is that 25

50
00:02:00,950 --> 00:01:58,320
15 to 25 million people who use the

51
00:02:02,950 --> 00:02:00,960
who make hits on our site every month

52
00:02:04,870 --> 00:02:02,960
then also to a bunch of scientists we've

53
00:02:07,350 --> 00:02:04,880
got scientific connections all over the

54
00:02:09,430 --> 00:02:07,360
world so those two major groups but then

55
00:02:10,869 --> 00:02:09,440
we also help the astronauts take these

56
00:02:12,470 --> 00:02:10,879
photographs because it's good for them

57
00:02:14,470 --> 00:02:12,480
to take the photographs we know that

58
00:02:16,390 --> 00:02:14,480
there's a psychological benefit to doing

59
00:02:18,309 --> 00:02:16,400
that yeah they do seem to enjoy taking

60
00:02:20,550 --> 00:02:18,319
those photographs and we

61
00:02:23,030 --> 00:02:20,560
probably just as equally enjoy you know

62
00:02:24,790 --> 00:02:23,040
looking at them so can you explain to me

63
00:02:26,790 --> 00:02:24,800

why it's important

64
00:02:29,190 --> 00:02:26,800
for us to be able to view earth from the

65
00:02:31,910 --> 00:02:29,200
perspective of the space station

66
00:02:33,350 --> 00:02:31,920
well the very large view that that all

67
00:02:34,630 --> 00:02:33,360
satellites but especially the space

68
00:02:36,550 --> 00:02:34,640
station are

69
00:02:39,270 --> 00:02:36,560
giving scientists

70
00:02:41,110 --> 00:02:39,280
it gives us a sense of the size of some

71
00:02:43,910 --> 00:02:41,120
of the natural systems so we we

72
00:02:46,550 --> 00:02:43,920
understand winds better we understand

73
00:02:48,390 --> 00:02:46,560
ocean dynamics better we understand even

74
00:02:51,030 --> 00:02:48,400
tectonics better by looking at the big

75
00:02:52,630 --> 00:02:51,040
view the the eye is a very small lens

76
00:02:54,229 --> 00:02:52,640
which means you see a huge view when you

77
00:02:57,430 --> 00:02:54,239
look out of a window and it's those

78
00:02:59,830 --> 00:02:57,440
perspectives which we are uh

79
00:03:01,670 --> 00:02:59,840
changing our knowledge of the earth with

80
00:03:04,149 --> 00:03:01,680
yeah and and i know

81
00:03:05,509 --> 00:03:04,159
some of these photos are the the we were

82
00:03:07,350 --> 00:03:05,519
talking about just the changing of the

83
00:03:09,110 --> 00:03:07,360
earth it's kind of interesting so are we

84
00:03:11,030 --> 00:03:09,120
comparing data that we received back

85
00:03:13,270 --> 00:03:11,040
from expedition 1 to like current data

86
00:03:14,630 --> 00:03:13,280
now of the same locations

87
00:03:15,830 --> 00:03:14,640
that may be the biggest single thing

88
00:03:17,589 --> 00:03:15,840

that we are doing

89
00:03:19,990 --> 00:03:17,599
so many satellites up there now looking

90
00:03:22,390 --> 00:03:20,000
at parts of the earth but even within

91
00:03:24,309 --> 00:03:22,400
our own database which is now quite big

92
00:03:25,190 --> 00:03:24,319
about a million images

93
00:03:26,789 --> 00:03:25,200
we

94
00:03:28,949 --> 00:03:26,799
have the best time looking at the

95
00:03:30,710 --> 00:03:28,959
earlier images in comparing with

96
00:03:32,949 --> 00:03:30,720
comparing with what we see today we see

97
00:03:34,550 --> 00:03:32,959
all kinds of changes so i know some of

98
00:03:35,830 --> 00:03:34,560
these spots are pre-identified by you

99
00:03:37,350 --> 00:03:35,840
guys can you explain to me what are the

100
00:03:39,350 --> 00:03:37,360
factors what how do you go about

101
00:03:40,309 --> 00:03:39,360
determining which locations on earth

102
00:03:41,509 --> 00:03:40,319
that they're going to be taking for the

103
00:03:44,229 --> 00:03:41,519
day

104
00:03:47,190 --> 00:03:44,239
sure we have a series of scientific

105
00:03:49,670 --> 00:03:47,200
collaborators around the world and they

106
00:03:51,110 --> 00:03:49,680
send in a few sites that they would like

107
00:03:53,350 --> 00:03:51,120
to have imaged with the particular

108
00:03:55,670 --> 00:03:53,360
cameras that we have and so that makes

109
00:03:57,429 --> 00:03:55,680
the main set of sites that we have in

110
00:03:59,030 --> 00:03:57,439
our in our database that we ask for

111
00:04:01,190 --> 00:03:59,040
every day or some of which we ask for

112
00:04:02,789 --> 00:04:01,200
every day depending on where exactly uh

113
00:04:04,229 --> 00:04:02,799

the spacecraft is and when they're awake

114
00:04:06,789 --> 00:04:04,239
and all that stuff

115
00:04:09,190 --> 00:04:06,799
but the other group is uh personal

116
00:04:10,710 --> 00:04:09,200
requests from from crew members and they

117
00:04:12,309 --> 00:04:10,720
usually just send us a big long list of

118
00:04:14,309 --> 00:04:12,319
places they want to get so we put that

119
00:04:15,589 --> 00:04:14,319
in our database and we ask for those two

120
00:04:17,430 --> 00:04:15,599
again depending on whether and when

121
00:04:18,229 --> 00:04:17,440
they're awake

122
00:04:19,030 --> 00:04:18,239
wow

123
00:04:19,830 --> 00:04:19,040
so

124
00:04:22,390 --> 00:04:19,840
um

125
00:04:24,790 --> 00:04:22,400
so some of these these uh photos that we

126
00:04:26,230 --> 00:04:24,800
see we're seeing them on social media

127
00:04:29,110 --> 00:04:26,240
and the crew members aboard the space

128
00:04:30,629 --> 00:04:29,120
station are are really um really

129
00:04:32,310 --> 00:04:30,639
engaging with a lot of folks out there

130
00:04:34,070 --> 00:04:32,320
and they seem to be some of the most

131
00:04:36,150 --> 00:04:34,080
popular things that we're seeing out

132
00:04:37,510 --> 00:04:36,160
there um how do you explain do you feel

133
00:04:39,749 --> 00:04:37,520
that that how does that benefit the

134
00:04:41,270 --> 00:04:39,759
mission of the crews

135
00:04:42,870 --> 00:04:41,280
sharing these kinds of photos with the

136
00:04:43,990 --> 00:04:42,880
public

137
00:04:46,070 --> 00:04:44,000
well

138
00:04:48,629 --> 00:04:46,080

before there was twitter we were getting

139
00:04:49,990 --> 00:04:48,639
something like 20 million hits a month

140
00:04:51,909 --> 00:04:50,000
on our website looking at the

141
00:04:52,790 --> 00:04:51,919
photographs the stills

142
00:04:55,189 --> 00:04:52,800
this

143
00:04:56,629 --> 00:04:55,199
huge new thing of the social media is

144
00:04:57,990 --> 00:04:56,639
only boosting the number of people that

145
00:04:59,350 --> 00:04:58,000
see the images and starting to

146
00:05:00,870 --> 00:04:59,360
understand the world and see what the

147
00:05:02,870 --> 00:05:00,880
world actually looks like instead of

148
00:05:04,629 --> 00:05:02,880
from a map from an actual view such as

149
00:05:06,469 --> 00:05:04,639
the views we've got there that's there's

150
00:05:08,629 --> 00:05:06,479
a twitter shot of the andes mountains

151
00:05:11,029 --> 00:05:08,639
for example i mean that's just exciting

152
00:05:12,710 --> 00:05:11,039
it's why i do what i do

153
00:05:14,710 --> 00:05:12,720
it's very good it is exciting i think a

154
00:05:16,230 --> 00:05:14,720
lot of people really really do um

155
00:05:18,310 --> 00:05:16,240
somehow we connect with that it's it's

156
00:05:20,790 --> 00:05:18,320
our world it's our earth and you see

157
00:05:22,550 --> 00:05:20,800
you know how

158
00:05:24,310 --> 00:05:22,560
we have all these boundaries but yet up

159
00:05:27,029 --> 00:05:24,320
from up there it just doesn't seem that

160
00:05:28,469 --> 00:05:27,039
way and um very very interesting and

161
00:05:30,310 --> 00:05:28,479
some beautiful photos some of them are

162
00:05:31,749 --> 00:05:30,320
almost very artistic

163
00:05:33,830 --> 00:05:31,759

um looking but

164
00:05:35,590 --> 00:05:33,840
i think that the science part is is

165
00:05:37,270 --> 00:05:35,600
really intriguing for a lot of people as

166
00:05:39,110 --> 00:05:37,280
well um

167
00:05:41,590 --> 00:05:39,120
so if you have anything else you want to

168
00:05:43,029 --> 00:05:41,600
share about the science of studying

169
00:05:45,590 --> 00:05:43,039
earth observations or maybe even

170
00:05:47,430 --> 00:05:45,600
explaining how you got into that

171
00:05:48,550 --> 00:05:47,440
well maybe the first thing to say is

172
00:05:51,110 --> 00:05:48,560
that

173
00:05:52,950 --> 00:05:51,120
the artistic side is what galvanizes

174
00:05:55,029 --> 00:05:52,960
very many of the astronauts and some

175
00:05:56,629 --> 00:05:55,039
particularly good at taking artistic

176
00:05:58,150 --> 00:05:56,639
shots

177
00:05:59,590 --> 00:05:58,160
in fact a book recently came out with

178
00:06:01,749 --> 00:05:59,600
the most artistic shots that one of the

179
00:06:04,309 --> 00:06:01,759
astronauts had taken

180
00:06:06,790 --> 00:06:04,319
but for me i'm i'm a desert geologist

181
00:06:08,629 --> 00:06:06,800
which means that i have the best time of

182
00:06:10,150 --> 00:06:08,639
all because there's few clouds over the

183
00:06:11,830 --> 00:06:10,160
over the deserts of the world so i get

184
00:06:13,670 --> 00:06:11,840
to see what i want to see all the time

185
00:06:16,629 --> 00:06:13,680
okay and i've been working on that now

186
00:06:17,830 --> 00:06:16,639
for about 20 years right here okay so 20

187
00:06:20,870 --> 00:06:17,840
years so you've been working on this

188
00:06:22,309 --> 00:06:20,880

since the expedition one um of the

189
00:06:23,110 --> 00:06:22,319
photos that were being taken down the

190
00:06:24,710 --> 00:06:23,120
cooperation

191
00:06:27,590 --> 00:06:24,720
will before that so

192
00:06:29,749 --> 00:06:27,600
then you've gone through a lot of photos

193
00:06:31,510 --> 00:06:29,759
in your time here with us so i would

194
00:06:34,629 --> 00:06:31,520
like to know what is your favorite crew

195
00:06:36,230 --> 00:06:34,639
of observation and tell me why well that

196
00:06:37,909 --> 00:06:36,240
the first picture that you put up there

197
00:06:40,070 --> 00:06:37,919
the okavango swap set is actually one of

198
00:06:42,150 --> 00:06:40,080
my research areas there you go

199
00:06:43,749 --> 00:06:42,160
and uh what's neat about it is it shows

200
00:06:45,430 --> 00:06:43,759
that the the annual flood has come all

201
00:06:47,350 --> 00:06:45,440
the way to that bottom line that sharp

202
00:06:49,270 --> 00:06:47,360
bottom line just below the middle of the

203
00:06:51,110 --> 00:06:49,280
picture um

204
00:06:52,629 --> 00:06:51,120
and we find that there's not just one of

205
00:06:54,230 --> 00:06:52,639
these big swamps there but we've got

206
00:06:56,070 --> 00:06:54,240
something like 10 of them most of them

207
00:06:57,909 --> 00:06:56,080
not active now but that was a huge new

208
00:06:59,430 --> 00:06:57,919
discovery for us right next door to that

209
00:07:01,350 --> 00:06:59,440
one

210
00:07:02,629 --> 00:07:01,360
very well it's beautiful

211
00:07:04,150 --> 00:07:02,639
so that's that's one of my favorite

212
00:07:07,830 --> 00:07:04,160
shots my other favorite shot has just

213
00:07:09,830 --> 00:07:07,840

come up and this is the river plate in

214
00:07:12,309 --> 00:07:09,840
central argentina

215
00:07:14,070 --> 00:07:12,319
and just to give you a sense of scale

216
00:07:15,909 --> 00:07:14,080
there in the lower left

217
00:07:17,909 --> 00:07:15,919
you see the city of buenos aires which

218
00:07:20,230 --> 00:07:17,919
has got about 13 million people is it's

219
00:07:22,309 --> 00:07:20,240
it's 60 miles across it's a huge place

220
00:07:24,150 --> 00:07:22,319
and you can see that the the estuary

221
00:07:26,070 --> 00:07:24,160
itself which is all brown with filled

222
00:07:28,870 --> 00:07:26,080
with brown sediment water

223
00:07:31,510 --> 00:07:28,880
um is a very large area

224
00:07:33,270 --> 00:07:31,520
and all of that brown sediment has come

225
00:07:35,189 --> 00:07:33,280
down the big river the parana river the

226
00:07:37,189 --> 00:07:35,199
second river of south america

227
00:07:38,950 --> 00:07:37,199
and it's been deposited into the sea

228
00:07:40,550 --> 00:07:38,960
making that huge brown mess and

229
00:07:42,309 --> 00:07:40,560
basically what it is is the andes

230
00:07:44,390 --> 00:07:42,319
mountains which are being thrust upwards

231
00:07:46,469 --> 00:07:44,400
by tectonic forces being eroded down and

232
00:07:48,790 --> 00:07:46,479
that's the mud that's come off those

233
00:07:50,629 --> 00:07:48,800
from the erosion of those big mountains

234
00:07:52,390 --> 00:07:50,639
huge quantities of sediment coming into

235
00:07:54,390 --> 00:07:52,400
the sea yeah that is incredibly

236
00:07:56,230 --> 00:07:54,400
fascinating and actually that photo is

237
00:07:58,230 --> 00:07:56,240
is a piece of art i would think i would

238
00:08:00,150 --> 00:07:58,240

i would actually enjoy i could see that

239
00:08:01,510 --> 00:08:00,160
on the wall somewhere i think that's why

240
00:08:02,710 --> 00:08:01,520
i chose it i was asked for another

241
00:08:05,189 --> 00:08:02,720
favorite and that's one of my favorites

242
00:08:07,510 --> 00:08:05,199
for the exactly it's a nice photo i i it

243
00:08:09,510 --> 00:08:07,520
would be hard to pick one out of all the

244
00:08:11,909 --> 00:08:09,520
the photos that you've seen come across

245
00:08:14,390 --> 00:08:11,919
your desk but i i think your um your

246
00:08:16,070 --> 00:08:14,400
work is very um important and uh

247
00:08:17,909 --> 00:08:16,080
interesting for us and and again the

248
00:08:19,510 --> 00:08:17,919
public enjoys that and i think the crew

249
00:08:20,869 --> 00:08:19,520
member crew members aboard the space

250
00:08:22,950 --> 00:08:20,879
station enjoy taking those photos as

251
00:08:24,469 --> 00:08:22,960
well thanks so much for uh coming out

252
00:08:25,350 --> 00:08:24,479
and talking with us today you're very