

1
00:03:30,550 --> 00:00:46,360

[Music]

2
00:03:39,110 --> 00:03:32,630

hi we're the shainers and we're

3
00:03:44,789 --> 00:03:40,949

hi i'm matt and i'm at the south pole

4
00:03:55,070 --> 00:03:46,390

hi i'm matt here at the south pole

5
00:03:55,080 --> 00:04:09,190

ciao in italian

6
00:04:14,869 --> 00:04:11,509

i'm matt and i'm here at the south pole

7
00:04:16,710 --> 00:04:14,879

celebrating the moon

8
00:04:39,990 --> 00:04:16,720

hi this is mark i'm at the south pole

9
00:04:45,030 --> 00:04:42,390

i'm focusing on the moon because

10
00:04:47,909 --> 00:04:45,040

human will be expanding the area of

11
00:04:49,909 --> 00:04:47,919

activity in the near future

12
00:04:52,629 --> 00:04:49,919

i have been supporting it from the

13
00:04:54,790 --> 00:04:52,639

aspect of running site analysis using

14

00:04:57,110 --> 00:04:54,800

observation data

15

00:05:00,710 --> 00:04:57,120

let's look up the moon and imagine

16

00:05:03,189 --> 00:05:00,720

humans working there again

17

00:05:04,710 --> 00:05:03,199

hi my name is josh i work for ice cube

18

00:05:11,510 --> 00:05:04,720

here at the south pole and i'm super

19

00:05:14,230 --> 00:05:13,110

hi i'm danielle i'm here at the south

20

00:05:16,629 --> 00:05:14,240

phill and i'm really excited to

21

00:05:17,749 --> 00:05:16,639

celebrate the moon

22

00:05:19,909 --> 00:05:17,759

hi

23

00:05:22,230 --> 00:05:19,919

i'm frank sinkwoods engineer for the

24

00:05:24,629 --> 00:05:22,240

micro observatory telescopes robotic

25

00:05:27,270 --> 00:05:24,639

telescopes that you can use

26

00:05:29,830 --> 00:05:27,280

to observe the moon so join me

27

00:05:32,310 --> 00:05:29,840

at microobservatory.org

28

00:05:34,230 --> 00:05:32,320

clear skies

29

00:05:38,070 --> 00:05:34,240

i'm brandon i'm in the south pole and

30

00:05:39,990 --> 00:05:38,080

i'm super excited to celebrate

31

00:05:41,670 --> 00:05:40,000

hi my name is alyssa i'm here at the

32

00:05:59,909 --> 00:05:41,680

south pole and i'm super excited to

33

00:06:04,790 --> 00:06:02,070

here it is gianluca massey from the

34

00:06:06,870 --> 00:06:04,800

virtual telescope project i really love

35

00:06:09,510 --> 00:06:06,880

looking at the moon from rome italy

36

00:06:11,350 --> 00:06:09,520

where i live with our satellite showing

37

00:06:13,749 --> 00:06:11,360

together with the beautiful legendary

38

00:06:15,990 --> 00:06:13,759

monuments of the eternal city and for

39

00:06:22,150 --> 00:06:16,000

sure i will do the same during the

40

00:06:36,090 --> 00:06:25,749

hi i'm andrea and i'm alexandra

41

00:06:36,100 --> 00:07:06,710

[Music]

42

00:07:12,600 --> 00:07:08,870

hi everyone

43

00:07:34,950 --> 00:07:21,570

[Music]

44

00:07:39,589 --> 00:07:37,430

hello my name is alexandra matthia novak

45

00:07:41,830 --> 00:07:39,599

and i'm a planetary geologist at johns

46

00:07:44,230 --> 00:07:41,840

hopkins applied physics laboratory i

47

00:07:46,309 --> 00:07:44,240

have a phd in geology so i love talking

48

00:07:48,309 --> 00:07:46,319

about the moon and the many fascinating

49

00:07:50,550 --> 00:07:48,319

geological features we will be looking

50

00:07:52,150 --> 00:07:50,560

at tonight we are so excited to be here

51
00:07:54,830 --> 00:07:52,160
to celebrate internationals through the

52
00:07:58,290 --> 00:07:54,840
midnight with you

53
00:08:14,230 --> 00:07:58,300
international night is a day each

54
00:08:16,150 --> 00:08:14,240
[Music]

55
00:08:18,469 --> 00:08:16,160
and also to connect with lunar

56
00:08:25,590 --> 00:08:18,479
enthusiasts around the world

57
00:08:53,269 --> 00:08:33,909
[Music]

58
00:08:59,750 --> 00:08:55,350
or you can join an event there are

59
00:09:05,269 --> 00:08:59,760
events all over the world today

60
00:09:07,690 --> 00:09:05,279
[Music]

61
00:09:11,269 --> 00:09:07,700
that you were able to go outside

62
00:09:29,350 --> 00:09:11,279
[Music]

63
00:09:33,990 --> 00:09:31,829

memory of the moons we want you to be

64

00:09:41,269 --> 00:09:34,000

creative and we are so glad that you're

65

00:09:45,350 --> 00:09:43,350

this program was inspired by the

66

00:09:47,269 --> 00:09:45,360

interest in large public events we held

67

00:09:49,509 --> 00:09:47,279

in 2009 when asked as lunar

68

00:09:51,350 --> 00:09:49,519

reconnaissance orbiter and lunar creator

69

00:09:52,389 --> 00:09:51,360

observing and sensing satellite arrived

70

00:09:54,389 --> 00:09:52,399

at the moon

71

00:09:56,550 --> 00:09:54,399

Iro has continued to support this

72

00:09:59,190 --> 00:09:56,560

program and we also have support from

73

00:10:01,829 --> 00:09:59,200

nasa's goddard space flight center nasa

74

00:10:04,470 --> 00:10:01,839

headquarters nasa colleagues across the

75

00:10:08,470 --> 00:10:04,480

agency and program supporters hosts and

76
00:10:13,210 --> 00:10:10,630
we have so many things to share with you

77
00:10:18,710 --> 00:10:13,220
today

78
00:10:24,280 --> 00:10:21,269
and so much more on our website

79
00:10:41,110 --> 00:10:24,290
by participating in this broadcast

80
00:10:49,910 --> 00:10:41,120
[Music]

81
00:10:55,509 --> 00:10:53,110
as andrea said you are participating

82
00:11:00,780 --> 00:10:55,519
in international observers of unite by

83
00:11:09,190 --> 00:11:07,350
[Music]

84
00:11:11,430 --> 00:11:09,200
all right let's see at our first tweet

85
00:11:13,829 --> 00:11:11,440
from social

86
00:11:15,190 --> 00:11:13,839
it's tonight we have dr aldrin who is

87
00:11:25,120 --> 00:11:15,200
joining us for observing the night

88
00:11:25,130 --> 00:11:35,590

[Music]

89

00:11:39,750 --> 00:11:37,750

using the hashtag observe the moon and

90

00:11:41,990 --> 00:11:39,760

here we can see some moon observations

91

00:11:43,190 --> 00:11:42,000

from rome italy oh my goodness look at

92

00:11:46,630 --> 00:11:43,200

that beautiful

93

00:11:52,069 --> 00:11:46,640

sky this whole moon in the sky this is

94

00:11:58,629 --> 00:11:55,350

and next up we have some awesome images

95

00:12:00,949 --> 00:11:58,639

from japan and we love our japanese

96

00:12:03,190 --> 00:12:00,959

colleagues they have done an awesome job

97

00:12:05,190 --> 00:12:03,200

helping us explore the moon and we're so

98

00:12:07,590 --> 00:12:05,200

appreciative of all the work at jaxa and

99

00:12:09,829 --> 00:12:07,600

here's some really cool images of some

100

00:12:12,310 --> 00:12:09,839

of the spacecraft that japan has flown

101
00:12:17,430 --> 00:12:13,350
wow

102
00:12:19,509 --> 00:12:17,440
the world are participating so this is

103
00:12:21,670 --> 00:12:19,519
from just a little while ago

104
00:12:35,990 --> 00:12:21,680
and we can see that more and more people

105
00:12:40,069 --> 00:12:38,310
and yes we do like your moon painting it

106
00:12:42,150 --> 00:12:40,079
is so beautiful and creative and a

107
00:12:44,550 --> 00:12:42,160
wonderful reminder of how looking at the

108
00:12:47,110 --> 00:12:44,560
moon makes all of us feel some awesome

109
00:13:04,470 --> 00:12:47,120
emotions and creativity that we can all

110
00:13:08,389 --> 00:13:06,069
so keep letting us know keep sharing

111
00:13:10,470 --> 00:13:08,399
your stories and um

112
00:13:12,629 --> 00:13:10,480
also send us those questions we have a

113
00:13:14,629 --> 00:13:12,639

team of amina experts standing by to

114

00:13:16,470 --> 00:13:14,639

answer your questions on social media

115

00:13:21,350 --> 00:13:16,480

and alexandra will answer some of them

116

00:13:24,230 --> 00:13:22,230

so

117

00:13:28,389 --> 00:13:24,240

when you go to our website as well you

118

00:13:30,870 --> 00:13:28,399

can also find um our moon maps so each

119

00:13:33,750 --> 00:13:30,880

day sorry each year we make moon maps

120

00:13:35,590 --> 00:13:33,760

for this particular day

121

00:13:38,470 --> 00:13:35,600

and you can find them

122

00:13:40,790 --> 00:13:38,480

on [loon.nasa.gov](https://www.nasa.gov) under our resources

123

00:13:43,030 --> 00:13:40,800

these are moon maps that brian day and

124

00:13:45,030 --> 00:13:43,040

jen baer from nasa ames make each year

125

00:13:47,990 --> 00:13:45,040

for the phase that the moon is in right

126
00:13:50,310 --> 00:13:48,000
now and this year brian also made some

127
00:13:52,470 --> 00:13:50,320
incredible flyovers of the different

128
00:13:54,870 --> 00:13:52,480
maps as well from the highlighted sites

129
00:13:57,350 --> 00:13:54,880
and we are going to share a few of those

130
00:14:14,389 --> 00:13:57,360
with you here today and let's start with

131
00:14:21,189 --> 00:14:17,829
sinusoidal the bay of rainbows is a bay

132
00:14:24,470 --> 00:14:21,199
along the northwest edge of mare imbrium

133
00:14:26,550 --> 00:14:24,480
this 260 kilometer wide craters floor

134
00:14:28,069 --> 00:14:26,560
was flooded with lava along with the

135
00:14:30,710 --> 00:14:28,079
imbrium basin

136
00:14:32,160 --> 00:14:30,720
its north and west rim forms the jura

137
00:15:09,430 --> 00:14:32,170
mountains

138
00:15:15,430 --> 00:15:13,030

now for a special guest we're back thank

139

00:15:17,590 --> 00:15:15,440

you so much now for a special guest john

140

00:15:19,670 --> 00:15:17,600

beauveir is joining us to give us an

141

00:15:24,629 --> 00:15:19,680

extraordinary view of the moon john

142

00:15:49,910 --> 00:15:26,790

it's going really well thank you so much

143

00:15:54,069 --> 00:15:51,030

all right

144

00:15:55,350 --> 00:15:54,079

we are going to be joining john in just

145

00:15:56,949 --> 00:15:55,360

a few minutes we were having some

146

00:15:58,949 --> 00:15:56,959

technical difficulties here sorry about

147

00:16:01,509 --> 00:15:58,959

that but john is from slu and he's going

148

00:16:02,470 --> 00:16:01,519

to be showing us views from around the

149

00:16:05,110 --> 00:16:02,480

world

150

00:16:07,670 --> 00:16:05,120

from telescopes that he works with in

151

00:16:09,670 --> 00:16:07,680

chile and in other places as well so

152

00:16:11,509 --> 00:16:09,680

it's going to be really really neat to

153

00:16:17,910 --> 00:16:11,519

see what the moon looks like at this

154

00:16:22,710 --> 00:16:20,150

thank you so much andrea and dr matia

155

00:16:25,189 --> 00:16:22,720

novak and greetings are you as excited

156

00:16:27,430 --> 00:16:25,199

as i am to observe the moon together all

157

00:16:30,310 --> 00:16:27,440

as one global community well i'm over

158

00:16:32,310 --> 00:16:30,320

the moon well not literally my name is

159

00:16:34,470 --> 00:16:32,320

dr john h povarin i'm the director of

160

00:16:36,389 --> 00:16:34,480

curriculum at slu a community of

161

00:16:37,910 --> 00:16:36,399

students educators and astronomers

162

00:16:40,230 --> 00:16:37,920

sharing their knowledge and discoveries

163

00:16:42,790 --> 00:16:40,240

of the universe using an arsenal of

164

00:16:45,110 --> 00:16:42,800

powerful robotic telescopes at premier

165

00:16:46,710 --> 00:16:45,120

observatories in both hemispheres slu

166

00:16:48,550 --> 00:16:46,720

provides a direct means for students to

167

00:16:50,230 --> 00:16:48,560

connect with the universe and fosters a

168

00:16:51,749 --> 00:16:50,240

collaborative citizen science for the

169

00:16:53,189 --> 00:16:51,759

next generation

170

00:16:54,949 --> 00:16:53,199

there are learning activities called

171

00:16:57,030 --> 00:16:54,959

quests to embark on and discover the

172

00:16:59,350 --> 00:16:57,040

secrets behind some of the universe's

173

00:17:01,670 --> 00:16:59,360

biggest mysteries while capturing images

174

00:17:04,390 --> 00:17:01,680

with slew's suite of telescopes such as

175

00:17:06,870 --> 00:17:04,400

the canary one half meter telescope that

176

00:17:08,630 --> 00:17:06,880

we're looking through right now

177

00:17:11,510 --> 00:17:08,640

i'm speaking to you all from las vegas

178

00:17:13,350 --> 00:17:11,520

nevada but tonight you are celebrating

179

00:17:15,189 --> 00:17:13,360

the this year's international observe

180

00:17:16,789 --> 00:17:15,199

the moon night with live views of the

181

00:17:19,029 --> 00:17:16,799

waxing gibbous moon from slough's

182

00:17:21,110 --> 00:17:19,039

flagship observatory at the institute of

183

00:17:22,789 --> 00:17:21,120

astrophysics of the canary islands

184

00:17:26,069 --> 00:17:22,799

located on the island of tinariff on the

185

00:17:27,669 --> 00:17:26,079

northwestern coast of africa and later

186

00:17:29,590 --> 00:17:27,679

on we'll check out the moon from our

187

00:17:31,669 --> 00:17:29,600

southern hemisphere observatory in la

188

00:17:34,150 --> 00:17:31,679

tahisa chile in association with the

189

00:17:36,549 --> 00:17:34,160

catholic university of chile

190

00:17:38,710 --> 00:17:36,559

we're looking through canary one half

191

00:17:40,470 --> 00:17:38,720

meter telescope which is my favorite one

192

00:17:42,390 --> 00:17:40,480

for capturing the moon

193

00:17:44,310 --> 00:17:42,400

now it's still too bright and chilly at

194

00:17:46,310 --> 00:17:44,320

this very moment so we'll check out the

195

00:17:47,750 --> 00:17:46,320

moon with our chilean telescopes later

196

00:17:48,549 --> 00:17:47,760

on in the hour

197

00:17:51,110 --> 00:17:48,559

but

198

00:17:54,150 --> 00:17:51,120

before we go i want to uh i want us to

199

00:17:55,510 --> 00:17:54,160

peek through one more telescope

200

00:17:58,470 --> 00:17:55,520

this is the

201
00:18:01,029 --> 00:17:58,480
this is canary 4 solar system telescope

202
00:18:03,510 --> 00:18:01,039
this telescope lets us zoom in on the

203
00:18:07,029 --> 00:18:03,520
lunar surface and see it in exquisite

204
00:18:09,029 --> 00:18:07,039
detail wow what a gorgeous moon we hope

205
00:18:11,669 --> 00:18:09,039
you enjoy the lunar views throughout the

206
00:18:13,909 --> 00:18:11,679
evening oh i want to give a shout out to

207
00:18:16,310 --> 00:18:13,919
anybody who knows a teacher or educator

208
00:18:19,110 --> 00:18:16,320
or knows a parent of a child who is at

209
00:18:21,270 --> 00:18:19,120
school basically anybody in education if

210
00:18:22,549 --> 00:18:21,280
you know anybody in education or related

211
00:18:25,830 --> 00:18:22,559
to someone who knows somebody in

212
00:18:27,990 --> 00:18:25,840
education please hop on over to slu.org

213
00:18:29,830 --> 00:18:28,000

slu.org has free student accounts for

214

00:18:31,190 --> 00:18:29,840

classrooms and light polluted areas

215

00:18:33,510 --> 00:18:31,200

ready and waiting to connect your

216

00:18:36,070 --> 00:18:33,520

students with the stars this grant aims

217

00:18:37,830 --> 00:18:36,080

to help one million students nationwide

218

00:18:39,830 --> 00:18:37,840

experience the wonder of space from

219

00:18:41,990 --> 00:18:39,840

their classrooms and home computers it's

220

00:18:43,909 --> 00:18:42,000

a very ambitious goal but you know the

221

00:18:45,990 --> 00:18:43,919

same if you shoot for the moon and miss

222

00:18:47,909 --> 00:18:46,000

you'll land among the stars you can

223

00:18:50,549 --> 00:18:47,919

learn more about the space exploration

224

00:18:51,990 --> 00:18:50,559

grant at slu.org what's more is you can

225

00:18:53,590 --> 00:18:52,000

come and get free professional

226

00:18:56,150 --> 00:18:53,600

development to learn how to use the

227

00:18:57,990 --> 00:18:56,160

platform in your classes and sections oh

228

00:19:00,870 --> 00:18:58,000

it's time for our second social media

229

00:19:05,029 --> 00:19:00,880

check-in so back to you dr metia novak

230

00:19:09,669 --> 00:19:07,190

thank you so much john now let's check

231

00:19:11,750 --> 00:19:09,679

in with how you are observing the moon

232

00:19:13,750 --> 00:19:11,760

let us know by sharing your pictures and

233

00:19:15,909 --> 00:19:13,760

sending us your questions using the

234

00:19:18,870 --> 00:19:15,919

hashtag observe the moon on whatever

235

00:19:20,549 --> 00:19:18,880

social media platform you like to use

236

00:19:22,150 --> 00:19:20,559

let's look at some ways people are

237

00:19:27,430 --> 00:19:22,160

observing the moon around the world

238

00:19:32,470 --> 00:19:30,070

oh this is beautiful from brazil oh my

239

00:19:33,270 --> 00:19:32,480

goodness i love how the sky looks with

240

00:19:38,870 --> 00:19:33,280

the

241

00:19:43,510 --> 00:19:41,110

and this is a beautiful picture of a

242

00:19:45,350 --> 00:19:43,520

view from the moon from italy thank you

243

00:19:47,430 --> 00:19:45,360

so much paolo for sending us this

244

00:19:49,350 --> 00:19:47,440

picture we love all the different

245

00:19:54,870 --> 00:19:49,360

perspectives and ways that we can view

246

00:19:57,590 --> 00:19:56,230

well i love

247

00:20:00,310 --> 00:19:57,600

having a little trouble seeing this one

248

00:20:02,710 --> 00:20:00,320

but i'm thinking that we're seeing oh a

249

00:20:05,190 --> 00:20:02,720

daughter and um someone else observing

250

00:20:06,870 --> 00:20:05,200

the moon in a light polluted sky that's

251

00:20:08,710 --> 00:20:06,880

incredible that's one of the reasons i

252

00:20:10,789 --> 00:20:08,720

love observing the moon so much is that

253

00:20:12,950 --> 00:20:10,799

you can see it even in some really

254

00:20:15,190 --> 00:20:12,960

bright cities as well as those beautiful

255

00:20:17,350 --> 00:20:15,200

dark skies far away from the city so i'm

256

00:20:20,070 --> 00:20:17,360

so glad so many of you are joining us

257

00:20:21,630 --> 00:20:20,080

this is great

258

00:20:23,669 --> 00:20:21,640

of course a shout out to our

259

00:20:26,149 --> 00:20:23,679

planetariums we have joining us the

260

00:20:28,470 --> 00:20:26,159

south carolina state museum

261

00:20:30,789 --> 00:20:28,480

virtual planetarium sky tours so

262

00:20:32,950 --> 00:20:30,799

beautiful image of the moon thank you so

263

00:20:41,190 --> 00:20:32,960

much to planetariums for keeping

264

00:20:45,909 --> 00:20:43,510

and now we're going to check out another

265

00:20:50,390 --> 00:20:45,919

place on the moon with brian day from

266

00:20:56,870 --> 00:20:53,510

copernicus is a magnificent 93 kilometer

267

00:21:00,310 --> 00:20:56,880

diameter crater with terraced walls a

268

00:21:02,870 --> 00:21:00,320

flat floor and a group of central peaks

269

00:21:04,470 --> 00:21:02,880

towering thousand two hundred meters

270

00:21:06,789 --> 00:21:04,480

above the floor

271

00:21:17,540 --> 00:21:06,799

the crater is over three thousand seven

272

00:21:17,550 --> 00:22:05,430

[Music]

273

00:22:05,440 --> 00:22:09,360

do

274

00:22:09,370 --> 00:22:32,950

[Music]

275

00:22:37,270 --> 00:22:35,029

i love that activity

276

00:22:39,590 --> 00:22:37,280

and we are in the midst of a very

277

00:22:41,909 --> 00:22:39,600

exciting time for lunar science and

278

00:22:44,470 --> 00:22:41,919

exploration we have an orbiter at the

279

00:22:46,390 --> 00:22:44,480

moon right now that is helping us better

280

00:22:48,390 --> 00:22:46,400

understand the moon's surface and its

281

00:22:50,310 --> 00:22:48,400

environment we're sending new

282

00:22:51,350 --> 00:22:50,320

instruments to the moon with commercial

283

00:22:53,510 --> 00:22:51,360

partners

284

00:22:55,990 --> 00:22:53,520

and we are preparing to return to the

285

00:22:58,789 --> 00:22:56,000

moon with people through our artemis

286

00:23:00,630 --> 00:22:58,799

program let's learn more about why we're

287

00:23:03,029 --> 00:23:00,640

going back to the moon and what we're

288

00:23:03,909 --> 00:23:03,039

doing to prepare

289

00:23:06,950 --> 00:23:03,919

we

290

00:23:12,789 --> 00:23:09,990

the history of this agency is marked

291

00:23:14,789 --> 00:23:12,799

with broken barriers once viewed as

292

00:23:18,070 --> 00:23:14,799

impossible

293

00:23:20,630 --> 00:23:18,080

with science fiction turned reality

294

00:23:23,510 --> 00:23:20,640

with innovations that have spun

295

00:23:25,669 --> 00:23:23,520

industries all their own

296

00:23:31,110 --> 00:23:25,679

and with demonstrations

297

00:23:39,190 --> 00:23:35,990

we soar in the skies of our home planet

298

00:23:41,110 --> 00:23:39,200

we maintain a human presence just

299

00:23:44,230 --> 00:23:41,120

outside of gravity

300

00:23:46,789 --> 00:23:44,240

and we touch points all across the solar

301
00:23:48,789 --> 00:23:46,799
system and beyond

302
00:23:50,740 --> 00:23:48,799
we're going back to the moon

303
00:23:51,990 --> 00:23:50,750
and this is why

304
00:23:54,549 --> 00:23:52,000
[Music]

305
00:23:56,789 --> 00:23:54,559
the moon is a treasure trove of science

306
00:23:59,669 --> 00:23:56,799
it holds opportunities for us to make

307
00:24:02,390 --> 00:23:59,679
discoveries about our home planet about

308
00:24:03,990 --> 00:24:02,400
our sun and about our solar system

309
00:24:05,909 --> 00:24:04,000
the wealth of knowledge to be gleaned

310
00:24:08,789 --> 00:24:05,919
from the moon will inspire a new

311
00:24:11,350 --> 00:24:08,799
generation of thought and action without

312
00:24:13,350 --> 00:24:11,360
fail every major program and mission

313
00:24:15,510 --> 00:24:13,360

nasa has invested in has led to

314

00:24:16,950 --> 00:24:15,520

technologies and capabilities that have

315

00:24:18,950 --> 00:24:16,960

shaped our culture

316

00:24:21,190 --> 00:24:18,960

the breakthroughs of the artemis era

317

00:24:23,110 --> 00:24:21,200

will define our generation and the

318

00:24:25,350 --> 00:24:23,120

generations to follow

319

00:24:27,669 --> 00:24:25,360

the tens of thousands of jobs associated

320

00:24:30,070 --> 00:24:27,679

with propelling us to the moon today are

321

00:24:32,230 --> 00:24:30,080

just the beginning of a lunar economy

322

00:24:35,190 --> 00:24:32,240

that will see hundreds of thousands of

323

00:24:37,430 --> 00:24:35,200

new jobs develop around the world this

324

00:24:39,830 --> 00:24:37,440

is not an ambition of one entity or one

325

00:24:41,110 --> 00:24:39,840

country the exploration of the moon is a

326

00:24:43,350 --> 00:24:41,120

shared effort

327

00:24:44,470 --> 00:24:43,360

woven together by a desire for the

328

00:24:46,630 --> 00:24:44,480

greater good

329

00:24:48,950 --> 00:24:46,640

why the moon because the missions of

330

00:24:50,710 --> 00:24:48,960

tomorrow will be sparked by the

331

00:24:52,470 --> 00:24:50,720

accomplishments of the artemis

332

00:24:54,950 --> 00:24:52,480

generation today

333

00:24:56,230 --> 00:24:54,960

because the ambition to go has already

334

00:24:58,230 --> 00:24:56,240

begun

335

00:24:59,590 --> 00:24:58,240

and because mars is calling we need to

336

00:25:01,909 --> 00:24:59,600

learn what it takes to establish

337

00:25:06,230 --> 00:25:01,919

community on another cosmic shore

338

00:25:07,430 --> 00:25:06,240

so let's camp close before pushing out

339

00:25:10,070 --> 00:25:07,440

and so

340

00:25:13,590 --> 00:25:10,080

we go to the moon now not as a series of

341

00:25:20,230 --> 00:25:16,710

but to build a community on and around

342

00:25:22,470 --> 00:25:20,240

the moon capable of proving how to live

343

00:25:27,190 --> 00:25:22,480

on other worlds

344

00:25:29,190 --> 00:25:27,200

[Music]

345

00:25:31,590 --> 00:25:29,200

we'll use the lessons for more than 50

346

00:25:33,669 --> 00:25:31,600

years of peaceful exploration

347

00:25:35,990 --> 00:25:33,679

to send a new generation to the lunar

348

00:25:37,750 --> 00:25:36,000

surface to stay we will anchor our

349

00:25:39,750 --> 00:25:37,760

efforts on the lunar south pole to

350

00:25:42,070 --> 00:25:39,760

establish the artemis-based camp

351
00:25:44,710 --> 00:25:42,080
positioning us for long-term science and

352
00:25:46,950 --> 00:25:44,720
exploration of the lunar surface

353
00:25:49,590 --> 00:25:46,960
we will prove what it takes to assemble

354
00:25:52,549 --> 00:25:49,600
a complex ship in deep space

355
00:25:55,190 --> 00:25:52,559
we will perfect descending downtube and

356
00:25:57,669 --> 00:25:55,200
returning from a distance

357
00:26:00,549 --> 00:25:57,679
we will learn how humans can survive and

358
00:26:02,630 --> 00:26:00,559
thrive in a partial gravity environment

359
00:26:04,950 --> 00:26:02,640
with improved spacesuit designs mobile

360
00:26:07,669 --> 00:26:04,960
habitats and with reconnaissance robots

361
00:26:09,029 --> 00:26:07,679
pre-positioning and relocating supplies

362
00:26:11,430 --> 00:26:09,039
we will learn how to utilize the

363
00:26:13,110 --> 00:26:11,440

resources we find on these other worlds

364

00:26:15,190 --> 00:26:13,120

starting with finding water ice and

365

00:26:17,590 --> 00:26:15,200

purifying it to drinkable water and

366

00:26:19,269 --> 00:26:17,600

refining that into hydrogen for fuel and

367

00:26:21,990 --> 00:26:19,279

oxygen to breathe

368

00:26:24,310 --> 00:26:22,000

we will establish fission power plants

369

00:26:26,149 --> 00:26:24,320

on the surface of the moon capable of

370

00:26:27,190 --> 00:26:26,159

supporting a growing community of

371

00:26:29,350 --> 00:26:27,200

efforts

372

00:26:31,190 --> 00:26:29,360

and we will expand the logistics supply

373

00:26:33,750 --> 00:26:31,200

chain to enable commercial and

374

00:26:37,990 --> 00:26:33,760

international partners to resupply and

375

00:26:40,310 --> 00:26:38,000

refuel deep space outposts

376

00:26:41,990 --> 00:26:40,320

none of this is simple

377

00:26:44,789 --> 00:26:42,000

or easy

378

00:26:47,029 --> 00:26:44,799

but nothing in our history ever has been

379

00:26:48,870 --> 00:26:47,039

the angel has landed we got a bunch of

380

00:26:50,630 --> 00:26:48,880

guys about to turn blue we're breathing

381

00:26:53,029 --> 00:26:50,640

again

382

00:26:55,830 --> 00:26:53,039

this kind of continuous lunar presence

383

00:26:59,190 --> 00:26:55,840

is a natural extension of all that we've

384

00:27:01,750 --> 00:26:59,200

learned in low earth orbit

385

00:27:04,870 --> 00:27:01,760

and what we will accomplish there will

386

00:27:07,750 --> 00:27:04,880

ensure the monumental missions to mars

387

00:27:10,630 --> 00:27:07,760

are within reach

388

00:27:12,549 --> 00:27:10,640

as we ready the launch of the first

389

00:27:14,710 --> 00:27:12,559

artemis mission

390

00:27:17,510 --> 00:27:14,720

and as commercial companies ready their

391

00:27:19,590 --> 00:27:17,520

lunar landers for the first private

392

00:27:20,789 --> 00:27:19,600

payload deliveries

393

00:27:23,110 --> 00:27:20,799

we

394

00:27:26,890 --> 00:27:23,120

have already begun

395

00:27:35,990 --> 00:27:26,900

to take the next step

396

00:27:39,190 --> 00:27:37,830

the moon south pole is a fascinating

397

00:27:40,870 --> 00:27:39,200

region to study

398

00:27:42,950 --> 00:27:40,880

especially when you pay attention to the

399

00:27:45,480 --> 00:27:42,960

areas that are in sunlight and darkness

400

00:27:52,070 --> 00:27:45,490

over time

401
00:27:55,430 --> 00:27:53,269
and thanks to nasa's lunar

402
00:27:56,950 --> 00:27:55,440
reconnaissance orbiter we can zoom in

403
00:27:59,110 --> 00:27:56,960
for an extremely close view of the

404
00:28:01,070 --> 00:27:59,120
terrain that shows how the sun shines on

405
00:28:05,990 --> 00:28:01,080
the south pole

406
00:28:08,070 --> 00:28:06,000
[Music]

407
00:28:09,990 --> 00:28:08,080
here you see how the moon's topography

408
00:28:12,549 --> 00:28:10,000
creates areas of shadows over the course

409
00:28:19,530 --> 00:28:12,559
of two lunar days which is equal to two

410
00:28:22,630 --> 00:28:20,789
[Music]

411
00:28:24,870 --> 00:28:22,640
the flowing dance of sunlight and shadow

412
00:28:27,269 --> 00:28:24,880
on the surface reveals areas that exist

413
00:28:29,590 --> 00:28:27,279

in permanent darkness nearly persistent

414

00:28:32,390 --> 00:28:29,600

sunshine and others where the balance of

415

00:28:39,190 --> 00:28:32,400

light and dark fluctuates through time

416

00:28:41,269 --> 00:28:39,200

[Music]

417

00:28:43,110 --> 00:28:41,279

studying the shadows at the south pole

418

00:28:45,029 --> 00:28:43,120

informs scientists about the temperature

419

00:28:46,950 --> 00:28:45,039

at and below the surface

420

00:28:48,389 --> 00:28:46,960

and the possibilities regarding water

421

00:28:50,470 --> 00:28:48,399

and other volatiles

422

00:28:59,830 --> 00:28:50,480

all of which sheds light on what future

423

00:29:03,430 --> 00:29:01,590

i'm ernie wright i work in the

424

00:29:05,669 --> 00:29:03,440

scientific visualization studio at

425

00:29:07,750 --> 00:29:05,679

nasa's goddard space flight center

426
00:29:09,990 --> 00:29:07,760
we're looking at a computer model of the

427
00:29:11,750 --> 00:29:10,000
view at the south pole of the moon

428
00:29:13,430 --> 00:29:11,760
this is like a time lapse to show the

429
00:29:16,230 --> 00:29:13,440
motion of the sun and the earth and how

430
00:29:18,149 --> 00:29:16,240
the shadows change over time

431
00:29:20,630 --> 00:29:18,159
things don't rise and set in the usual

432
00:29:23,029 --> 00:29:20,640
way here the sun travels around the

433
00:29:25,110 --> 00:29:23,039
horizon never getting more than a degree

434
00:29:27,669 --> 00:29:25,120
and a half above or below it so there

435
00:29:29,750 --> 00:29:27,679
are always these long shadows

436
00:29:32,310 --> 00:29:29,760
and from here the earth appears to be

437
00:29:35,430 --> 00:29:32,320
upside down and rotating backwards but

438
00:29:36,789 --> 00:29:35,440

that's just because of our point of view

439

00:29:37,990 --> 00:29:36,799

the earth doesn't move much in the

440

00:29:39,990 --> 00:29:38,000

moon's sky

441

00:29:41,909 --> 00:29:40,000

it's always in roughly the same place

442

00:29:43,269 --> 00:29:41,919

just sort of bobbing around

443

00:29:45,029 --> 00:29:43,279

that's true everywhere on the near side

444

00:29:46,549 --> 00:29:45,039

of the road it's a consequence of the

445

00:29:48,549 --> 00:29:46,559

moon always pointing the same face

446

00:29:50,630 --> 00:29:48,559

toward earth

447

00:29:51,909 --> 00:29:50,640

it takes about a month for the sun to

448

00:29:54,789 --> 00:29:51,919

make a complete circuit around the

449

00:29:57,909 --> 00:29:54,799

horizon and every so often it'll pass

450

00:29:59,510 --> 00:29:57,919

behind the earth creating an eclipse

451
00:30:02,070 --> 00:29:59,520
i've slowed down time here a little so

452
00:30:04,070 --> 00:30:02,080
that it's easier to see

453
00:30:06,149 --> 00:30:04,080
on earth that would be a total lunar

454
00:30:08,630 --> 00:30:06,159
eclipse of the moon passing through the

455
00:30:10,630 --> 00:30:08,640
shadow cast by the earth but if you're

456
00:30:12,710 --> 00:30:10,640
standing on the moon it's an eclipse of

457
00:30:14,149 --> 00:30:12,720
the sun

458
00:30:16,549 --> 00:30:14,159
the terrain at the south pole is

459
00:30:18,470 --> 00:30:16,559
especially rugged the rim of shackles

460
00:30:20,549 --> 00:30:18,480
and craters in the foreground here and

461
00:30:22,630 --> 00:30:20,559
the mountain off on the horizon

462
00:30:25,430 --> 00:30:22,640
unofficially known as mons malapur it's

463
00:30:27,269 --> 00:30:25,440

about 85 miles away

464

00:30:29,430 --> 00:30:27,279

shackle and crater is about 13 miles

465

00:30:32,149 --> 00:30:29,440

wide not quite as wide as the grand

466

00:30:34,149 --> 00:30:32,159

canyon but it's twice as deep

467

00:30:36,310 --> 00:30:34,159

sunlight never reaches the crater floor

468

00:30:40,230 --> 00:30:36,320

so temperatures there are around 300

469

00:30:43,909 --> 00:30:41,669

this model of the terrain is made

470

00:30:45,669 --> 00:30:43,919

possible by lunar reconnaissance orbiter

471

00:30:49,830 --> 00:30:45,679

which has been mapping the surface of

472

00:30:51,590 --> 00:30:49,840

the moon from lunar orbit since 2009.

473

00:30:53,909 --> 00:30:51,600

maps will be incredibly important for

474

00:31:00,690 --> 00:30:53,919

exploring the moon and locating water

475

00:31:00,700 --> 00:31:06,230

[Music]

476

00:31:10,549 --> 00:31:08,549

watching apollo footage of astronauts

477

00:31:12,710 --> 00:31:10,559

doing geology on the surface of the moon

478

00:31:15,190 --> 00:31:12,720

is a really great way to think about

479

00:31:18,310 --> 00:31:15,200

preparing for artemis for putting people

480

00:31:20,870 --> 00:31:18,320

on the lunar surface once again

481

00:31:22,389 --> 00:31:20,880

we learn a lot in how they did science

482

00:31:24,149 --> 00:31:22,399

operations on the moon and what it's

483

00:31:26,389 --> 00:31:24,159

like to work on the moon you see them

484

00:31:28,470 --> 00:31:26,399

doing geology you see them taking rock

485

00:31:30,630 --> 00:31:28,480

samples putting in a drive tube to take

486

00:31:32,230 --> 00:31:30,640

a core sample you see them bouncing

487

00:31:34,630 --> 00:31:32,240

along the surface of the moon on the

488

00:31:37,350 --> 00:31:34,640

lunar rover that they used in apollo 15

489

00:31:39,110 --> 00:31:37,360

through 17. so it's a great way to help

490

00:31:40,950 --> 00:31:39,120

drive technology development for the

491

00:31:43,029 --> 00:31:40,960

next generation of spacesuits and

492

00:31:46,149 --> 00:31:43,039

geology sampling tools there's these

493

00:31:48,870 --> 00:31:46,159

facilities that help us train like we

494

00:31:52,710 --> 00:31:48,880

are on the lunar surface you know these

495

00:31:54,470 --> 00:31:52,720

1 6g offload systems or putting people

496

00:31:57,029 --> 00:31:54,480

in the aquatic environment are great

497

00:31:58,950 --> 00:31:57,039

ways to train the mobility part right

498

00:32:01,669 --> 00:31:58,960

like what can you do and how different

499

00:32:04,070 --> 00:32:01,679

does it feel to be in 1 6g and do these

500

00:32:06,710 --> 00:32:04,080

tasks we've been training astronauts in

501
00:32:09,029 --> 00:32:06,720
geology and geoscience for decades now

502
00:32:11,350 --> 00:32:09,039
the apollo astronauts had literally

503
00:32:13,190 --> 00:32:11,360
hundreds of hours of training in geology

504
00:32:14,870 --> 00:32:13,200
before they flew to the moon it's often

505
00:32:16,630 --> 00:32:14,880
said that the apollo astronauts had the

506
00:32:18,310 --> 00:32:16,640
equivalent of a master's degree in

507
00:32:19,110 --> 00:32:18,320
geology by the time they flew to the

508
00:32:21,110 --> 00:32:19,120
moon

509
00:32:23,110 --> 00:32:21,120
in the intervening decades since apollo

510
00:32:24,630 --> 00:32:23,120
we've been training astronauts who fly

511
00:32:26,549 --> 00:32:24,640
to the international space station

512
00:32:28,789 --> 00:32:26,559
because when they're on the iss they

513
00:32:30,630 --> 00:32:28,799

spend time observing the earth looking

514

00:32:32,549 --> 00:32:30,640

out the window taking pictures of what

515

00:32:34,310 --> 00:32:32,559

they see on the earth's surface now that

516

00:32:36,389 --> 00:32:34,320

we're looking at putting astronauts on

517

00:32:38,549 --> 00:32:36,399

the surface of the moon we also take

518

00:32:40,710 --> 00:32:38,559

them into the field we take them to

519

00:32:42,789 --> 00:32:40,720

field sites here on earth that resemble

520

00:32:44,549 --> 00:32:42,799

field sites that we expect them to see

521

00:32:46,310 --> 00:32:44,559

on the moon that's the reason why we

522

00:32:50,149 --> 00:32:46,320

take them out into places that are

523

00:32:52,230 --> 00:32:50,159

unique like volcanic landscapes or

524

00:32:54,310 --> 00:32:52,240

places that are analogous to the lunar

525

00:32:56,389 --> 00:32:54,320

surface to train them on the scale and

526

00:32:58,789 --> 00:32:56,399

fidelity of science that you just can't

527

00:33:00,789 --> 00:32:58,799

recreate in these facilities and so by

528

00:33:02,789 --> 00:33:00,799

combining this classroom and field

529

00:33:04,789 --> 00:33:02,799

training we're able to prep them for

530

00:33:06,549 --> 00:33:04,799

fundamentals of geology the major

531

00:33:08,230 --> 00:33:06,559

driving lunar science questions that we

532

00:33:10,389 --> 00:33:08,240

have that we hope to address with the

533

00:33:12,230 --> 00:33:10,399

artemis program and teaching them how to

534

00:33:15,190 --> 00:33:12,240

do field work in relevant analog

535

00:33:17,669 --> 00:33:15,200

environments for just science aspects of

536

00:33:19,990 --> 00:33:17,679

developing new spacesuits can it get you

537

00:33:22,470 --> 00:33:20,000

to where you need to go and then once

538

00:33:24,789 --> 00:33:22,480

you get there can you do the cool

539

00:33:27,190 --> 00:33:24,799

science that you need to do and so

540

00:33:28,870 --> 00:33:27,200

that's can you move effectively and

541

00:33:31,830 --> 00:33:28,880

efficiently in the suit to be able to

542

00:33:33,990 --> 00:33:31,840

collect the samples or use the tools or

543

00:33:35,509 --> 00:33:34,000

the instruments for the visibility it's

544

00:33:38,070 --> 00:33:35,519

like can you make the necessary

545

00:33:40,070 --> 00:33:38,080

observations that you need to or does

546

00:33:42,149 --> 00:33:40,080

the suit have the lights on it that it

547

00:33:45,909 --> 00:33:42,159

needs to to illuminate the surface and

548

00:33:50,630 --> 00:33:48,470

the lunar south pole holds tremendous

549

00:33:52,870 --> 00:33:50,640

resources that are going to allow us to

550

00:33:54,549 --> 00:33:52,880

continue to explore this is this is a

551
00:33:56,470 --> 00:33:54,559
place that we've never been before

552
00:33:58,070 --> 00:33:56,480
there's so much to be learned from

553
00:34:00,710 --> 00:33:58,080
getting boots on the ground and

554
00:34:03,750 --> 00:34:00,720
exploring a unique place that challenges

555
00:34:06,630 --> 00:34:03,760
us as humans and also helps us develop

556
00:34:08,710 --> 00:34:06,640
technologies that make our everyday life

557
00:34:11,030 --> 00:34:08,720
that much better we think there might be

558
00:34:12,790 --> 00:34:11,040
volatiles present at the south pole by

559
00:34:14,790 --> 00:34:12,800
using these volatiles we'll be able to

560
00:34:16,869 --> 00:34:14,800
do things like create drinking water

561
00:34:18,550 --> 00:34:16,879
create rocket fuel to launch astronauts

562
00:34:20,550 --> 00:34:18,560
back to earth and so by harnessing the

563
00:34:22,389 --> 00:34:20,560

power of the land will be able to help

564

00:34:23,970 --> 00:34:22,399

astronauts establish that long-term

565

00:34:33,030 --> 00:34:23,980

sustainable presence

566

00:34:37,829 --> 00:34:35,270

it's human nature to explore pushing our

567

00:34:39,510 --> 00:34:37,839

boundaries and exploring our universe is

568

00:34:41,829 --> 00:34:39,520

i think just one of those things that's

569

00:34:43,669 --> 00:34:41,839

just stuck in our human nature and that

570

00:34:45,190 --> 00:34:43,679

we need to do it in order to understand

571

00:34:52,360 --> 00:34:45,200

the world around us

572

00:34:52,370 --> 00:34:58,870

[Music]

573

00:35:04,550 --> 00:35:02,230

wow that was so exciting and inspiring

574

00:35:06,310 --> 00:35:04,560

now the views tonight of tonight's moon

575

00:35:09,030 --> 00:35:06,320

through slu's canary four solar system

576
00:35:11,190 --> 00:35:09,040
telescope are pretty fantastic there is

577
00:35:12,790 --> 00:35:11,200
one spot that i love to point out to

578
00:35:14,630 --> 00:35:12,800
myself whenever i'm looking at our

579
00:35:16,630 --> 00:35:14,640
natural satellite both through a

580
00:35:18,950 --> 00:35:16,640
telescope or with the naked eye and it's

581
00:35:21,270 --> 00:35:18,960
where the first crewed mission landed

582
00:35:22,870 --> 00:35:21,280
neil armstrong and edwin buzz aldrin

583
00:35:25,750 --> 00:35:22,880
explored the lunar surface near the

584
00:35:28,550 --> 00:35:25,760
southwest corner of mare trancolotales

585
00:35:31,510 --> 00:35:28,560
during apollo 11. an easy way to spot it

586
00:35:33,190 --> 00:35:31,520
out is to look for the crater multik

587
00:35:36,150 --> 00:35:33,200
it's this one right here and a little

588
00:35:39,670 --> 00:35:36,160

bit away from this left thailand tip

589

00:35:41,510 --> 00:35:39,680

here is about where apollo 11 landed

590

00:35:47,829 --> 00:35:41,520

now it's time for another social media

591

00:35:47,839 --> 00:35:52,390

thanks john that was awesome

592

00:35:56,470 --> 00:35:54,470

now let's check in with you and your

593

00:36:00,390 --> 00:35:56,480

moon observations don't forget to use

594

00:36:04,790 --> 00:36:02,790

well it looks like we have a planetarium

595

00:36:07,109 --> 00:36:04,800

that's sharing uh information about the

596

00:36:09,270 --> 00:36:07,119

moon tonight so fantastic thank you so

597

00:36:14,230 --> 00:36:09,280

much for for getting out there and

598

00:36:19,510 --> 00:36:17,750

and more beautiful artwork showing the

599

00:36:21,030 --> 00:36:19,520

awesome things that we see in our sky

600

00:36:23,270 --> 00:36:21,040

including the moon and that looks like

601
00:36:24,790 --> 00:36:23,280
it might be the sun the relationship

602
00:36:26,390 --> 00:36:24,800
between the moon and the sun thank you

603
00:36:30,630 --> 00:36:26,400
so much

604
00:36:34,470 --> 00:36:32,710
wow this one's beautiful as well i feel

605
00:36:37,190 --> 00:36:34,480
like i could just hang that right up on

606
00:36:41,430 --> 00:36:37,200
my wall oh my goodness what a view thank

607
00:36:45,990 --> 00:36:44,390
wow beautiful pictures showing all the

608
00:36:48,230 --> 00:36:46,000
different ways that we see the moon up

609
00:36:50,470 --> 00:36:48,240
in our sky sometimes it's on a clear

610
00:36:54,390 --> 00:36:50,480
night sometimes it has some clouds in

611
00:36:56,630 --> 00:36:54,400
front of it to give it a little extra um

612
00:36:58,150 --> 00:36:56,640
spookiness maybe some people would say

613
00:37:00,150 --> 00:36:58,160

so thank you so much for all these

614

00:37:01,670 --> 00:37:00,160

beautiful pictures about of the moon we

615

00:37:03,589 --> 00:37:01,680

love looking at them

616

00:37:05,829 --> 00:37:03,599

yeah viewing the moon is my favorite too

617

00:37:07,910 --> 00:37:05,839

so this is this is so great oh and this

618

00:37:09,589 --> 00:37:07,920

is a great picture to demonstrate we

619

00:37:12,310 --> 00:37:09,599

really like to start with the moon and

620

00:37:14,550 --> 00:37:12,320

then keep exploring launch from the moon

621

00:37:16,470 --> 00:37:14,560

into you know whatever part of the sky

622

00:37:18,630 --> 00:37:16,480

that you want to also view so this is

623

00:37:21,190 --> 00:37:18,640

great we have saturn and jupiter and the

624

00:37:27,030 --> 00:37:21,200

moon all in one incredible thank you so

625

00:37:32,470 --> 00:37:29,030

and now we're going to take another look

626

00:37:35,109 --> 00:37:32,480

at the moon uh in our moon trek tours

627

00:37:38,310 --> 00:37:35,119

let's take a look most impact craters on

628

00:37:40,550 --> 00:37:38,320

the moon are quite circular in shape

629

00:37:42,710 --> 00:37:40,560

shiller is an exception

630

00:37:44,470 --> 00:37:42,720

it takes the form of a strongly

631

00:37:48,470 --> 00:37:44,480

elongated oval

632

00:37:51,030 --> 00:37:48,480

measuring 180 by 70 kilometers

633

00:37:53,910 --> 00:37:51,040

it was likely formed by the impact of an

634

00:37:54,870 --> 00:37:53,920

asteroid coming in at a very shallow

635

00:37:56,630 --> 00:37:54,880

angle

636

00:38:01,990 --> 00:37:56,640

and striking the ground nearly

637

00:38:06,069 --> 00:38:04,150

on international observe the moon night

638

00:38:08,710 --> 00:38:06,079

2021

639

00:38:11,430 --> 00:38:08,720

we'll see the harbinger mountains just

640

00:38:14,470 --> 00:38:11,440

after they have experienced sunrise

641

00:38:17,109 --> 00:38:14,480

this small range measures about 95

642

00:38:19,109 --> 00:38:17,119

kilometers long and reaches heights of

643

00:38:22,150 --> 00:38:19,119

about two kilometers

644

00:38:25,640 --> 00:38:22,160

larger telescopes show volcanic vents

645

00:38:30,630 --> 00:38:25,650

and channels on the range's western edge

646

00:38:32,870 --> 00:38:30,640

[Music]

647

00:38:35,270 --> 00:38:32,880

most impact craters on the moon are

648

00:38:37,430 --> 00:38:35,280

quite circular in shape

649

00:38:39,589 --> 00:38:37,440

shiller is an exception

650

00:38:43,829 --> 00:38:39,599

it takes the form of a strongly

651
00:38:45,430 --> 00:38:43,839
elongated oval measuring 180 by 70

652
00:38:47,910 --> 00:38:45,440
kilometers

653
00:38:50,790 --> 00:38:47,920
it was likely formed by the impact of an

654
00:38:51,750 --> 00:38:50,800
asteroid coming in at a very shallow

655
00:38:53,510 --> 00:38:51,760
angle

656
00:39:01,910 --> 00:38:53,520
and striking the ground nearly

657
00:39:06,630 --> 00:39:05,030
wonderful what a beautiful view so

658
00:39:08,550 --> 00:39:06,640
international observant night is

659
00:39:10,710 --> 00:39:08,560
certainly a time for science but it's

660
00:39:12,790 --> 00:39:10,720
also a time to honor our personal and

661
00:39:15,589 --> 00:39:12,800
cultural connections to the moon the

662
00:39:17,589 --> 00:39:15,599
moon is woven into our language and into

663
00:39:20,390 --> 00:39:17,599

cultures around the world we're going to

664

00:39:21,670 --> 00:39:20,400

show you one example here today and we

665

00:39:23,349 --> 00:39:21,680

hope that you

666

00:39:25,190 --> 00:39:23,359

try to learn more about the moon in your

667

00:39:37,990 --> 00:39:25,200

own culture and other cultures around

668

00:39:38,000 --> 00:39:49,710

inca story about the moon

669

00:39:49,720 --> 00:39:54,150

[Music]

670

00:40:00,069 --> 00:39:57,510

hello dr john bover from slu again

671

00:40:02,390 --> 00:40:00,079

next an educator and slew ambassador

672

00:40:05,430 --> 00:40:02,400

milton villarreal will share an inca

673

00:40:08,630 --> 00:40:05,440

myth about our moon titled las lagrimas

674

00:40:11,349 --> 00:40:08,640

de plata de la luna inca or in english

675

00:40:14,790 --> 00:40:11,359

the silver teardrops of the inca moon

676
00:40:14,800 --> 00:40:20,309
las lagrimas de plata de la luna

677
00:40:20,319 --> 00:40:50,309
de los muchos mitosis

678
00:42:46,680 --> 00:42:28,470
a

679
00:42:46,690 --> 00:42:53,670
[Music]

680
00:43:00,390 --> 00:42:57,750
wow thank you so much melton

681
00:43:02,710 --> 00:43:00,400
slu.org has free student accounts for

682
00:43:04,870 --> 00:43:02,720
classrooms and light polluted areas to

683
00:43:09,240 --> 00:43:04,880
connect your students with the stars

684
00:43:09,250 --> 00:43:13,430
[Music]

685
00:43:17,589 --> 00:43:15,430
hello everyone we are the hillbilly

686
00:43:19,190 --> 00:43:17,599
inquirer from south africa and we are so

687
00:43:21,030 --> 00:43:19,200
excited to be celebrating the

688
00:43:22,140 --> 00:43:21,040

international observe the moon night

689

00:43:27,510 --> 00:43:22,150

with

690

00:43:27,520 --> 00:43:36,770

[Applause]

691

00:43:52,309 --> 00:43:42,410

[Music]

692

00:43:55,030 --> 00:43:52,319

i'll close my eyes and i can see

693

00:44:00,820 --> 00:43:55,040

a world that's

694

00:44:09,109 --> 00:44:06,950

[Music]

695

00:44:14,710 --> 00:44:09,119

been before

696

00:44:24,930 --> 00:44:17,430

they can say they can say it all sounds

697

00:44:24,940 --> 00:44:34,069

[Music]

698

00:44:41,080 --> 00:44:39,080

we can live in a world that we desire

699

00:44:43,349 --> 00:44:41,090

[Applause]

700

00:44:46,870 --> 00:44:43,359

[Music]

701
00:44:52,390 --> 00:44:46,880
the brightest colors fill my head a

702
00:45:18,150 --> 00:45:13,589
[Music]

703
00:45:23,030 --> 00:45:18,160
let me be part of it

704
00:45:28,120 --> 00:45:26,470
you may be right you may be wrong but

705
00:45:31,190 --> 00:45:28,130
say that you'll bring

706
00:45:41,050 --> 00:45:31,200
[Music]

707
00:45:49,910 --> 00:45:43,350
[Applause]

708
00:45:54,470 --> 00:45:49,920
[Music]

709
00:46:04,309 --> 00:45:54,480
a million dreams are keeping me away

710
00:46:08,510 --> 00:46:06,210
is

711
00:46:14,570 --> 00:46:08,520
[Applause]

712
00:46:18,790 --> 00:46:14,580
[Music]

713
00:46:21,270 --> 00:46:18,800

[Applause]

714

00:46:24,070 --> 00:46:21,280

over a million dreams for the world

715

00:46:46,790 --> 00:46:24,080

we're gonna make

716

00:46:46,800 --> 00:47:22,390

gascendi is a 110 kilometer diameter

717

00:47:26,309 --> 00:47:24,150

have you gone outside yet to catch the

718

00:47:28,390 --> 00:47:26,319

moon with your own eyes make sure you do

719

00:47:30,549 --> 00:47:28,400

that tonight to add a third vantage

720

00:47:32,069 --> 00:47:30,559

point to your celebration of the

721

00:47:35,109 --> 00:47:32,079

international observe the moon night

722

00:47:36,870 --> 00:47:35,119

2021 thank you so much for enjoying the

723

00:47:45,109 --> 00:47:36,880

live views of our nearest celestial

724

00:47:49,510 --> 00:47:47,430

oh thank you so much john it is really

725

00:47:51,349 --> 00:47:49,520

wonderful to explore the moon with you

726

00:47:53,270 --> 00:47:51,359

and around the world with you

727

00:47:55,349 --> 00:47:53,280

and now we're going to turn it over to

728

00:47:57,990 --> 00:47:55,359

you all out there we've been getting

729

00:48:00,230 --> 00:47:58,000

some great questions from you again you

730

00:48:01,829 --> 00:48:00,240

can still send them in using the hashtag

731

00:48:03,990 --> 00:48:01,839

observe the moon we're going to answer

732

00:48:06,390 --> 00:48:04,000

some on air and there are people waiting

733

00:48:09,270 --> 00:48:06,400

online to answer your questions as well

734

00:48:12,549 --> 00:48:09,280

so let's see alexandra let's get started

735

00:48:15,589 --> 00:48:12,559

yeah rolando on twitter would like to

736

00:48:19,109 --> 00:48:15,599

know he says my son nine years old wants

737

00:48:20,470 --> 00:48:19,119

to know what's at the center of our moon

738

00:48:22,230 --> 00:48:20,480

well that's a fantastic

739

00:48:24,230 --> 00:48:22,240

question and actually what's at the

740

00:48:25,750 --> 00:48:24,240

center of our moon is very similar to

741

00:48:27,430 --> 00:48:25,760

what's at the center of our earth and

742

00:48:30,470 --> 00:48:27,440

that's an iron core

743

00:48:32,790 --> 00:48:30,480

so structurally the moon is very similar

744

00:48:35,990 --> 00:48:32,800

to the earth it has an iron core and it

745

00:48:38,710 --> 00:48:36,000

has a somewhat warm middle mantle middle

746

00:48:40,710 --> 00:48:38,720

and then it's got a cold crust and now

747

00:48:43,670 --> 00:48:40,720

it's it's a lot smaller than the earth

748

00:48:45,109 --> 00:48:43,680

so the the structure the thicknesses of

749

00:48:47,030 --> 00:48:45,119

these materials are a little bit

750

00:48:48,950 --> 00:48:47,040

different but it's very similar and it

751
00:48:49,990 --> 00:48:48,960
does have an iron core much like the

752
00:48:53,109 --> 00:48:50,000
earth

753
00:48:54,549 --> 00:48:53,119
excellent okay now stella on twitter

754
00:48:57,990 --> 00:48:54,559
would like to know

755
00:49:00,230 --> 00:48:58,000
why are some craters circle shaped and

756
00:49:02,230 --> 00:49:00,240
others are oval shaped

757
00:49:04,390 --> 00:49:02,240
fantastic question well the simple

758
00:49:07,430 --> 00:49:04,400
answer for that is that the more

759
00:49:09,990 --> 00:49:07,440
circle-shaped craters are resulting from

760
00:49:12,390 --> 00:49:10,000
impacts that came in more at a

761
00:49:14,069 --> 00:49:12,400
straight-on angle to the surface whereas

762
00:49:16,870 --> 00:49:14,079
the ones the craters that are more

763
00:49:19,430 --> 00:49:16,880

elongated are from impactors that came

764

00:49:21,910 --> 00:49:19,440

in at a more oblique angle so at a more

765

00:49:23,750 --> 00:49:21,920

slanted angle to the surface of the moon

766

00:49:25,990 --> 00:49:23,760

and so the difference in those types of

767

00:49:28,470 --> 00:49:26,000

shapes actually tells us a lot of

768

00:49:31,430 --> 00:49:28,480

information about how that surface was

769

00:49:32,630 --> 00:49:31,440

impacted by whatever material impacted

770

00:49:34,870 --> 00:49:32,640

it

771

00:49:36,710 --> 00:49:34,880

excellent and i guess a related question

772

00:49:38,790 --> 00:49:36,720

here the nordford family on facebook

773

00:49:41,030 --> 00:49:38,800

would like to know how many craters are

774

00:49:42,790 --> 00:49:41,040

there on the moon oh wow well that's a

775

00:49:44,950 --> 00:49:42,800

great question and there really are more

776

00:49:47,030 --> 00:49:44,960

than we can count there's just craters

777

00:49:49,109 --> 00:49:47,040

all over the surface of the moon some

778

00:49:51,430 --> 00:49:49,119

areas have more craters than others

779

00:49:53,829 --> 00:49:51,440

usually the older areas have a lot more

780

00:49:54,870 --> 00:49:53,839

craters in younger areas but there are

781

00:49:56,950 --> 00:49:54,880

just

782

00:49:58,549 --> 00:49:56,960

a lot of craters thousands of craters

783

00:50:01,270 --> 00:49:58,559

all over the moon so i don't know that

784

00:50:03,750 --> 00:50:01,280

anyone's actually counted but there are

785

00:50:07,910 --> 00:50:05,990

excellent well a lot of people have a

786

00:50:09,430 --> 00:50:07,920

lot of questions about the moon now

787

00:50:11,589 --> 00:50:09,440

we're going to hear some more answers

788

00:50:14,230 --> 00:50:11,599

from nasa's lunar reconnaissance orbiter

789

00:50:18,520 --> 00:50:14,240

project scientist noah petro answering

790

00:50:18,530 --> 00:50:27,750

[Music]

791

00:50:31,589 --> 00:50:29,750

hi everyone i'm noah petro the project

792

00:50:33,190 --> 00:50:31,599

scientist of nasa's lunar reconnaissance

793

00:50:35,349 --> 00:50:33,200

orbiter spacecraft which has been at the

794

00:50:37,589 --> 00:50:35,359

moon for over a decade now sending back

795

00:50:39,270 --> 00:50:37,599

a treasure trove of data including some

796

00:50:40,549 --> 00:50:39,280

spectacular images

797

00:50:42,390 --> 00:50:40,559

take a look at that

798

00:50:44,069 --> 00:50:42,400

inevitably whenever nasa publishes a

799

00:50:45,750 --> 00:50:44,079

photo or releases a video of ours

800

00:50:47,670 --> 00:50:45,760

showing the lunar landscape we get

801
00:50:50,069 --> 00:50:47,680
emails tweets and online posts from

802
00:50:51,829 --> 00:50:50,079
viewers asking us to further explain

803
00:50:54,309 --> 00:50:51,839
some of the weird-looking visuals that

804
00:50:55,670 --> 00:50:54,319
they're seeing

805
00:50:57,349 --> 00:50:55,680
so today we're going to look at these

806
00:50:59,430 --> 00:50:57,359
strange and mysterious looking features

807
00:51:00,870 --> 00:50:59,440
on the moon to answer the question what

808
00:51:02,170 --> 00:51:00,880
the heck is that

809
00:51:04,870 --> 00:51:02,180
so let's launch into this

810
00:51:07,270 --> 00:51:04,880
[Music]

811
00:51:08,950 --> 00:51:07,280
in our video apollo 13 views of the moon

812
00:51:11,190 --> 00:51:08,960
many viewers wondered about this strange

813
00:51:13,349 --> 00:51:11,200

looking circle with dark lines so what

814

00:51:15,109 --> 00:51:13,359

the heck is that well for starters this

815

00:51:17,430 --> 00:51:15,119

is not the remnants of an ancient lake

816

00:51:18,870 --> 00:51:17,440

an apology is a sci-fi crowd it's not a

817

00:51:21,190 --> 00:51:18,880

secret moon base with runways or

818

00:51:23,270 --> 00:51:21,200

spacecraft this is a geological feature

819

00:51:24,950 --> 00:51:23,280

known as kamarav crater it's 80

820

00:51:26,470 --> 00:51:24,960

kilometers wide and it's on the far side

821

00:51:27,829 --> 00:51:26,480

of the moon on the edge of marie

822

00:51:29,510 --> 00:51:27,839

moscoviensi

823

00:51:31,270 --> 00:51:29,520

the floor is covered with a network of

824

00:51:33,829 --> 00:51:31,280

rills that make it look like sun-dried

825

00:51:36,790 --> 00:51:33,839

mud and it's a great example of a floor

826

00:51:39,030 --> 00:51:36,800

fracture crater or ffc so what made

827

00:51:41,190 --> 00:51:39,040

comrade look like that the leading idea

828

00:51:42,870 --> 00:51:41,200

among scientists is that sfcs are like

829

00:51:45,510 --> 00:51:42,880

volcanoes that didn't quite reach the

830

00:51:47,270 --> 00:51:45,520

surface an impactor hits the moon

831

00:51:49,030 --> 00:51:47,280

forming the crater and underneath the

832

00:51:51,430 --> 00:51:49,040

crater floor the impact creates a zone

833

00:51:53,349 --> 00:51:51,440

of broken rock called a brecha lens

834

00:51:54,790 --> 00:51:53,359

magma from deeper inside the moon rises

835

00:51:56,630 --> 00:51:54,800

into the cracks of the brechure lens but

836

00:51:58,069 --> 00:51:56,640

something stops it from getting all the

837

00:51:59,990 --> 00:51:58,079

way to the surface

838

00:52:02,069 --> 00:52:00,000

so it spreads out under the crater floor

839

00:52:04,150 --> 00:52:02,079

forming what's called a sill

840

00:52:06,069 --> 00:52:04,160

the magma and hot gases in the cell push

841

00:52:08,390 --> 00:52:06,079

on the crater floor from below causing

842

00:52:10,549 --> 00:52:08,400

it to bulge and fracture like the top of

843

00:52:13,349 --> 00:52:10,559

a cake in an oven the cracks you see are

844

00:52:15,030 --> 00:52:13,359

known as graben release the grubbin

845

00:52:16,630 --> 00:52:15,040

using data from the lunar reconnaissance

846

00:52:18,309 --> 00:52:16,640

orbiter scientists have catalogued over

847

00:52:21,109 --> 00:52:18,319

a hundred floor fractured craters just

848

00:52:23,030 --> 00:52:21,119

like camera they are fascinating works

849

00:52:24,549 --> 00:52:23,040

of nature from billions of years ago

850

00:52:26,150 --> 00:52:24,559

billions

851
00:52:28,309 --> 00:52:26,160
an image from the apollo 11 mission has

852
00:52:29,990 --> 00:52:28,319
gotten a lot of attention over the years

853
00:52:32,309 --> 00:52:30,000
here you see a pair of craters known as

854
00:52:33,829 --> 00:52:32,319
messier and messier a but they don't

855
00:52:35,910 --> 00:52:33,839
look like the more typical round craters

856
00:52:37,670 --> 00:52:35,920
that you see on the moon elro has taken

857
00:52:40,549 --> 00:52:37,680
even more high definition shots of these

858
00:52:42,549 --> 00:52:40,559
two sites showing us incredible detail

859
00:52:44,390 --> 00:52:42,559
these oval shapes and areas of ejected

860
00:52:45,910 --> 00:52:44,400
rock do look like they could belong in

861
00:52:47,910 --> 00:52:45,920
star wars is the crash site of the

862
00:52:49,109 --> 00:52:47,920
millennium falcon and actually the way

863
00:52:51,030 --> 00:52:49,119

you might imagine it seemed like that

864

00:52:52,870 --> 00:52:51,040

happening with an object slamming and

865

00:52:55,670 --> 00:52:52,880

then skipping across the surface is what

866

00:52:57,750 --> 00:52:55,680

took place here except with an asteroid

867

00:52:59,910 --> 00:52:57,760

you see at very low angles an incoming

868

00:53:01,829 --> 00:52:59,920

asteroid can actually become decapitated

869

00:53:03,750 --> 00:53:01,839

with the top part splitting off at the

870

00:53:05,750 --> 00:53:03,760

impact and either escaping back into

871

00:53:07,829 --> 00:53:05,760

space or skipping to form a second

872

00:53:09,109 --> 00:53:07,839

crater think of it like skipping a stone

873

00:53:10,870 --> 00:53:09,119

across the water

874

00:53:12,790 --> 00:53:10,880

both laboratory impact experiments and

875

00:53:15,030 --> 00:53:12,800

computer modeling have demonstrating the

876

00:53:17,109 --> 00:53:15,040

physical effects of the oblique impact a

877

00:53:19,430 --> 00:53:17,119

large asteroid on the moon and Iro's

878

00:53:20,250 --> 00:53:19,440

data helps prove the formation of these

879

00:53:22,950 --> 00:53:20,260

unusual features

880

00:53:24,549 --> 00:53:22,960

[Music]

881

00:53:26,870 --> 00:53:24,559

scattered across the lunar surface are

882

00:53:28,230 --> 00:53:26,880

these long winding features which many

883

00:53:29,190 --> 00:53:28,240

viewers have correctly assumed are

884

00:53:31,270 --> 00:53:29,200

channels

885

00:53:32,470 --> 00:53:31,280

on the moon these are called rills

886

00:53:34,230 --> 00:53:32,480

there's a prominent one here on the

887

00:53:35,990 --> 00:53:34,240

aristarcus plateau and if you're

888

00:53:37,589 --> 00:53:36,000

comparing the visuals on the earth you

889

00:53:39,910 --> 00:53:37,599

might be tempted to think about long

890

00:53:41,829 --> 00:53:39,920

river canyons flowing in long sweeping

891

00:53:44,069 --> 00:53:41,839

manners like the mighty mississippi

892

00:53:45,670 --> 00:53:44,079

pouring out to the gulf of mexico and if

893

00:53:47,349 --> 00:53:45,680

that's what you're thinking

894

00:53:49,910 --> 00:53:47,359

erase it from your memory because it's

895

00:53:53,109 --> 00:53:51,430

now to be fair when these channels were

896

00:53:54,790 --> 00:53:53,119

observed on the moon for the first time

897

00:53:56,790 --> 00:53:54,800

there was an immediate thought that

898

00:53:58,549 --> 00:53:56,800

water may have carved these features

899

00:54:00,470 --> 00:53:58,559

but once we got actual samples from the

900

00:54:02,390 --> 00:54:00,480

moon combined with additional spacecraft

901
00:54:03,910 --> 00:54:02,400
data and studies over the years we've

902
00:54:06,230 --> 00:54:03,920
come to understand that there was never

903
00:54:08,309 --> 00:54:06,240
flowing water on the moon so what could

904
00:54:11,109 --> 00:54:08,319
carve these sweeping features

905
00:54:13,030 --> 00:54:11,119
if you said flowing liquid hot magma

906
00:54:15,990 --> 00:54:13,040
after erupted on the moon's surface

907
00:54:18,309 --> 00:54:16,000
you'd be correct winner when lava flows

908
00:54:21,109 --> 00:54:18,319
across the surface it erodes the crust

909
00:54:23,270 --> 00:54:21,119
and slowly flows as it bends and turns

910
00:54:24,950 --> 00:54:23,280
forming these beautiful channels we have

911
00:54:26,470 --> 00:54:24,960
a great view of this in our rima prince

912
00:54:28,390 --> 00:54:26,480
visualization

913
00:54:30,069 --> 00:54:28,400

here you see a long channel where lava

914

00:54:31,190 --> 00:54:30,079

once flowed from the vera volcanic

915

00:54:32,950 --> 00:54:31,200

depression

916

00:54:35,430 --> 00:54:32,960

eruptions of lava fountains formed a

917

00:54:37,510 --> 00:54:35,440

lake of lava 300 meters deep and carved

918

00:54:39,589 --> 00:54:37,520

a lava channel 100 times deeper than

919

00:54:41,349 --> 00:54:39,599

anything found on the earth these types

920

00:54:43,430 --> 00:54:41,359

of features were so compelling that the

921

00:54:46,390 --> 00:54:43,440

apollo 15 mission went and explored one

922

00:54:47,829 --> 00:54:46,400

in 1971 known as the happy real

923

00:54:49,349 --> 00:54:47,839

future explorers may want to visit

924

00:54:52,470 --> 00:54:49,359

others but they should leave their

925

00:54:54,630 --> 00:54:52,480

fishing lines at home

926
00:54:56,630 --> 00:54:54,640
this visual is one of our most popular

927
00:54:58,789 --> 00:54:56,640
this is a picture of taiko crater and

928
00:55:01,190 --> 00:54:58,799
the famous central peak boulder which is

929
00:55:03,750 --> 00:55:01,200
about 400 feet wide and that's longer

930
00:55:05,510 --> 00:55:03,760
than a football field

931
00:55:11,120 --> 00:55:05,520
how in the world that wind up there well

932
00:55:16,150 --> 00:55:14,630
[Music]

933
00:55:17,990 --> 00:55:16,160
we're going to fly now into a spot on

934
00:55:19,990 --> 00:55:18,000
the near side to look at this weird

935
00:55:22,630 --> 00:55:20,000
feature which has long defied an easy

936
00:55:24,549 --> 00:55:22,640
explanation it's known as reiner gamma

937
00:55:25,910 --> 00:55:24,559
those squiggles and swirls sure are

938
00:55:27,750 --> 00:55:25,920

bizarre

939

00:55:29,589 --> 00:55:27,760

a combination of computer modeling and

940

00:55:31,349 --> 00:55:29,599

data gathered from numerous recent lunar

941

00:55:33,430 --> 00:55:31,359

missions including lunar reconnaissance

942

00:55:35,589 --> 00:55:33,440

orbiter now sheds light on the origin of

943

00:55:37,750 --> 00:55:35,599

these unusual surface decorations which

944

00:55:39,589 --> 00:55:37,760

we call lunar swirls now think of it

945

00:55:41,030 --> 00:55:39,599

this way you've probably been told that

946

00:55:42,470 --> 00:55:41,040

when you go outside to put on your

947

00:55:44,069 --> 00:55:42,480

sunscreen

948

00:55:45,829 --> 00:55:44,079

these beautiful swirls are constant

949

00:55:47,030 --> 00:55:45,839

reminders the moon is no different from

950

00:55:50,069 --> 00:55:47,040

you and me

951
00:55:51,510 --> 00:55:50,079
except that it's a moon and we're humans

952
00:55:53,750 --> 00:55:51,520
these swirls are examples of what

953
00:55:56,150 --> 00:55:53,760
happens when the moon applies spf 3

954
00:55:58,789 --> 00:55:56,160
million the moon is constantly bombarded

955
00:56:00,630 --> 00:55:58,799
by radiation of the sun and galaxy as

956
00:56:03,510 --> 00:56:00,640
well as micro meteorites that sand blast

957
00:56:04,789 --> 00:56:03,520
the surface these swirls however show

958
00:56:07,190 --> 00:56:04,799
what happens when the radiation is

959
00:56:08,789 --> 00:56:07,200
blocked from reaching the surface

960
00:56:10,789 --> 00:56:08,799
data suggests that small magnetic

961
00:56:12,630 --> 00:56:10,799
anomalies block radiation from reaching

962
00:56:14,230 --> 00:56:12,640
the surface and therefore prevent the

963
00:56:15,829 --> 00:56:14,240

moon from getting sunburned in these

964

00:56:16,870 --> 00:56:15,839

areas which keep them as bright as they

965

00:56:18,470 --> 00:56:16,880

appear to be

966

00:56:20,630 --> 00:56:18,480

so the next time you put on sunblock to

967

00:56:22,390 --> 00:56:20,640

go lounge outside think of the moon and

968

00:56:23,780 --> 00:56:22,400

how it gets baked in the sun just like

969

00:56:25,589 --> 00:56:23,790

you and me

970

00:56:27,190 --> 00:56:25,599

[Music]

971

00:56:28,870 --> 00:56:27,200

thanks for watching today hopefully this

972

00:56:30,390 --> 00:56:28,880

video taught you more about the moon and

973

00:56:31,750 --> 00:56:30,400

that you aren't left thinking what the

974

00:56:35,109 --> 00:56:31,760

heck was that

975

00:56:38,630 --> 00:56:35,119

i'm noah petro signing off

976

00:56:41,349 --> 00:56:38,640

gascendi is a 110 kilometer diameter

977

00:56:44,870 --> 00:56:41,359

floor fractured crater that lies on the

978

00:56:47,750 --> 00:56:44,880

northern rim of mare humerum it had its

979

00:56:49,030 --> 00:56:47,760

floor pushed up by magma rising from

980

00:56:52,069 --> 00:56:49,040

below

981

00:56:56,590 --> 00:56:52,079

larger telescopes will reveal a network

982

00:57:03,990 --> 00:56:56,600

of fractures across the crater floor

983

00:57:08,230 --> 00:57:06,150

the future of human space exploration is

984

00:57:10,309 --> 00:57:08,240

being driven by what we can discover and

985

00:57:12,230 --> 00:57:10,319

accomplish on the moon

986

00:57:14,549 --> 00:57:12,240

and with nasa's confirmation of ice

987

00:57:16,390 --> 00:57:14,559

existing at the lunar south pole the

988

00:57:19,030 --> 00:57:16,400

critical task of finding and mapping

989

00:57:23,349 --> 00:57:19,040

where water exists what form it is in

990

00:57:26,789 --> 00:57:24,710

leading us on that journey will be

991

00:57:29,829 --> 00:57:26,799

nasa's first mobile robotic mission on

992

00:57:32,630 --> 00:57:29,839

the moon known as viper the volatiles

993

00:57:34,390 --> 00:57:32,640

investigating polar exploration rover it

994

00:57:36,470 --> 00:57:34,400

will be delivered to the nobile region

995

00:57:38,309 --> 00:57:36,480

of the south pole as part of nasa's

996

00:57:39,349 --> 00:57:38,319

commercial lunar payload services

997

00:57:41,030 --> 00:57:39,359

initiative

998

00:57:43,589 --> 00:57:41,040

this region sits just outside the

999

00:57:47,349 --> 00:57:43,599

western rim of nobile crater and covers

1000

00:57:49,109 --> 00:57:47,359

an area of 36 square miles

1001
00:57:50,549 --> 00:57:49,119
as the first ever resource mapping

1002
00:57:51,990 --> 00:57:50,559
mission on the surface of another

1003
00:57:53,750 --> 00:57:52,000
celestial body

1004
00:57:55,349 --> 00:57:53,760
viper will roam the surface equipped

1005
00:57:57,670 --> 00:57:55,359
with three science instruments and a

1006
00:57:59,750 --> 00:57:57,680
drill to detect and analyze various

1007
00:58:02,069 --> 00:57:59,760
lunar soil environments at a range of

1008
00:58:03,829 --> 00:58:02,079
depths and temperatures

1009
00:58:05,670 --> 00:58:03,839
the rover will venture into permanently

1010
00:58:07,829 --> 00:58:05,680
shadowed craters some of the coldest

1011
00:58:09,349 --> 00:58:07,839
spots in the solar system where ice

1012
00:58:15,270 --> 00:58:09,359
reserves have been preserved for

1013
00:58:19,589 --> 00:58:17,349

nasa had four critical parameters when

1014

00:58:21,670 --> 00:58:19,599

choosing a landing site for viper

1015

00:58:23,349 --> 00:58:21,680

available sunlight

1016

00:58:25,190 --> 00:58:23,359

visibility for communications from the

1017

00:58:26,950 --> 00:58:25,200

moon to the earth

1018

00:58:28,789 --> 00:58:26,960

data showing the potential presence of

1019

00:58:30,309 --> 00:58:28,799

water and other resources

1020

00:58:32,090 --> 00:58:30,319

and terrain that is well suited for

1021

00:58:36,390 --> 00:58:32,100

viper to navigate

1022

00:58:38,470 --> 00:58:36,400

[Music]

1023

00:58:43,030 --> 00:58:38,480

the area to the west of nobile crater

1024

00:58:47,990 --> 00:58:45,190

once on the surface viper's mission will

1025

00:58:48,870 --> 00:58:48,000

last 100 days and cover between 10 to 15

1026
00:58:50,470 --> 00:58:48,880
miles

1027
00:58:52,390 --> 00:58:50,480
and while a baseline traversal through

1028
00:58:54,789 --> 00:58:52,400
the nobile region has been identified

1029
00:58:57,030 --> 00:58:54,799
for the rover the scientific discoveries

1030
00:58:58,549 --> 00:58:57,040
viper makes along the way will actually

1031
00:59:01,109 --> 00:58:58,559
influence where the mission team sends

1032
00:59:04,470 --> 00:59:01,119
it next so its planned route will most

1033
00:59:06,630 --> 00:59:04,480
likely change

1034
00:59:08,870 --> 00:59:06,640
during its travels viper will visit at

1035
00:59:15,260 --> 00:59:08,880
least six locations where data suggests

1036
00:59:19,190 --> 00:59:17,349
[Music]

1037
00:59:21,750 --> 00:59:19,200
by helping determine the locations of

1038
00:59:23,510 --> 00:59:21,760

where water and other resources exist

1039

00:59:25,430 --> 00:59:23,520

viper's findings will help pave the way

1040

00:59:27,349 --> 00:59:25,440

for future landing sites under nasa's

1041

00:59:29,270 --> 00:59:27,359

artemis program

1042

00:59:31,589 --> 00:59:29,280

the prospects of achieving a long-term

1043

00:59:45,589 --> 00:59:31,599

human presence on our moon never looks

1044

00:59:49,190 --> 00:59:47,910

hello again now earlier in the broadcast

1045

00:59:51,510 --> 00:59:49,200

we were looking at the moons from the

1046

00:59:55,270 --> 00:59:51,520

canary islands but now we've traveled

1047

00:59:57,030 --> 00:59:55,280

more than 5 500 miles or 8 900

1048

00:59:58,950 --> 00:59:57,040

kilometers from the canary islands to

1049

01:00:00,630 --> 00:59:58,960

light adhesive chili check out the moon

1050

01:00:03,190 --> 01:00:00,640

with slew's chili one wide wheel

1051
01:00:05,589 --> 01:00:03,200
telescope it's amazing to experience the

1052
01:00:07,430 --> 01:00:05,599
same mood from different vantage points

1053
01:00:09,589 --> 01:00:07,440
have you gone outside yet to catch the

1054
01:00:11,510 --> 01:00:09,599
moon in your own eyes make sure you do

1055
01:00:13,670 --> 01:00:11,520
that tonight to add a third vantage

1056
01:00:15,349 --> 01:00:13,680
point to our celebration of the

1057
01:00:18,630 --> 01:00:15,359
international observe the moon night

1058
01:00:20,230 --> 01:00:18,640
2021 thank you so much for life for

1059
01:00:26,789 --> 01:00:20,240
enjoying the live views of our nearest

1060
01:00:31,990 --> 01:00:28,630
now let's take one more look at your

1061
01:00:34,710 --> 01:00:32,000
moon observations andrea what do we have

1062
01:00:36,950 --> 01:00:34,720
oh we have this great view of the moon

1063
01:00:42,390 --> 01:00:36,960

from houston texas it looks like maybe a

1064

01:00:44,870 --> 01:00:42,400

painting i love this moon art thank you

1065

01:00:46,309 --> 01:00:44,880

and next we have some a beautiful artist

1066

01:00:47,829 --> 01:00:46,319

painting showing all the different

1067

01:00:50,630 --> 01:00:47,839

colors of the moon in different

1068

01:00:53,109 --> 01:00:50,640

compositions so thank you so much again

1069

01:00:56,950 --> 01:00:53,119

we love seeing this creativity around

1070

01:00:59,750 --> 01:00:56,960

science and around the moon

1071

01:01:02,230 --> 01:00:59,760

oh and we have moon observations in

1072

01:01:04,230 --> 01:01:02,240

pakistan it's just incredible that

1073

01:01:05,829 --> 01:01:04,240

people around the world right now are

1074

01:01:08,549 --> 01:01:05,839

observing the moon and we've been seeing

1075

01:01:10,870 --> 01:01:08,559

so many more of your moon views and your

1076
01:01:12,870 --> 01:01:10,880
moon observations coming in so follow

1077
01:01:14,470 --> 01:01:12,880
along and see what everyone else is is

1078
01:01:16,789 --> 01:01:14,480
doing around the world right now on that

1079
01:01:19,510 --> 01:01:16,799
hashtag observe the moon it's great to

1080
01:01:20,630 --> 01:01:19,520
to see what you're doing thank you

1081
01:01:24,549 --> 01:01:20,640
all right

1082
01:01:26,549 --> 01:01:24,559
so i think we're wrapping up here this

1083
01:01:28,549 --> 01:01:26,559
has been such a pleasure i hope those of

1084
01:01:30,390 --> 01:01:28,559
you who are able to do so go out and

1085
01:01:32,150 --> 01:01:30,400
look at the moon tonight from wherever

1086
01:01:34,710 --> 01:01:32,160
you are knowing that people around the

1087
01:01:36,549 --> 01:01:34,720
world are observing with you

1088
01:01:38,470 --> 01:01:36,559

and keep letting us know keep letting

1089

01:01:40,549 --> 01:01:38,480

each other know how you are

1090

01:01:42,789 --> 01:01:40,559

participating again using that hashtag

1091

01:01:44,950 --> 01:01:42,799

observe the moon and you can still add

1092

01:01:47,030 --> 01:01:44,960

yourself to the map of lunar observers

1093

01:01:49,349 --> 01:01:47,040

around the world and you can share your

1094

01:01:51,109 --> 01:01:49,359

feedback with us about this broadcast

1095

01:01:53,270 --> 01:01:51,119

and about international observe the moon

1096

01:01:56,069 --> 01:01:53,280

night so we can keep making the program

1097

01:01:58,069 --> 01:01:56,079

better year after year on our website

1098

01:01:59,990 --> 01:01:58,079

which is moon.nasa.gov

1099

01:02:02,630 --> 01:02:00,000

observe and we also want to take a

1100

01:02:04,390 --> 01:02:02,640

minute to congratulate another team

1101

01:02:07,190 --> 01:02:04,400

there's another great planetary event

1102

01:02:09,349 --> 01:02:07,200

today the lucy mission launched

1103

01:02:12,309 --> 01:02:09,359

successfully this morning and it is now

1104

01:02:14,069 --> 01:02:12,319

off to explore the trojan asteroids it's

1105

01:02:16,230 --> 01:02:14,079

going to help us better understand our

1106

01:02:18,230 --> 01:02:16,240

solar system origins so we hope you

1107

01:02:20,549 --> 01:02:18,240

follow along with that mission we hope

1108

01:02:23,910 --> 01:02:20,559

that you continue observing the moon the

1109

01:02:25,750 --> 01:02:23,920

skies the stars and the world around you

1110

01:02:27,910 --> 01:02:25,760

and we're really really happy that you

1111

01:02:29,750 --> 01:02:27,920

were able to be here with us tonight

1112

01:02:31,270 --> 01:02:29,760

thanks so much for joining us and we

1113

01:02:32,870 --> 01:02:31,280

hope you have a great rest of your

1114

01:02:35,450 --> 01:02:32,880

international observe the moon night

1115

01:02:46,840 --> 01:02:35,460

adios goodbye

1116

01:02:46,850 --> 01:02:51,990

[Music]

1117

01:05:56,900 --> 01:02:53,240

so

1118

01:06:44,870 --> 01:06:20,430

[Music]

1119

01:06:48,789 --> 01:06:46,870

hey everybody this is beck and i'm a

1120

01:06:51,910 --> 01:06:48,799

maker of music

1121

01:06:53,430 --> 01:06:51,920

and like the great sun raw said space is

1122

01:06:55,829 --> 01:06:53,440

the place

1123

01:06:59,109 --> 01:06:55,839

and i'm farah i work at nasa and i use

1124

01:07:00,710 --> 01:06:59,119

ai to explore mars and i brought a few

1125

01:07:02,710 --> 01:07:00,720

friends along who knows something about

1126

01:07:03,990 --> 01:07:02,720

artificial intelligence