

#AskNASA



WHAT'S OUT THERE?

1
00:00:02,635 --> 00:00:04,104
>> HI, I'M LORI,

2
00:00:04,104 --> 00:00:05,305
I STUDY THE PLANETS,

3
00:00:05,305 --> 00:00:06,473
OUR SOLAR SYSTEM,

4
00:00:06,473 --> 00:00:08,541
AND I ESPECIALLY LOVE VOLCANOES.

5
00:00:08,541 --> 00:00:10,310
AND THIS IS "ASK NASA."

6
00:00:15,248 --> 00:00:16,683
THE THING I LOVE THE MOST

7
00:00:16,683 --> 00:00:18,017
ABOUT OUR SOLAR SYSTEM

8
00:00:18,017 --> 00:00:19,753
IS THAT IT'S AN INCREDIBLE

9
00:00:19,753 --> 00:00:21,688
NATURAL LABORATORY.

10
00:00:21,688 --> 00:00:23,656
WE HAVE SO MANY DIFFERENT

11
00:00:23,656 --> 00:00:25,425
TYPES OF OBJECTS

12
00:00:25,425 --> 00:00:26,359
IN THE SOLAR SYSTEM,

13
00:00:26,359 --> 00:00:27,827

FROM PLANETS AND MOONS

14

00:00:27,827 --> 00:00:29,295
AND ASTEROIDS AND COMETS.

15

00:00:29,295 --> 00:00:30,830
WE CAN STUDY EACH ONE OF THOSE,

16

00:00:30,830 --> 00:00:31,831
AND THEY ALL HAVE SOMETHING

17

00:00:31,831 --> 00:00:33,533
THEY CAN TELL US ABOUT

18

00:00:33,533 --> 00:00:35,735
HOW THE SOLAR SYSTEM FORMED

19

00:00:35,735 --> 00:00:36,903
OR HOW EARTH ENDED UP

20

00:00:36,903 --> 00:00:38,438
IN ITS SPECIAL PLACE.

21

00:00:38,438 --> 00:00:39,606
AND UNDERSTANDING WHY

22

00:00:39,606 --> 00:00:40,573
THE OTHER PLANETS ARE

23

00:00:40,573 --> 00:00:41,975
DIFFERENT FROM EARTH ACTUALLY

24

00:00:41,975 --> 00:00:43,343
HELPS US BETTER UNDERSTAND

25

00:00:43,343 --> 00:00:44,077
HOW WE ENDED UP

26

00:00:44,077 --> 00:00:45,412

THE WAY WE ARE TODAY.

27

00:00:48,181 --> 00:00:49,716

SO THIS IS A GLOBE

28

00:00:49,716 --> 00:00:51,484

OF MARS RIGHT HERE.

29

00:00:51,484 --> 00:00:53,286

AND, UH, MANY OF THE REASONS

30

00:00:53,286 --> 00:00:55,088

WHY WE'RE SO INTERESTED IN MARS,

31

00:00:55,088 --> 00:00:55,722

THERE'S A LOT

32

00:00:55,722 --> 00:00:56,689

OF DIFFERENT PROCESSES

33

00:00:56,689 --> 00:00:58,091

GOING ON ON MARS

34

00:00:58,091 --> 00:00:58,992

THAT HELP US

35

00:00:58,992 --> 00:01:00,193

BETTER UNDERSTAND EARTH.

36

00:01:00,193 --> 00:01:01,928

A LOT OF THE SURFACE OF MARS

37

00:01:01,928 --> 00:01:02,929

HAS BEEN PRESERVED

38

00:01:02,929 --> 00:01:05,465

FOR ALMOST 4 BILLION YEARS.

39

00:01:05,465 --> 00:01:06,299

AND SO WE CAN STUDY

40

00:01:06,299 --> 00:01:07,167

A LOT OF THINGS ON MARS

41

00:01:07,167 --> 00:01:07,734

THAT YOU CAN'T

42

00:01:07,734 --> 00:01:09,235

EVEN FIND ON EARTH.

43

00:01:09,235 --> 00:01:10,403

>> TOUCHDOWN CONFIRMED.

44

00:01:10,403 --> 00:01:12,439

PERSEVERANCE SAFELY

45

00:01:12,439 --> 00:01:14,274

ON THE SURFACE OF MARS,

46

00:01:14,274 --> 00:01:15,175

READY TO BEGIN

47

00:01:15,175 --> 00:01:18,545

SEEKING THE SIGNS OF PAST LIFE.

48

00:01:18,545 --> 00:01:19,679

>> SO, PERSEVERANCE ROVER

49

00:01:19,679 --> 00:01:20,780

IS GONNA DRIVE AROUND

50

00:01:20,780 --> 00:01:21,414

AND FIND SOME

51
00:01:21,414 --> 00:01:23,149
OF THE BEST ROCKS IT CAN,

52
00:01:23,149 --> 00:01:24,050
DRILL DOWN INTO

53
00:01:24,050 --> 00:01:25,018
THE ROCK AND SOIL

54
00:01:25,018 --> 00:01:26,619
AND COLLECT THOSE SAMPLES

55
00:01:26,619 --> 00:01:28,488
SO THAT ON OUR NEXT MISSION,

56
00:01:28,488 --> 00:01:29,289
MARS SAMPLE RETURN,

57
00:01:29,289 --> 00:01:29,989
WE'LL BE ABLE TO BRING

58
00:01:29,989 --> 00:01:31,357
THOSE BACK AND STUDY 'EM

59
00:01:31,357 --> 00:01:32,258
IN OUR LABORATORIES

60
00:01:32,258 --> 00:01:34,394
HERE ON EARTH.

61
00:01:34,394 --> 00:01:36,095
THERE IS A VOLCANO ON MARS!

62
00:01:36,095 --> 00:01:37,330
IN FACT, THERE'S LOTS

63
00:01:37,330 --> 00:01:39,032

OF VOLCANOES ON MARS.

64
00:01:39,032 --> 00:01:41,100
THE LARGEST VOLCANO WE KNOW OF

65
00:01:41,100 --> 00:01:42,969
IN OUR WHOLE SOLAR SYSTEM

66
00:01:42,969 --> 00:01:43,970
IS ON MARS.

67
00:01:43,970 --> 00:01:45,505
IT'S CALLED OLYMPUS MONS,

68
00:01:45,505 --> 00:01:47,006
AND IT IS SO GIANT

69
00:01:47,006 --> 00:01:48,374
THAT THE ENTIRE CHAIN

70
00:01:48,374 --> 00:01:49,476
OF HAWAIIAN ISLANDS

71
00:01:49,476 --> 00:01:51,044
COULD FIT INSIDE THE CRATER

72
00:01:51,044 --> 00:01:53,012
AT THE TOP OF THAT VOLCANO.

73
00:01:53,012 --> 00:01:54,347
WE SEE VOLCANOES

74
00:01:54,347 --> 00:01:56,015
REALLY ACROSS THE SOLAR SYSTEM

75
00:01:56,015 --> 00:01:57,650
ON ALL OF OUR ROCKY BODIES.

76
00:01:57,650 --> 00:01:58,985
SO ON MERCURY, WE SEE EVIDENCE

77
00:01:58,985 --> 00:02:00,286
OF LAVA FLOWS

78
00:02:00,286 --> 00:02:01,321
ON THE SURFACE OF MERCURY.

79
00:02:01,321 --> 00:02:02,088
EVEN ON THE MOON

80
00:02:02,088 --> 00:02:03,323
WE HAVE LAVA FLOWS

81
00:02:03,323 --> 00:02:04,591
THAT WE CAN SEE.

82
00:02:04,591 --> 00:02:05,792
ON VENUS, WE SEE

83
00:02:05,792 --> 00:02:06,860
THE ENTIRE SURFACE OF VENUS

84
00:02:06,860 --> 00:02:07,794
IS COVERED WITH

85
00:02:07,794 --> 00:02:08,895
LOTS OF VOLCANOES

86
00:02:08,895 --> 00:02:12,198
AND VOLCANIC DEPOSIT.

87
00:02:12,198 --> 00:02:14,267
>> HEY!

88
00:02:14,267 --> 00:02:16,436

>> SO THIS IS A GLOBE

89

00:02:16,436 --> 00:02:18,004
OF THE MOON IO.

90

00:02:18,004 --> 00:02:19,506
IO'S A MOON OF JUPITER.

91

00:02:19,506 --> 00:02:20,106
THAT'S THE MOST

92

00:02:20,106 --> 00:02:21,508
VOLCANICALLY ACTIVE BODY

93

00:02:21,508 --> 00:02:22,976
IN OUR SOLAR SYSTEM.

94

00:02:22,976 --> 00:02:24,143
AND THAT'S BECAUSE

95

00:02:24,143 --> 00:02:25,578
THE PULL OF JUPITER'S

96

00:02:25,578 --> 00:02:26,713
GRAVITY ON IO

97

00:02:26,713 --> 00:02:28,715
AS IT GOES AROUND JUPITER

98

00:02:28,715 --> 00:02:30,383
TUGS AND PULLS AT IO,

99

00:02:30,383 --> 00:02:32,452
AND THAT HEATS UP THE INSIDE,

100

00:02:32,452 --> 00:02:34,120
AND THAT DRIVES VOLCANOES.

101
00:02:34,120 --> 00:02:35,622
THE HEAT NEEDS TO BE RELEASED.

102
00:02:35,622 --> 00:02:37,690
THIS IS THE VOLCANO PELE,

103
00:02:37,690 --> 00:02:39,125
UM, AND THERE'S LAVA FLOWS

104
00:02:39,125 --> 00:02:39,893
DOWN HERE IN THE MIDDLE,

105
00:02:39,893 --> 00:02:40,860
BUT THEN THERE'S ALSO

106
00:02:40,860 --> 00:02:43,096
THIS BIG RED-ORANGE DEPOSIT,

107
00:02:43,096 --> 00:02:44,430
WHICH IS ACTUALLY FROM

108
00:02:44,430 --> 00:02:45,899
THE EXPLOSIVE ERUPTION

109
00:02:45,899 --> 00:02:46,699
OF THE GASSES

110
00:02:46,699 --> 00:02:47,600
THAT ARE FALLING DOWN

111
00:02:47,600 --> 00:02:48,968
ONTO THE SURFACE OF IO

112
00:02:48,968 --> 00:02:50,603
AROUND THE VOLCANO.

113
00:02:50,603 --> 00:02:51,704

AND IT HAS NO ATMOSPHERE,

114

00:02:51,704 --> 00:02:52,338

SO IF YOU WERE

115

00:02:52,338 --> 00:02:54,007

TO TURN IT LIKE THIS

116

00:02:54,007 --> 00:02:55,808

AND LOOK AT THIS VOLCANO

117

00:02:55,808 --> 00:02:56,309

FROM THE SIDE,

118

00:02:56,309 --> 00:02:58,645

YOU'D SEE A BIG UMBRELLA OF GAS.

119

00:02:58,645 --> 00:03:00,113

THE PARTICLES JUST

120

00:03:00,113 --> 00:03:00,914

COME OUT, SHOOP,

121

00:03:00,914 --> 00:03:04,617

AND THEN THEY DROP BACK DOWN.

122

00:03:04,617 --> 00:03:05,718

UM, AND I STARTED STUDYING

123

00:03:05,718 --> 00:03:06,586

VOLCANOES ON EARTH,

124

00:03:06,586 --> 00:03:08,154

ABOUT 35 YEARS AGO,

125

00:03:08,154 --> 00:03:09,122

AND THEN STARTED STUDYING

126
00:03:09,122 --> 00:03:10,390
VOLCANOES ON OTHER PLANETS,

127
00:03:10,390 --> 00:03:11,624
AND THAT GREW INTO MY LOVE

128
00:03:11,624 --> 00:03:13,593
OF OUR SOLAR SYSTEM.

129
00:03:13,593 --> 00:03:15,194
SO THE ASTEROID BELT

130
00:03:15,194 --> 00:03:17,130
REALLY CONTAINS A LOT

131
00:03:17,130 --> 00:03:18,798
OF LEFTOVER MATERIAL

132
00:03:18,798 --> 00:03:20,833
FROM SOLAR SYSTEM FORMATION.

133
00:03:20,833 --> 00:03:21,901
YOU CAN IMAGINE THAT WHEN

134
00:03:21,901 --> 00:03:23,570
THE SOLAR SYSTEM FIRST FORMED,

135
00:03:23,570 --> 00:03:24,370
THE PARTICLES KIND OF

136
00:03:24,370 --> 00:03:25,572
CAME TOGETHER

137
00:03:25,572 --> 00:03:26,739
AND MADE BIGGER PARTICLES.

138
00:03:26,739 --> 00:03:27,640

SOME OF THOSE CAME TOGETHER

139

00:03:27,640 --> 00:03:29,609

AND CREATED THE PLANETS.

140

00:03:29,609 --> 00:03:30,877

WE ACTUALLY FIND ASTEROIDS

141

00:03:30,877 --> 00:03:32,045

IN LOTS OF DIFFERENT PARTS

142

00:03:32,045 --> 00:03:33,112

OF OUR SOLAR SYSTEM.

143

00:03:33,112 --> 00:03:33,880

WE HAVE ASTEROIDS

144

00:03:33,880 --> 00:03:35,281

THAT ARE NEAR JUPITER,

145

00:03:35,281 --> 00:03:36,082

THE LUCY MISSION,

146

00:03:36,082 --> 00:03:37,150

WHICH IS GOING TO LAUNCH

147

00:03:37,150 --> 00:03:39,452

THIS YEAR IN 2021,

148

00:03:39,452 --> 00:03:40,286

AND IT'S GONNA GO STUDY

149

00:03:40,286 --> 00:03:41,588

THOSE SPECIAL ASTEROIDS

150

00:03:41,588 --> 00:03:42,255

THAT ARE TRAPPED

151
00:03:42,255 --> 00:03:43,890
IN JUPITER'S ORBIT.

152
00:03:43,890 --> 00:03:44,924
AND THEN NEXT YEAR WE HAVE

153
00:03:44,924 --> 00:03:47,026
ANOTHER MISSION CALLED PSYCHE

154
00:03:47,026 --> 00:03:47,660
THAT'S GOING TO

155
00:03:47,660 --> 00:03:49,362
A PARTICULAR ASTEROID

156
00:03:49,362 --> 00:03:50,530
CALLED PSYCHE

157
00:03:50,530 --> 00:03:51,531
THAT LOOKS TO BE MADE

158
00:03:51,531 --> 00:03:54,667
MOSTLY OF METAL, OF IRON.

159
00:03:54,667 --> 00:03:56,069
IT MAY ACTUALLY BE

160
00:03:56,069 --> 00:03:57,437
THE EXPOSED CORE

161
00:03:57,437 --> 00:03:59,072
OF A SMALL PLANET

162
00:03:59,072 --> 00:04:00,039
THAT MAY HAVE HAD ITS CRUST

163
00:04:00,039 --> 00:04:01,407

BLOWN OFF BY AN IMPACT

164

00:04:01,407 --> 00:04:02,508
AND LEFT THAT METAL CORE

165

00:04:02,508 --> 00:04:03,876
THAT WE CAN SEE.

166

00:04:03,876 --> 00:04:05,044
THERE IS DEFINITELY

167

00:04:05,044 --> 00:04:05,979
WATER ON THE MOON.

168

00:04:05,979 --> 00:04:07,046
WE KNOW THIS

169

00:04:07,046 --> 00:04:08,581
BECAUSE WE'VE OBSERVED

170

00:04:08,581 --> 00:04:10,516
WITH SOME OF OUR ORBITERS

171

00:04:10,516 --> 00:04:11,584
BEING ABLE TO IDENTIFY

172

00:04:11,584 --> 00:04:13,086
THAT THERE'S WATER MOLECULES

173

00:04:13,086 --> 00:04:13,753
ON THE MOON.

174

00:04:13,753 --> 00:04:14,854
AND IN FACT,

175

00:04:14,854 --> 00:04:16,055
SOME OF THESE WE BELIEVE

176
00:04:16,055 --> 00:04:18,591
ARE PRESERVED AS WATER ICE,

177
00:04:18,591 --> 00:04:19,826
PERHAPS IN THESE PERMANENTLY

178
00:04:19,826 --> 00:04:20,893
SHADOWED REGIONS

179
00:04:20,893 --> 00:04:22,362
THAT ARE VERY, VERY COLD

180
00:04:22,362 --> 00:04:23,563
NEAR THE POLES.

181
00:04:23,563 --> 00:04:25,231
AND WHAT WE NEED TO DO NEXT

182
00:04:25,231 --> 00:04:26,399
IS TO ACTUALLY GO DOWN

183
00:04:26,399 --> 00:04:28,001
TO THE SURFACE OF THE MOON

184
00:04:28,001 --> 00:04:30,103
AND ACTUALLY LOOK AT THAT ICE

185
00:04:30,103 --> 00:04:31,371
UP CLOSE.

186
00:04:31,371 --> 00:04:32,605
AND SO THAT'S WHAT WE'RE DOING

187
00:04:32,605 --> 00:04:33,773
WITH THE ARTEMIS MISSION.

188
00:04:33,773 --> 00:04:36,075

WE'LL BE FOCUSED ON LOOKING FOR

189

00:04:36,075 --> 00:04:36,809

SOME OF THAT WATER

190

00:04:36,809 --> 00:04:38,778

IN THE SOIL OF THE MOON.

191

00:04:38,778 --> 00:04:40,813

WE HAVE EXPLORED

192

00:04:40,813 --> 00:04:42,181

REALLY THE FAR REACHES

193

00:04:42,181 --> 00:04:43,616

OF OUR SOLAR SYSTEM.

194

00:04:43,616 --> 00:04:45,451

WE HAVE SENT MISSIONS

195

00:04:45,451 --> 00:04:47,320

TO MERCURY NEAR THE SUN

196

00:04:47,320 --> 00:04:48,755

AND VISITED ALL OF THE PLANETS

197

00:04:48,755 --> 00:04:49,822

IN OUR SOLAR SYSTEM

198

00:04:49,822 --> 00:04:52,058

ALL THE WAY OUT EVEN TO PLUTO.

199

00:04:52,058 --> 00:04:53,459

AND THEN ONE OF OUR MISSIONS

200

00:04:53,459 --> 00:04:54,260

CALLED VOYAGER

201
00:04:54,260 --> 00:04:55,862
ACTUALLY HAS TWO SPACECRAFT

202
00:04:55,862 --> 00:04:57,263
THAT HAVE NOW EVEN GONE

203
00:04:57,263 --> 00:04:58,398
BEYOND THE EDGES

204
00:04:58,398 --> 00:04:59,966
OF OUR SOLAR SYSTEM.

205
00:04:59,966 --> 00:05:01,868
SO WE HAVE REALLY EXPANDED--

206
00:05:01,868 --> 00:05:03,169
EXPLORED THE WHOLE EXPANSE

207
00:05:03,169 --> 00:05:05,672
OF OUR SOLAR SYSTEM.

208
00:05:05,672 --> 00:05:07,507
>> COOL, IO AND MARS ARE GREAT!

209
00:05:09,709 --> 00:05:11,411
>> LET'S TRY IT AGAIN.

210
00:05:11,411 --> 00:05:12,245
>> WHOA, THAT'S TOO HIGH.

211
00:05:12,245 --> 00:05:14,047
[LAUGHTER]

212
00:05:14,047 --> 00:05:15,148
THAT WAS A FASTBALL.

213
00:05:15,148 --> 00:05:16,649

SHE HAD A FASTBALL.

214

00:05:16,649 --> 00:05:17,216

>> DO YOU HAVE

215

00:05:17,216 --> 00:05:18,818

A QUESTION FOR NASA?

216

00:05:18,818 --> 00:05:19,519

SEND YOUR QUESTIONS