



1
00:00:03,850 --> 00:00:04,850
>>> GOOD AFTERNOON.

2
00:00:04,850 --> 00:00:08,860
MY NAME IS DWAYNE BROWN WITH THE
OFFICE OF COMMUNICATIONS AND

3
00:00:08,860 --> 00:00:12,549
WELCOME TO NASA HEADQUARTERS.

4
00:00:12,549 --> 00:00:17,650
ASTERIODS ARE A POPULAR SUBJECT
THESE DAYS, AND TODAY WE'LL GET

5
00:00:17,650 --> 00:00:22,840
UP CLOSE AND PERSONAL WITH THE
GIANT ASTEROID VESTA COURTESY OF

6
00:00:22,840 --> 00:00:25,070
NASA'S DAWN SPACECRAFT.

7
00:00:25,070 --> 00:00:29,619
WE'LL HAVE BRIEF PRESENTATIONS
AND THEN OPEN IT UP FOR

8
00:00:29,619 --> 00:00:31,130
QUESTIONS.

9
00:00:31,130 --> 00:00:38,790
AND YOU CAN FOLLOW US ON THE
INTERNET AT WWW.NASA.GOV/DAWN.

10
00:00:38,790 --> 00:00:42,120
SOMETHING WE'RE DOING TO BE
INCLUDED IN SCIENCE PRESS

11
00:00:42,120 --> 00:00:46,260
CONFERENCES IS USING THE
INCREDIBLE AUDIENCE OF SOCIAL

12

00:00:46,260 --> 00:00:47,260
MEDIA.

13

00:00:47,260 --> 00:00:53,519
JOIN THE CONVERSATION AT
#ASKNASA.

14

00:00:53,519 --> 00:00:56,899
OF COURSE, YOU CAN FOLLOW US ON
THE OTHER NASA SOCIAL MEDIA

15

00:00:56,899 --> 00:01:04,680
SITES THAT INCLUDE FACEBOOK,
TWITTER, YOUTUBE, AND OTHERS.

16

00:01:04,680 --> 00:01:08,140
BEFORE I INTRODUCE TODAY'S
SPEAKERS, IT IS MY HONOR AND

17

00:01:08,140 --> 00:01:11,210
PLEASURE TO INTRODUCE DR.

18

00:01:11,210 --> 00:01:14,250
JIM
GREEN, DIRECTOR OF NASA'S

19

00:01:14,250 --> 00:01:21,469
PLANETARY SCIENCE DIVISION TO
GIVE US SOME OPENING REMARKS.

20

00:01:21,469 --> 00:01:24,689
DR.

21

00:01:24,689 --> 00:01:27,909
GREEN?

22

00:01:27,909 --> 00:01:29,130
>> THANK YOU VERY MUCH, DWAYNE.

23

00:01:29,130 --> 00:01:32,390

IT'S, INDEED, A PLEASURE TO COME
AND TALK ABOUT SOME OF THE

24

00:01:32,390 --> 00:01:35,680

EXCITING SCIENCE RESULTS THAT
WE'LL HEAR ABOUT TODAY, BUT I

25

00:01:35,680 --> 00:01:40,469

WANT TO TAKE YOU BACK 50 YEARS
BEFORE WE START AND CONSIDER

26

00:01:40,469 --> 00:01:46,229

THIS, 50 YEARS AGO WE ONLY
UNDERSTOOD THE SOLAR SYSTEM BY

27

00:01:46,229 --> 00:01:50,040

ANALYZING THE LIGHTS IN THE BACK
OF A TELESCOPE.

28

00:01:50,040 --> 00:01:53,600

SO THIS IS, INDEED, OUR 50th
ANNIVERSARY OF PLAN TEAR RI

29

00:01:53,600 --> 00:01:54,600

SCIENCE.

30

00:01:54,600 --> 00:01:57,530

NASA PUT IN PLACE A WHOLE SERIES
OF PROGRAMS THAT ALLOWED US TO

31

00:01:57,530 --> 00:02:02,740

LAUNCH SATELLITES IN FAR REACHES
OF OUR SOLAR SYSTEM FROM MERCURY

32

00:02:02,740 --> 00:02:07,560

ALL THE WAY OUT TO THE OUTER
REACHES OF OUR ENVIRONMENT, AND

33

00:02:07,560 --> 00:02:11,860

OVER THOSE YEARS WE HAVE MADE
SOME EXCITING DISCOVERIES.

34

00:02:11,860 --> 00:02:16,140

THE DISCOVERY PROGRAM, WHICH
STARTED 20 YEARS AGO AND HAS

35

00:02:16,140 --> 00:02:22,440

LAUNCHED NOW 11 MISSIONS BRINGS
THAT EXCITEMENT REALLY TO A

36

00:02:22,440 --> 00:02:23,440

FOCUS.

37

00:02:23,440 --> 00:02:27,610

AND TODAY'S MISSION, DAWN,
REALLY EXEM PLE 2350IS THE

38

00:02:27,610 --> 00:02:30,250

INVESTIGATOR SCIENCE THAT'S
ACCOMPLISHED THROUGH THIS

39

00:02:30,250 --> 00:02:31,650

PROGRAM.

40

00:02:31,650 --> 00:02:37,440

WE'RE REALLY SO DELIGHTED WITH
THE RESULTS KNOWING THAT THERE'S

41

00:02:37,440 --> 00:02:42,370

MORE TO FOLLOW AS DAWN BEGINS
ANOTHER JOURNEY, BUT FOR NOW,

42

00:02:42,370 --> 00:02:45,190

LET'S GET GOING AND LET ME TURN
IT BACK OVER TO DWAYNE TO

43

00:02:45,190 --> 00:02:53,700

INTRODUCE THE SPEAKERS.

44

00:02:53,700 --> 00:02:55,050

>> THANK YOU, JIM.

45

00:02:55,050 --> 00:02:57,120

LET'S LEARN ABOUT VESTA.

46

00:02:57,120 --> 00:03:00,760

LET ME INTRODUCE TODAY'S
SPEAKERS STARTING WITH CAROL

47

00:03:00,760 --> 00:03:02,600

RAYMOND.

48

00:03:02,600 --> 00:03:06,180

DAWN DEPUTY PRINCIPAL
INVESTIGATOR, NASA'S JET

49

00:03:06,180 --> 00:03:12,290

PROPULSION LABORATORY IN
PASADENA, CALIFORNIA.

50

00:03:12,290 --> 00:03:20,550

HAP McSWEEN, UNIVERSITY OF
TENNESSEE IN KNOXVILLE.

51

00:03:20,550 --> 00:03:25,650

VISHNU REDDY, A DAWN FRAMING
CAMERA TEAM MEMBER FROM THE MAX

52

00:03:25,650 --> 00:03:30,070

PLANCK INSTITUTE FOR SOLAR
SYSTEM RESEARCH IN GERMANY AND

53

00:03:30,070 --> 00:03:36,370

THE UNIVERSITY OF NORTH DAKOTA
IN GRAND FORKS.

54

00:03:36,370 --> 00:03:43,180
DAVID O'BRIEN, PLANT TEAR
SCIENCE INSTITUTE IN TUCSON,

55
00:03:43,180 --> 00:03:45,810
ARIZONA.

56
00:03:45,810 --> 00:03:51,671
CHRISTINA De SANCTIS, A DAWN
CO-INVESTIGATOR AND VISIBLE AND

57
00:03:51,671 --> 00:03:55,070
INFRARED MAPPING SPECTROMETER
TEAM LEAD FROM THE ITALIAN

58
00:03:55,070 --> 00:03:59,150
NATIONAL INSTITUTE FOR
ASTROPHYSICS IN ROME.

59
00:03:59,150 --> 00:04:02,050
WITH THAT, I'LL TURN IT OVER TO
CAROL.

60
00:04:02,050 --> 00:04:03,510
>> THANK YOU, DWAYNE.

61
00:04:03,510 --> 00:04:06,900
WE'RE ALL DELIGHTED TO BE HERE
TODAY TO TALK TO YOU ABOUT

62
00:04:06,900 --> 00:04:10,300
DAWN'S FIRST RESULTS FROM VESTA.

63
00:04:10,300 --> 00:04:13,680
DAWN'S MISSION AT VEST AT THAT
HAS BEEN A SPECTACULAR SUCCESS.

64
00:04:13,680 --> 00:04:18,000
IT'S TRANSFORMED VESTA FROM A
FUZZY ORB INTO A PLAN TEAR RI

65

00:04:18,000 --> 00:04:22,150

BODY WHICH HAS EXCEEDED OUR
EXPECTATIONS IN MANY WAYS THAT

66

00:04:22,150 --> 00:04:24,750

WE'LL BE TALKING ABOUT TODAY.

67

00:04:24,750 --> 00:04:27,760

DAWN'S DATA PROVIDE THE FIRST
COMPREHENSIVE ANALYSIS OF

68

00:04:27,760 --> 00:04:31,960

VESTA'S GLOBAL PROPERTIES AND
PROVIDE A FIRM LINK BETWEEN

69

00:04:31,960 --> 00:04:35,810

METEOR RIGHTS THAT HAVE FALLEN
TO EARTH AND THEIR PARENT BODY,

70

00:04:35,810 --> 00:04:36,810

VESTA.

71

00:04:36,810 --> 00:04:39,860

MAY I HAVE THE FIRST GRAPHIC?

72

00:04:39,860 --> 00:04:44,330

VESTA IS A VERY SPECIAL AND
UNIQUE OBJECT.

73

00:04:44,330 --> 00:04:48,590

IT'S THE SECOND MOST MASSIVE
ASTEROID AND ONE OF THE

74

00:04:48,590 --> 00:04:53,430

BRIGHTEST ASTEROIDS IN THE MAIN
BELT BETWEEN MARS AND JUPITER.

75

00:04:53,430 --> 00:04:57,260

IT'S NORM MOUSE SIZE RELATIVE TO
OTHER ASTEROIDS THAT HAVE BEEN

76

00:04:57,260 --> 00:05:02,350

VISITED IS SHOWN IN THIS
MONTAGE.

77

00:05:02,350 --> 00:05:09,540

AS WE'LL DESCRIBE TODAY, VESTA
EXHIBITS MANY THINGS THAT ARE

78

00:05:09,540 --> 00:05:15,150

TRANSITIONAL BETWEEN ASTEROIDS
AND PLANETS VERSUS YOUR GARDEN

79

00:05:15,150 --> 00:05:17,600

VARIETY OF ASTEROIDS.

80

00:05:17,600 --> 00:05:20,210

THE COLLECTION OF SIX PAPERS
THAT ARE BEING PUBLISHED IN

81

00:05:20,210 --> 00:05:26,240

"SCIENCE" DESCRIBE ITS COLORFUL
AND DIVERSE SURFACE AND THE PLAN

82

00:05:26,240 --> 00:05:29,120

FATHER RI PROCESSES THAT HAVE
SHAPED THE BODY SINCE ITS

83

00:05:29,120 --> 00:05:31,420

FORMATION.

84

00:05:31,420 --> 00:05:38,560

IN THE SECOND GRAPHIC, THIS
MONTAGE EMPHASIZES THAT VEST'S

85

00:05:38,560 --> 00:05:41,280

HISTORY APPEARS TO BE MORE
SIMILAR TO ROCKY TERRESTRIAL

86

00:05:41,280 --> 00:05:46,040

PLANETS, MARS AND THE EARTH'S
MOON, THAN TO ITS LARGER

87

00:05:46,040 --> 00:05:50,190

SIBLING, THE DWARF PLANET, WHICH
WILL BE THE SECOND TARGET OF THE

88

00:05:50,190 --> 00:05:52,460

DAWN MISSION.

89

00:05:52,460 --> 00:05:57,520

DAWN'S DATA HAVE ENABLED THE
HISTORY OF VESTA TO BE DEFINED.

90

00:05:57,520 --> 00:06:02,919

IT FORMED WITHIN 2 MILLION YEARS
AFTER THE FIRST SOLIDS FORMED IN

91

00:06:02,919 --> 00:06:05,310

THE SOLAR SYSTEM.

92

00:06:05,310 --> 00:06:09,900

BEFORE SERIES FORMED, BEFORE THE
TERRESTRIAL PLANETS FORMED, AND

93

00:06:09,900 --> 00:06:13,740

WHEN THE CONCENTRATION OF
RADIOACTIVE MATERIAL WAS SHORT

94

00:06:13,740 --> 00:06:18,280

DECAY TIMES GENERATED ENOUGH
HEAT INSIDE VESTA TO CAUSE

95

00:06:18,280 --> 00:06:23,000

MELTING, WE NOW KNOW THAT VESTA A
IS THE ONLY INTACT LAYERED

96

00:06:23,000 --> 00:06:27,340
PLANETARY BUILDING BLOCK
SURVIVING FROM THE VERY EARLIEST

97
00:06:27,340 --> 00:06:30,610
DAYS OF THE SOLAR SYSTEM.

98
00:06:30,610 --> 00:06:37,700
VEST A IS ALSO VERY SPECIAL
BECAUSE THEY'VE BEEN LIPGED BY

99
00:06:37,700 --> 00:06:40,820
TELESCOPIC OBSERVATIONS.

100
00:06:40,820 --> 00:06:43,920
DAWN IS UNIQUE BECAUSE IT'S THE
FIRST TIME THAT A SPACECRAFT HAS

101
00:06:43,920 --> 00:06:47,330
BEEN ABLE TO VISIT AN OBJECT
KNOWN TO BE THE SOURCE OF

102
00:06:47,330 --> 00:06:51,020
SAMPLES AFTER THOSE SAMPLES WERE
IDENTIFIED.

103
00:06:51,020 --> 00:06:53,690
WE'VE HAD PIECES OF VEST A UNDER
STUDY IN THE LABORATORY FOR

104
00:06:53,690 --> 00:06:59,220
DECADES BUT ARE NOW ONLY GETTING
OUT TO KNOW THE PARENT BODY AND

105
00:06:59,220 --> 00:07:03,590
HAP AND CHRISTINA ARE GOING TO
BE TALKING MORE ABOUT THAT.

106
00:07:03,590 --> 00:07:08,290
IN THE NEXT GRAPHIC I SHOW SOME

OF THE RESULTS OF OUR MISSION.

107

00:07:08,290 --> 00:07:12,010

DAWN MEASURED VEST A'S MASS VERY ACCURATELY AND MAPPED ITS

108

00:07:12,010 --> 00:07:16,889

TOPOGRAPHY AND GRAVITY IN GREAT PRECISION AND RESOLUTION.

109

00:07:16,889 --> 00:07:22,070

THE TOPOGRAPHY IS SHOWN HERE AT THE TOP AS A COLOR CONTOURED 3 D

110

00:07:22,070 --> 00:07:25,580

MAP AND IT'S ILLUSTRATING THAT VEST A HAS VERY RUGGED

111

00:07:25,580 --> 00:07:31,480

TOPOGRAPHY AND IT ALSO DISPLAYS VERY STEEP SLOPES, MUCH STEEPER

112

00:07:31,480 --> 00:07:34,900

THAN IS SEEN ON PLANETARY BODIES.

113

00:07:34,900 --> 00:07:40,280

THIS HAS BEEN A BIG FACTOR IN THE TYPES OF MORPHOLOGIES THAT

114

00:07:40,280 --> 00:07:42,960

WE SEE ON THE SURFACE.

115

00:07:42,960 --> 00:07:46,870

THE GRAVITY FIELD IS SHOWN COLOR CONTOURED AT THE BOTTOM.

116

00:07:46,870 --> 00:07:50,440

DAWN'S GRAVITY AND TOPOGRAPHY REVEAL THE INTERNAL DENSITY

117

00:07:50,440 --> 00:07:53,290

STRUCTURE OF VEST A AND HAVE
CONFIRMED THAT VEST A HAS A

118

00:07:53,290 --> 00:07:57,410

CONCENTRATION OF MASS AT ITS
CENTER PROVING THAT IT IS A

119

00:07:57,410 --> 00:08:01,100

DIFFERENTIATED BODY WITH AN IRON
CORE, A SILICATE MANTLE AND A

120

00:08:01,100 --> 00:08:05,190

LESS DENSE BASAL PARTICULAR
CRUST, THE SAME AS MERCURY,

121

00:08:05,190 --> 00:08:07,450

MARS, THE EARTH AND THE MOON.

122

00:08:07,450 --> 00:08:13,240

IN MY LAST GRAPHIC, THIS IS A
CUT AWAY VIEW OF VEST A'S

123

00:08:13,240 --> 00:08:16,669

INTERNAL STRUCTURE, AND ASSUMING
THAT THE CORE'S MADE OF THE SAME

124

00:08:16,669 --> 00:08:21,800

MATERIAL AS IRON NICKEL METEOR
RIGHTS, WE CAN USE THE GRAVITY

125

00:08:21,800 --> 00:08:25,949

DATA TO DERIVE THE SIZE OF THE
CORE, WHICH IS AT ABOUT 70 MILES

126

00:08:25,949 --> 00:08:31,820

IN RADIUS OR ABOUT 40% OF THE
RADIUS OF THE BODY OR ABOUT 18%

127

00:08:31,820 --> 00:08:34,640

OF THE MASS OF THE BODY.

128

00:08:34,640 --> 00:08:37,769

DAWN'S EVIDENCE FOR THE
DIFFERENTIATED NATURE OF THE

129

00:08:37,769 --> 00:08:41,529

INTERIOR OF VEST A CONFIRMS
CONJECTURAL THEORIES BASED ON

130

00:08:41,529 --> 00:08:42,529

THE H.E.D.

131

00:08:42,529 --> 00:08:45,519

METEORITES AND
THEREFORE INCREASES THE VALUE OF

132

00:08:45,519 --> 00:08:50,139

THOSE SAMPLES FOR STUDYING THE
EARLY -- THE PROCESSES IN THE

133

00:08:50,139 --> 00:08:52,559

EARLY SOLAR SYSTEM.

134

00:08:52,559 --> 00:08:55,790

VEST A IS SPECIAL BECAUSE IT
SURVIVED THE INTENSE COLLISIONAL

135

00:08:55,790 --> 00:09:00,369

ENVIRONMENT OF THE MAIN ASTEROID
BELT FOR BILLIONS OF YEARS

136

00:09:00,369 --> 00:09:03,369

ALLOWING US TO INTERROGATE A KEY
WITNESS TO THE EVENTS AT THE

137

00:09:03,369 --> 00:09:05,870

VERY BEGINNING OF THE SOLAR

SYSTEM.

138

00:09:05,870 --> 00:09:09,690

WE BELIEVE VEST A IS THE ONLY
INTACT MEMBER OF A FAMILY OF

139

00:09:09,690 --> 00:09:13,620

SIMILAR BODIES THAT HAS SINCE
PERISHED.

140

00:09:13,620 --> 00:09:16,610

TURN IT OVER TO HAP TO TELL YOU
MORE ABOUT THE H.E.D.

141

00:09:16,610 --> 00:09:18,870

METEORITE
CONNECTION.

142

00:09:18,870 --> 00:09:20,120

>> THANK YOU, CAROL.

143

00:09:20,120 --> 00:09:23,550

THE SYNERGY OF SPACECRAFT
EXPLORATION AND SAMPLES THAT CAN

144

00:09:23,550 --> 00:09:27,980

BE ANALYZED IN THE LABORATORY
HAS MARKEDLY ENHANCED WHAT WE

145

00:09:27,980 --> 00:09:30,180

UNDERSTAND ABOUT THE MOON.

146

00:09:30,180 --> 00:09:33,920

VEST A IS SPECIAL BECAUSE WE
ALREADY HAVE ITS SAMPLE IN THE

147

00:09:33,920 --> 00:09:36,470

FORM OF HUNDREDS OF METEOR IETS.

148

00:09:36,470 --> 00:09:41,259
I'D LIKE TO TALK ABOUT HOW DAWN
CONFIRMS THIS CONNECTION BETWEEN

149
00:09:41,259 --> 00:09:44,160
THE ASTEROID AND ROCKS THAT FELL
FROM THE SKY.

150
00:09:44,160 --> 00:09:47,339
CAN I HAVE MY FIRST SLIDE?

151
00:09:47,339 --> 00:09:50,639
MAKING THIS CONNECTION IS A
RECURRENT THEME OF OUR NEW

152
00:09:50,639 --> 00:09:53,320
SCIENCE PAPERS.

153
00:09:53,320 --> 00:09:55,040
NEXT SLIDE PLEASE.

154
00:09:55,040 --> 00:09:59,329
THE HOWARD IET U CITE DODGE DID
HE NIGHT METEOR RIGHTS.

155
00:09:59,329 --> 00:10:01,220
WE NORMALLY SAY H.E.D.

156
00:10:01,220 --> 00:10:04,670
METEOR
RIGHTS, ARE SEEN HERE AS VIEWED

157
00:10:04,670 --> 00:10:06,319
THROUGH A MICROSCOPE.

158
00:10:06,319 --> 00:10:10,149
THE H.E.D.s ARE A COMPLEX
ASSORTMENT OF ROCKS WHOSE

159

00:10:10,149 --> 00:10:14,430
PROPERTIES INDICATE THAT SOME OF
THEM ERUPTED ON THE SURFACE AS

160
00:10:14,430 --> 00:10:19,610
LAVAS, SOME OF THEM COOLED AND
CRYSTALIZED SLOWLY AT DEPTH IN A

161
00:10:19,610 --> 00:10:22,959
LARGE PARENT BODY.

162
00:10:22,959 --> 00:10:24,309
NEXT SLIDE PLEASE.

163
00:10:24,309 --> 00:10:30,720
AT 325 MILES ACROSS VEST A IS
CERTAINLY A LARGE PARENT BODY.

164
00:10:30,720 --> 00:10:35,079
THIS FALSE COLOR MAP OF DAWN
FRAMING CAMERA BAND RATIOS

165
00:10:35,079 --> 00:10:40,920
ILLUSTRATES THAT VEST A'S
SURFACE IS HETEROGENEOUS LIKE

166
00:10:40,920 --> 00:10:41,920
THE H.E.D.

167
00:10:41,920 --> 00:10:44,790
METEOR RIGHTS UNLIKE
THE SMALL ASTEROIDS THAT WE

168
00:10:44,790 --> 00:10:47,999
PREVIOUSLY VISITED BY
SPACECRAFT.

169
00:10:47,999 --> 00:10:52,379
ANOTHER INDICATION THAT A LARGE
BODY PRODUCED THE HEDs IS ITS

170

00:10:52,379 --> 00:10:54,529

PROTRACTED IMPACT HISTORY.

171

00:10:54,529 --> 00:10:56,610

NEXT SLIDE PLEASE.

172

00:10:56,610 --> 00:11:00,129

MOST OF THESE METEOR RIGHTS ARE
BRIDGES, THAT IS ROCKS ASSEMBLED

173

00:11:00,129 --> 00:11:04,379

FROM BROKEN FRAGMENTS AS YOU CAN
SEE ON THE LEFT, AND THAT IS

174

00:11:04,379 --> 00:11:08,329

MOST READILY ACCOMPLISHED IN A
LARGE GRAVITY FIELD.

175

00:11:08,329 --> 00:11:12,040

THE SQUIGGLES ON THE RIGHT SHOW
THAT THESE BRIDGES WERE CREATED

176

00:11:12,040 --> 00:11:16,610

BY IMPACTS OVER A PERIOD OF
PERHAPS A BILLION YEARS AND THE

177

00:11:16,610 --> 00:11:21,980

REPEATED IMPACTS ARE RECORDED BY
RESETTING OF SOME RADIOACTIVE

178

00:11:21,980 --> 00:11:27,600

ISOTOPE CLOCKS IN THE METEOR
RIGHTS THAT CAN BE ANALYZED.

179

00:11:27,600 --> 00:11:29,509

NEXT PLEASE.

180

00:11:29,509 --> 00:11:33,170

THE ANCIENT AGE OF VEST A'S
SURFACE IS REVEALED BY DAWN'S

181

00:11:33,170 --> 00:11:37,679

NEW HIGH RESOLUTION IMAGES OF
HEAVILY CRATERED TERRAINS AS YOU

182

00:11:37,679 --> 00:11:41,949

CAN SEE IN THIS IMAGE,
ESPECIALLY IN THE NORTHERN PART

183

00:11:41,949 --> 00:11:43,860

OF THE IMAGE.

184

00:11:43,860 --> 00:11:47,779

THE RADIOMETRIC AGES OF THE HED
METEOR RIGHTS RECORD THEIR MAG

185

00:11:47,779 --> 00:11:53,240

MAS 4.5 BILLION YEARS AGO AND
THE DENSITY OF CRATERS IN THE

186

00:11:53,240 --> 00:11:57,959

NORTHERN REGION IS CONSISTENT
WITH THAT AGE.

187

00:11:57,959 --> 00:12:01,639

THE NEXT SLIDE WILL SHOW YOU THE
SPECTRUM OF SUNLIGHT REFLECTED

188

00:12:01,639 --> 00:12:07,629

FROM VEST A AND RECORDED BY
DAWN'S VEER INSTRUMENT.

189

00:12:07,629 --> 00:12:11,689

THAT SPECTRUM SHOWN IN WHITE
CLOSELY RESEMBLES THE LABORATORY

190

00:12:11,689 --> 00:12:16,660

SPECTRA OF THE VARIOUS HEDs

ESPECIALLY THE HOWARD DIETS

191

00:12:16,660 --> 00:12:21,589

WHICH ARE SAMPLES MOST LIKELY TO
HAVE RESIDED ON THE SURFACE OF

192

00:12:21,589 --> 00:12:25,000

VEST A.

MORE IMPORTANTLY, THE MAP

193

00:12:25,000 --> 00:12:29,660

LOCATIONS OF THEIR SPECTRAL
TYPES MAKE PERFECT GEOLOGIC

194

00:12:29,660 --> 00:12:30,829

SENSE.

195

00:12:30,829 --> 00:12:35,829

NEXT SLIDE SHOWS A MAP OF VEST
A'S SOUTH POLE REGION AND IT

196

00:12:35,829 --> 00:12:40,699

ILLUSTRATES THE DEPTH OF THE ONE
MICRON BAND WHICH IS A PROXY FOR

197

00:12:40,699 --> 00:12:44,350

THE PROPORTION OF DYE OJ GE
NIGHT.

198

00:12:44,350 --> 00:12:49,149

THE U CITES, WHICH FORMED ON THE
SURFACE, ARE CONCENTRATED IN

199

00:12:49,149 --> 00:12:53,759

TERRAINS OUTSIDE OF THIS REGION
AND THE DIOGENITES WHICH FORMED

200

00:12:53,759 --> 00:12:58,290

DEEP UNDERGROUND ARE ONLY
EXPOSED WHERE THEY HAVE BEEN

201

00:12:58,290 --> 00:13:02,759

EXCAVATED IN LARGE CRATERS LIKE
THE RIASYLVIA BASIN WHICH IS

202

00:13:02,759 --> 00:13:06,480

SHOWN HERE AND WHICH DANE WILL
TALK ABOUT LATER.

203

00:13:06,480 --> 00:13:10,569

FINALLY, DAWN'S NEW MEASUREMENTS
OF VEST A'S BULK DENSITY AND

204

00:13:10,569 --> 00:13:15,310

GRAVITY ALLOW US TO RECONSTRUCT
MODELS OF THE UNSEEN INTERIOR.

205

00:13:15,310 --> 00:13:21,161

THE NEXT SLIDE SHOWS YOU CAROL'S
DIAGRAM THAT INDICATES THAT VEST

206

00:13:21,161 --> 00:13:27,550

A HAS A LARGE IRON HEART WITH A
RADIUS OF ABOUT 70 MILES.

207

00:13:27,550 --> 00:13:31,560

A SUBSTANTIAL CORE IS PREDICTED
FOR THE HED PARENT BODY BECAUSE

208

00:13:31,560 --> 00:13:37,209

THEY ARE DEPLETED IN METALLIC
ELEMENTS AND MODELS FOR THE HED

209

00:13:37,209 --> 00:13:41,870

PARENT BODY THAT ARE BASED ON
THE PROPERTIES OF THE HED METEOR

210

00:13:41,870 --> 00:13:47,690

RIGHTS PREDICT A CORE OF ABOUT
THIS SIZE.

211

00:13:47,690 --> 00:13:52,939

SO DAWN'S OBSERVATIONS HAVE
CONVINCED MOST OF US, CERTAINLY

212

00:13:52,939 --> 00:13:56,949

ME, THAT VESTA IS THE HED
PARENT BODY.

213

00:13:56,949 --> 00:14:00,170

WITH THIS LINK MORE FIRMLY
ESTABLISHED, WE NOW ARE USING

214

00:14:00,170 --> 00:14:06,290

MEASUREMENTS OF THE HEDs TO
COMPLIMENT DAWN'S REMOTE SENSE

215

00:14:06,290 --> 00:14:09,540

DAG AT THAT AND TO HELP US
INTERPRET IT BETTER.

216

00:14:09,540 --> 00:14:13,660

THE TAKE-AWAY MESSAGE IS THAT WE
ARE NOW UNRAVELING THE GEOLOGIC

217

00:14:13,660 --> 00:14:18,189

HISTORY OF VESTA IN WAYS THAT
WOULD NOT BE POSSIBLE WITHOUT

218

00:14:18,189 --> 00:14:19,189

SAMPLES.

219

00:14:19,189 --> 00:14:22,249

I'D LIKE TO NOW PASS IT ON TO
VISHNU WHO WILL TALK ABOUT

220

00:14:22,249 --> 00:14:24,309

DAWN'S NEW COLOR IMAGES.

221

00:14:24,309 --> 00:14:25,329

>> THANK YOU, HAP.

222

00:14:25,329 --> 00:14:28,439

THE COLOR IMAGES OBTAINED BY THE
DAWN FRAMING CAMERA BASICALLY

223

00:14:28,439 --> 00:14:31,839

SHOWS THAT VEST A IS UNLIKE ANY
OTHER OBJECT WE'VE VISITED SO

224

00:14:31,839 --> 00:14:34,970

FAR IN THE SOLAR SYSTEM AND A
FEW POINTS I WOULD LIKE YOU TO

225

00:14:34,970 --> 00:14:38,220

TAKE AWAY FROM MY PRESENTATION
HERE TODAY.

226

00:14:38,220 --> 00:14:42,249

THE FIRST THING IS THAT ON VEST
A WE SEE A WIDE RANGE OF

227

00:14:42,249 --> 00:14:47,100

BRIGHTNESS VARIATION, SO WE SEE
AREAS THAT ARE AS BRIGHT AS SNOW

228

00:14:47,100 --> 00:14:49,399

AND AREAS THAT ARE AS DARK AS
COLE.

229

00:14:49,399 --> 00:14:52,290

THE SECOND POINT I WOULD LIKE TO
MAKE IS THAT WE SEE NO EVIDENCE

230

00:14:52,290 --> 00:14:56,660

FOR THIS ORIGINAL CRUST ON THE
VOLCANIC FEATURES WE EXPECT TO

231

00:14:56,660 --> 00:14:58,459

SEE FROM THE HED METEOR RIGHTS.

232

00:14:58,459 --> 00:15:00,529

WE DON'T SEE ANY EVIDENCE OF IT.

233

00:15:00,529 --> 00:15:03,720

THE REASON WE THINK IS THAT MOST
OF VEST A'S ORIGINAL PRIMITIVE

234

00:15:03,720 --> 00:15:07,259

CRUST HAS BEEN AFFECTED BY
IMPACTS AND ALL THE ORIGINAL

235

00:15:07,259 --> 00:15:09,660

MATERIAL HAS BEEN PULVERIZED AND
MIXED TOGETHER.

236

00:15:09,660 --> 00:15:13,800

THE THIRD POINT I'D LIKE TO MAKE
IS THAT WE HAVE IDENTIFIED

237

00:15:13,800 --> 00:15:18,040

DIFFERENT COLORED UNITS WITHIN
VEST A'S SURFACE, DIFFERENT

238

00:15:18,040 --> 00:15:21,220

TOPOGRAPHIC LEVELS, AND THIS IS
EVIDENCE FOR AN INTERNAL

239

00:15:21,220 --> 00:15:24,509

STRUCTURE JUST LIKE HAP AND
CAROL POINTED OUT.

240

00:15:24,509 --> 00:15:27,010

AND THE MOST INTERESTING PART
ABOUT THIS IS THAT THE LOWEST

241

00:15:27,010 --> 00:15:31,889

POINT OF THE SOUTH POLE REA
SYLVIA BASIN SHOWS THESE DYE OJ

242

00:15:31,889 --> 00:15:33,959
GE NIGHT METEOR RIGHTS.

243

00:15:33,959 --> 00:15:36,350
WE THINK THESE CAME FROM THE
LOWER CRUST, PROBABLY THE UPPER

244

00:15:36,350 --> 00:15:38,100
MANTLE OF VEST AT THAT.

245

00:15:38,100 --> 00:15:42,420
THERE'S A CORRELATION BETWEEN
COMPILATION AND TOPOGRAPHY.

246

00:15:42,420 --> 00:15:45,260
THE OTHER THING WE WANT TO SHARE
IS WE DON'T FIND ANY EVIDENCE

247

00:15:45,260 --> 00:15:48,009
FOR OLIVE BEAM IN THE IMAGES.

248

00:15:48,009 --> 00:15:52,489
THE FINAL POINT I WOULD LIKE TO
MAKE IS THAT WHILE VEST A HAS A

249

00:15:52,489 --> 00:15:55,920
LOT OF SIMILARITIES WITH THE
MOON, THE NEXT LARGEST

250

00:15:55,920 --> 00:15:59,069
DIFFERENTIATED OBJECT WE HAVE IN
OUR SOLAR SYSTEM APART FROM VEST

251

00:15:59,069 --> 00:16:01,319
A, THERE'S SOME KEY DIFFERENCES.

252

00:16:01,319 --> 00:16:04,130
ON THE MOON WHAT WE SEE IS THAT

WE HAVE A CLEAR CORRELATION

253

00:16:04,130 --> 00:16:10,559

BETWEEN TOPOGRAPHY AND THE THE
LIBIDO.

254

00:16:10,559 --> 00:16:13,720

IN VEST A WE DON'T SEE THIS
CLEAR CORRELATION.

255

00:16:13,720 --> 00:16:17,429

PART OF IT, THE REASON COULD BE
THE IMPACT PROCESSES HAVE

256

00:16:17,429 --> 00:16:24,309

IMPACTED IT SINCE WE DON'T SEE
THE CRUST OF VEST A.

257

00:16:24,309 --> 00:16:27,850

WITH THAT I'D LIKE TO SHOW A
COUPLE OF VIDEOS TO ILLUSTRATE

258

00:16:27,850 --> 00:16:29,639

MY IDEAS.

259

00:16:29,639 --> 00:16:33,691

HERE YOU SEE A BEAUTIFUL IMAGE
THAT HAS BEEN WRAPPED ON THE

260

00:16:33,691 --> 00:16:37,499

SHAPE MODEL OF VEST A AND THEY
HAVE CREATED THIS VIDEO OF IT.

261

00:16:37,499 --> 00:16:40,689

WHAT YOU SEE ARE THE FAMOUS SNOW
MAN CRATERS.

262

00:16:40,689 --> 00:16:43,189

THE LARGEST CRATER THERE IS THE
MARCIA CRATER WHICH IS

263

00:16:43,189 --> 00:16:45,269

APPROXIMATELY 60 KILOMETERS
ACROSS.

264

00:16:45,269 --> 00:16:53,579

THESE ARE FRAMING CAMERA FILTERS
THAT ARE IN THE INFRARED.

265

00:16:53,579 --> 00:16:55,899

I WOULD SAY THE CLOSEST THING
THAT COULD ACTUALLY SENSE AN

266

00:16:55,899 --> 00:16:57,720

IMAGE LIKE THIS IS A RATTLE
SNAKE.

267

00:16:57,720 --> 00:17:00,600

IF YOU HAD A SNAKE SNUCK ABOARD
DAWN, YOU WOULD PROBABLY SEE AN

268

00:17:00,600 --> 00:17:04,929

IMAGE LIKE THIS OFF VEST A.
THIS SHOWS SOME IMPORTANT

269

00:17:04,929 --> 00:17:06,360

INFORMATION.

270

00:17:06,360 --> 00:17:10,519

AS YOU CAN SEE, THIS TOPOGRAPHIC
LOWS WITHIN THE LARGE CRATER

271

00:17:10,519 --> 00:17:13,419

THAT IS BRIGHT COMPARED TO THE
TOPOGRAPHIC HIGHS WHICH ARE

272

00:17:13,419 --> 00:17:14,419

DARKER.

273

00:17:14,419 --> 00:17:17,919
IF YOU GO TO THE NEXT VIDEO
PLEASE.

274
00:17:17,919 --> 00:17:21,789
THE NEXT VIDEO SHOWS SOMETHING
SLIGHTLY DIFFERENT.

275
00:17:21,789 --> 00:17:25,789
HERE WHAT WE ARE HAVE COLORATION
YES IMAGES.

276
00:17:25,789 --> 00:17:28,481
WHAT WE HAVE TAKEN IS THESE
DIFFERENT FILTERS AND WE HAVE

277
00:17:28,481 --> 00:17:31,850
RATIOED THEM SO WE GET MORE
DIFFERENT INFORMATION ABOUT THE

278
00:17:31,850 --> 00:17:34,880
SURFACE OF VEST A.
WHAT YOU SEE HERE IS A 34

279
00:17:34,880 --> 00:17:38,080
KILOMETER CALCULATOR NAMED OPIA.

280
00:17:38,080 --> 00:17:43,220
IT HAS A BRIGHT RED EJECTOR THAT
IS COMING OUT OF THIS CRATER.

281
00:17:43,220 --> 00:17:46,600
WE'RE NOT REALLY SURE WHAT THIS
RED EJECTOR IS AT THIS POINT.

282
00:17:46,600 --> 00:17:49,550
WHAT WE PROBABLY THINK IT'S
RELATED TO THE IMPACT THAT

283
00:17:49,550 --> 00:17:53,330

AFFECTED IT OR PROBABLY
SOMETHING THAT WAS EXCAVATED

284

00:17:53,330 --> 00:17:55,070
WITHIN THE SITE ITSELF.

285

00:17:55,070 --> 00:17:58,130
SO WE GET SOME REALLY COOL --
NOT ONLY REALLY COOL IMAGES BUT

286

00:17:58,130 --> 00:18:02,309
ALSO WE GET IMPORTANT SCIENTIFIC
IMAGES FROM THIS.

287

00:18:02,309 --> 00:18:05,600
MOST OF THE SCIENCE WE HAVE DONE
SO FAR HAS BEEN USING HAMMER

288

00:18:05,600 --> 00:18:09,019
DATA WHICH IS APPROXIMATELY 60
KILOMETERS PER PIXEL.

289

00:18:09,019 --> 00:18:15,200
WE HAVE 16 METERS PERFECT PIXEL
SO WE'RE CONTINUING TO DO REALLY

290

00:18:15,200 --> 00:18:19,919
COOL SCIENCE AND WE HOPE TO HAVE
MANY MORE EXCITED RESULTS TO

291

00:18:19,919 --> 00:18:20,919
COME.

292

00:18:20,919 --> 00:18:23,879
WITH THAT, I'LL PASS ON TO DAVE
O'BRIEN, MY COLLEAGUE HERE.

293

00:18:23,879 --> 00:18:25,700
>> THANK YOU, VISHNU.

294

00:18:25,700 --> 00:18:28,940

SO AS NOTED PREVIOUSLY, VEST A
DATES BACK TO THE BEGINNING OF

295

00:18:28,940 --> 00:18:32,250

THE SOLAR SYSTEM, AND GIVEN ITS
LOCATION IN THE ASTEROID BELT,

296

00:18:32,250 --> 00:18:35,370

IT'S BEEN RECORDING IMPACTS FROM
ASTEROIDS EVER SINCE THAT POINT

297

00:18:35,370 --> 00:18:38,510

MAKING IT A VERY IMPORTANT
OBJECT TO STUDY AS WE'RE TRYING

298

00:18:38,510 --> 00:18:41,059

TO RECONSTRUCT THE DYNAMICAL
HISTORY AND COLLISIONAL HISTORY

299

00:18:41,059 --> 00:18:42,730

OF THE SOLAR SYSTEM.

300

00:18:42,730 --> 00:18:49,000

THE FIRST ONE SHOWS THE GLOBAL
MAP OF THE SURFACE OF VEST A

301

00:18:49,000 --> 00:18:51,700

SHOWING A WIDE RANGE OF CRATERS
FROM ALL KINDS OF DEGRADATION

302

00:18:51,700 --> 00:18:56,610

STATES FROM YOUNG FRESH CRATERS
TO OLD DEGRADED CRATERS.

303

00:18:56,610 --> 00:19:00,799

WE'VE CATALOGED CLOSE TO 2000
CRATERS LARGER THAN 2 1/2 MILES

304

00:19:00,799 --> 00:19:05,049
ON THE SURFACE AND ARE USING
THOSE TO HELP UNRAVEL THE

305

00:19:05,049 --> 00:19:09,140
SURFACE HISTORY OF VEST A.
THE LARGER CRATERS ARE SOMETIMES

306

00:19:09,140 --> 00:19:11,480
DIFFICULT TO PICK OUT FROM THE
IMAGES ALONE.

307

00:19:11,480 --> 00:19:15,990
THE NEXT SLIDE WILL SHOW THE
GLOBAL TOPOGRAPHY MAP.

308

00:19:15,990 --> 00:19:20,580
IN THIS MAP BLUE IS LOW AND RED
IS HIGH.

309

00:19:20,580 --> 00:19:24,490
WE CAN PICK OUT A NUMBER OF
LARGE DEPRESSIONS, SEVEN OF

310

00:19:24,490 --> 00:19:26,679
WHICH ARE CIRCLED ON THIS MAP.

311

00:19:26,679 --> 00:19:29,520
THESE ARE THE SEVEN MOST
PROMINENT IMPACT BASINS.

312

00:19:29,520 --> 00:19:30,710
THERE MAY BE OTHERS AS WELL.

313

00:19:30,710 --> 00:19:36,190
SOME OF THE OTHER LOW AREAS ARE
OF UNCERTAIN ORIGIN.

314

00:19:36,190 --> 00:19:39,480
ONE THING TO NOTE HERE IS IN

THIS IMAGE AND IT'S MORE CLEAR

315

00:19:39,480 --> 00:19:44,490

IN THE NEXT SLIDE AS WELL, THE
TWO LARGEST IMPACT BASINS ARE IN

316

00:19:44,490 --> 00:19:46,240

THE SOUTH POLAR REGION.

317

00:19:46,240 --> 00:19:48,850

NEXT SLIDE PLEASE.

318

00:19:48,850 --> 00:19:55,299

THIS SHOWS THE RIO SYLVIA BASIN
ABOUT 300 AND 250 MILES ACROSS

319

00:19:55,299 --> 00:19:58,690

RESPECTIVELY WHICH ARE IN THE
SOUTH POLAR REGION.

320

00:19:58,690 --> 00:20:00,950

ONE OF THE NEW RESULTS FROM DAWN
IS THAT WE'VE BEEN ABLE TO USE

321

00:20:00,950 --> 00:20:04,049

OUR GLOBAL CRATER CATALOGS THAT
HAVE BEEN CREATED TO COUNT THE

322

00:20:04,049 --> 00:20:08,220

NUMBER OF SMALL CRATERS ON THESE
IMPACT BASE SINCE AND ESTIMATE

323

00:20:08,220 --> 00:20:09,220

AN AGE OF THEM.

324

00:20:09,220 --> 00:20:13,280

RAY A SYLVIA BASIN HAS A
SURPRISINGLY YOUNG AGE OF ABOUT

325

00:20:13,280 --> 00:20:14,889

1 BILLION YEARS OLD.

326

00:20:14,889 --> 00:20:19,409

THE ZA NOOEN YEAH BASIN WHICH
LIES PARTIALLY UNDERNEATH HAS AN

327

00:20:19,409 --> 00:20:24,289

AGE OF ABOUT 2 BILLION YEARS OLD
OR POSSIBLY SOMEWHAT OLDER.

328

00:20:24,289 --> 00:20:27,590

SINCE REA SYLVIA FORMED ON TOP
OF IT IT ERASED SOME OF THE

329

00:20:27,590 --> 00:20:31,110

CRATERS.
2 BILLION YEARS IS A LOWER LIMIT

330

00:20:31,110 --> 00:20:33,399

FOR THAT ONE.

331

00:20:33,399 --> 00:20:36,330

THE RELATIVELY YOUNG AGES OF
BOTH OF THESE BASINS IS IN STARK

332

00:20:36,330 --> 00:20:39,309

CONTRAST TO WHAT WE FIND ON THE
MOON WHERE ALL OF THE OLD BASE

333

00:20:39,309 --> 00:20:42,210

SINCE ARE AT LEAST 3 1/2 BILLION
YEARS OLD.

334

00:20:42,210 --> 00:20:46,049

THIS IS TELLING US THE DYNAMICAL
HISTORY IN THESE TWO DIFFERENT

335

00:20:46,049 --> 00:20:48,980

PARTS OF THE SOLAR SYSTEM AND

THE COLLISIONAL HISTORY

336

00:20:48,980 --> 00:20:52,730

EXPERIENCE BY THE MOON AND VEST
A IS SURPRISINGLY DIFFERENT.

337

00:20:52,730 --> 00:20:56,490

THIS IS TELLING US SOMETHING
ABOUT THE DYNAMICAL HISTORY OF

338

00:20:56,490 --> 00:20:59,240

THE SOLAR SYSTEM AND IT'S A
COMPLEX STORY THAT WE'RE REALLY

339

00:20:59,240 --> 00:21:02,670

ONLY BEGINNING TO UNRAVEL.

340

00:21:02,670 --> 00:21:07,120

IN THE NEXT SLIDE YOU'LL SEE HOW
THE RELATIVELY YOUNG FORMATION

341

00:21:07,120 --> 00:21:10,850

AGE OF THE RAY A SYLVIA BASIN
HAS INFLUENCED THE SURFACE AND

342

00:21:10,850 --> 00:21:14,100

LED TO A STRONG NORTH SOUTH
DICHOTOMY ON VEST A.

343

00:21:14,100 --> 00:21:20,809

THIS IMAGE SHOWS A 1/4 OF VEST
A'S SURFACE, SORT OF A WEDGE CUT

344

00:21:20,809 --> 00:21:23,440

OUT OF IT, ALL THE WAY FROM
SOUTH TO NORTH.

345

00:21:23,440 --> 00:21:26,711

IN THE BOTTOM YOU'LL SEE IN THE
SOUTHERN HEMISPHERE THE REA

346

00:21:26,711 --> 00:21:32,250

SYLVIA RIM AND TOWARDS THE NORTH
WHERE IT'S DARK IS WHERE WE

347

00:21:32,250 --> 00:21:34,519

DON'T CURRENTLY HAVE DATA
BECAUSE THAT PART OF VEST A IS

348

00:21:34,519 --> 00:21:36,000

STILL IN SHADOW.

349

00:21:36,000 --> 00:21:40,080

YOU'LL NOTICE THAT IN THE SOUTH
THERE IS MANY -- THERE IS VERY

350

00:21:40,080 --> 00:21:42,659

SHARP TOPOGRAPHY AND VERY FEW
CRATERS.

351

00:21:42,659 --> 00:21:45,500

AS YOU MOVE TOWARDS THE NORTH,
THERE'S A LOT MORE CRATERS.

352

00:21:45,500 --> 00:21:47,759

IT'S A VERY DENSELY CRATERED
SURFACE.

353

00:21:47,759 --> 00:21:50,500

THE TOPOGRAPHY IS SMOOTHER AND
MORE ERODED.

354

00:21:50,500 --> 00:21:54,000

THIS IS BECAUSE THE FORMATION OF
REA SYLVIA UNDERNEATH THE CRATER

355

00:21:54,000 --> 00:22:00,390

ITSELF AND OUTSIDE OF THE CRATER
FOR HUNDREDS OF MILES COVERED

356

00:22:00,390 --> 00:22:03,730

THAT AREA IN EJECTED MATERIAL
ESSENTIALLY RESETTING THE

357

00:22:03,730 --> 00:22:04,730

SURFACE.

358

00:22:04,730 --> 00:22:07,490

MOST OF WHAT WE SEE IN THE SOUTH
IS REALLY ONLY ABOUT A BILLION

359

00:22:07,490 --> 00:22:08,490

YEARS OLD.

360

00:22:08,490 --> 00:22:10,450

AS WE GO TOWARDS THE NORTH,
THAT'S THE MUCH MORE ANCIENT

361

00:22:10,450 --> 00:22:16,649

TERRAIN OF VEST A.
THE FOLLOWING MOVIE OR THE MOVIE

362

00:22:16,649 --> 00:22:23,380

THAT IS SHOWING NOW SHOWS A VIEW
GOING INTO THE SOUTH POLE BASIN.

363

00:22:23,380 --> 00:22:25,630

AGAIN, RED IS HIGH AND BLUE IS
LOW HERE.

364

00:22:25,630 --> 00:22:29,419

THIS IS BASED ON THE GLOBAL
TOPOGRAPHY MODELS.

365

00:22:29,419 --> 00:22:32,139

YOU'LL SEE THAT THERE'S A
RELATIVELY HIGH AREA SURROUNDING

366

00:22:32,139 --> 00:22:36,159

THE CRATER, THE REDDISH RIM IN
MOST AREAS, WHERE THERE'S A GAP

367

00:22:36,159 --> 00:22:40,799

WHERE THE VERY THEN YEAH BASIN
IS OVERLAPPED BY REA SYLVIA.

368

00:22:40,799 --> 00:22:44,330

IN THE CENTER IS A VERY
PRONOUNCED CENTRAL PEAK AND ALSO

369

00:22:44,330 --> 00:22:48,130

AN INTERESTING SPIRALING GROOVED
PATTERN ON THE FLOOR OF THE REA

370

00:22:48,130 --> 00:22:50,150

SYLVIA BASIN.

371

00:22:50,150 --> 00:22:54,710

THE CENTRAL MOUND WAS SOMEWHAT
SURPRISING AT FIRST BECAUSE IT'S

372

00:22:54,710 --> 00:22:59,190

MUCH LARGER IN PROPORTION TO THE
CRATER SIZE THAN IMPACT CRATER

373

00:22:59,190 --> 00:23:01,940

CENTRAL PEAKS THAT WE SEE ON THE
MOON, FOR EXAMPLE.

374

00:23:01,940 --> 00:23:07,120

THE NEXT SLIDE SHOWS A VIEW FROM
THE RIM OF REA SYLVIA LOOKING

375

00:23:07,120 --> 00:23:10,520

INTO THE CRATER.

376

00:23:10,520 --> 00:23:11,620

NEXT SLIDE PLEASE.

377

00:23:11,620 --> 00:23:13,290

THANK YOU.

378

00:23:13,290 --> 00:23:17,440

HERE YOU CAN SEE A PROMINENT
SCARP OR CLIFF OFF TO THE RIGHT

379

00:23:17,440 --> 00:23:19,730

OF THE IMAGE, PART OF THE RIM OF
REA SYLVIA.

380

00:23:19,730 --> 00:23:21,190

IN THE CENTER IS THE CENTRAL
MOUND.

381

00:23:21,190 --> 00:23:24,200

THE TOP IS IMAGING DATA WRAPPED
OVER THE TOPOGRAPHY AND THE

382

00:23:24,200 --> 00:23:26,700

BOTTOM IS THE COLOR CODED
TOPOGRAPHY.

383

00:23:26,700 --> 00:23:31,610

THE CENTRAL MOUND IS ABOUT 1/3
OF THE DIAMETER OF THE CRATER.

384

00:23:31,610 --> 00:23:35,130

AT FIRST THIS IS VERY SURPRISING
BECAUSE CRATERS ON THE MOON AND

385

00:23:35,130 --> 00:23:37,559

OTHER LARGE BODIES DON'T REALLY
LOOK LIKE THIS.

386

00:23:37,559 --> 00:23:40,620

WHEN WE'VE LOOKED AT OTHER
SMALLER BODIES IN THE SOLAR

387

00:23:40,620 --> 00:23:43,700
SYSTEM, LIKE OUTER SOLAR SYSTEM
SATELLITES, WE'VE FOUND THAT

388
00:23:43,700 --> 00:23:46,740
THEY HAVE A SIMILAR STRUCTURE
WITH A VERY DOME LIKE, VERY

389
00:23:46,740 --> 00:23:48,190
LARGE CENTRAL PEAK.

390
00:23:48,190 --> 00:23:51,840
THIS APPEARS TO BE A CONSEQUENCE
OF CRATERS FORMING ON A BODY

391
00:23:51,840 --> 00:23:54,870
WHERE THE CRATER IS ALMOST AS
LARGE AS THE BODY ITSELF SO THE

392
00:23:54,870 --> 00:23:58,240
PLANETARY CURVATURE REALLY PLAYS
A ROLE IN THE SHAPE OF THE

393
00:23:58,240 --> 00:23:59,870
CRATER.

394
00:23:59,870 --> 00:24:02,549
WE'VE BEEN ABLE TO USE THE
GLOBAL TOPOGRAPHY MODELS TO MAKE

395
00:24:02,549 --> 00:24:06,129
AN ESTIMATE OF WHAT THE BOTTOM
OF THE REA SYLVIA BASIN IS.

396
00:24:06,129 --> 00:24:10,960
IN THE NEXT SLIDE WE SHOW A
SIMILAR FIGURE AGAIN.

397
00:24:10,960 --> 00:24:14,080
OUR ESTIMATE OF ABOUT 250,000

CUBIC MILES OF MATERIAL

398

00:24:14,080 --> 00:24:16,419

EXCAVATED FROM REA SYLVIA.

399

00:24:16,419 --> 00:24:19,480

A LARGE PART OF THIS WILL REMAIN
ON THE SURFACE AS I KNOW TO

400

00:24:19,480 --> 00:24:23,009

PREET PREVIOUSLY ERASING MANY
EXISTING CRATERS IN THE SOUTH.

401

00:24:23,009 --> 00:24:26,269

A LARGE FRACTION IS EJECTED INTO
SPACE.

402

00:24:26,269 --> 00:24:29,600

TO PUT THIS INTO ANOTHER PEKT
SPEKTTIVE, 250,000 CUBIC MILES

403

00:24:29,600 --> 00:24:35,960

CAN FILL THE GRAND CANYON A,000
TIMES OVER.

404

00:24:35,960 --> 00:24:39,429

THE AMOUNT OF MATERIAL EJECTED
INTO SPACE FROM THE REA SYLVIA

405

00:24:39,429 --> 00:24:43,139

IMPACT IS MORE THAN ENOUGH TO
EXPLAIN THE NUMBER OF VEST A

406

00:24:43,139 --> 00:24:45,929

FAMILY ASTEROIDS THAT WE SEE IN
SPACE.

407

00:24:45,929 --> 00:24:48,210

THESE VEST A FAMILY ASTEROIDS
ARE VERY IMPORTANT BECAUSE

408

00:24:48,210 --> 00:24:50,170

THEY'RE ESSENTIALLY AN
INTERMEDIATE LINK BETWEEN THE

409

00:24:50,170 --> 00:24:53,470

SURFACE OF VEST A AND THE HED
METEOR RIGHTS THAT WE HAVE HERE

410

00:24:53,470 --> 00:24:56,100

ON EARTH.

411

00:24:56,100 --> 00:24:58,509

ANOTHER INTERESTING POINT ABOUT
THIS IS THAT THE INDEPENDENT

412

00:24:58,509 --> 00:25:01,220

ESTIMATES OF THE AGE OF THAT
VEST A FAMILY PUT IT AT ABOUT A

413

00:25:01,220 --> 00:25:02,530

BILLION YEARS.

414

00:25:02,530 --> 00:25:06,200

SO THE FACT THAT WE'RE FINDING A
BILLION YEAR AGE FOR REA SYLVIA

415

00:25:06,200 --> 00:25:11,710

WHICH COINCIDES WITH THE AGE OF
VEST A ASTEROID FAMILY REALLY

416

00:25:11,710 --> 00:25:14,070

KIND OF TIES THE WHOLE DYNAMICAL
STORY TOGETHER.

417

00:25:14,070 --> 00:25:18,899

NOT ONLY IS THE DAWN MISSION
TELLING US THAT VEST A IS THE

418

00:25:18,899 --> 00:25:22,129
HED PARENT BODY, IT'S ALSO
SOLIDIFYING THE DYNAMICAL LIPG

419
00:25:22,129 --> 00:25:25,879
BETWEEN THE SURFACE OF VEST A
AND THE BODIES THAT WE HAVE ON

420
00:25:25,879 --> 00:25:28,700
EARTH THAT WE'RE STUDYING AS
METEOR RIGHTS.

421
00:25:28,700 --> 00:25:31,259
WITH THAT I'D LIKE TO HAND IT
OFF TO CHRISTINA WHO WILL TALK

422
00:25:31,259 --> 00:25:35,919
ABOUT THE COMPOSITION OF VEST A
AND THE RIO SYLVIA BASIN.

423
00:25:35,919 --> 00:25:41,049
>> SO DAWN DEMONSTRATES THAT
VEST A IS A PLANET.

424
00:25:41,049 --> 00:25:50,220
WE SEE VERY DEEP DOWN AND
POSSIBLY ALSO DOWN INTO IT.

425
00:25:50,220 --> 00:25:55,429
THEY ARE THE SAME THAT WE SEE AS
METEOR RIGHTS.

426
00:25:55,429 --> 00:26:02,059
THE GLOBAL DISTRIBUTION TELL US
THAT VEST A WOULD HAVE BEEN

427
00:26:02,059 --> 00:26:07,210
EARLY IN ITS HISTORY AND THESE
NEW FINDING GIVE OUT THE WINDOWS

428

00:26:07,210 --> 00:26:11,649
IN THE PROCESS THAT FORM THE
EARLIEST BODY OF VEST A.

429
00:26:11,649 --> 00:26:18,000
IN THE NEXT SLIDE YOU WILL SEE
HOW THE DISTRIBUTION, TELL US

430
00:26:18,000 --> 00:26:19,669
ABOUT IT.

431
00:26:19,669 --> 00:26:24,250
THIS COLOR IMAGE, FIRST COLOR
IMAGES HAS BEEN TAKEN WITH THE

432
00:26:24,250 --> 00:26:26,980
VISIBILITY MAPPING SPEC THROW
METER.

433
00:26:26,980 --> 00:26:35,380
WE ONLY USE THE SPEC THROW
METER.

434
00:26:35,380 --> 00:26:39,740
YOU SEE THAT THERE IS A CLEAR
DICHOTOMY BETWEEN THE NORTHERN

435
00:26:39,740 --> 00:26:43,580
REGION, THE SOUTHERN REGION.

436
00:26:43,580 --> 00:26:48,570
THE NEXT SLIDE YOU SEE THAT
THESE TWO REGION CORRESPONDS TO

437
00:26:48,570 --> 00:26:54,730
DIFFERENT COMPOSITION AND THIS
COMPOSITION TELL US ABOUT THE

438
00:26:54,730 --> 00:26:59,070
PROCESS THAT FORM VEST A.

FOR INSTANCE, IN THE BLUE, THAT

439

00:26:59,070 --> 00:27:04,909

CORRESPONDS TO THE SOUTH POLAR
REGION, TELL US THAT WE HAVE DYE

440

00:27:04,909 --> 00:27:08,299

OJ GE NIGHTS.

441

00:27:08,299 --> 00:27:16,120

THESE MINERALS ARE MADE BY ROCKS
FORMING.

442

00:27:16,120 --> 00:27:22,630

THE NEXT SLIDE YOU SEE HOW THESE
MINERALS ARE ON THE REST OF THE

443

00:27:22,630 --> 00:27:24,039

SURFACE.

444

00:27:24,039 --> 00:27:28,871

THE VIOLET MEANS THAT WE HAVE
MORE DYE OJ GE NIGHTS LIKE

445

00:27:28,871 --> 00:27:29,871

MINERALS.

446

00:27:29,871 --> 00:27:34,520

THE ONES IN YELLOW MEANS THAT WE
HAVE MORE UK KA RIGHT LIKE

447

00:27:34,520 --> 00:27:38,929

MINERALS.

448

00:27:38,929 --> 00:27:45,970

AND THE IMAGERY DATA TELL US
THAT THE BASIN IS A MINERAL THAT

449

00:27:45,970 --> 00:27:46,970

FORMS.

450

00:27:46,970 --> 00:27:53,549

IN THE SOUTHERN REGION WE HAVE A
PREVALENCE OF U KROOIT MINERALS

451

00:27:53,549 --> 00:28:04,039

SO WE THINK OVERALL THE MEN NER
ROLLING SAYS THEY WERE DEPOSITED

452

00:28:04,039 --> 00:28:14,200

BY THE IMPACTS AND THE REGION IN
THE NORTHERN PART OF VEST A

453

00:28:14,200 --> 00:28:20,510

SEEMS TO RETAIN THE MOST RICH
MEN NER ROLLING, RICH U KRIT

454

00:28:20,510 --> 00:28:21,870

TICK MINERALOGIES.

455

00:28:21,870 --> 00:28:28,370

IN THE NEXT SLIDE YOU SEE HOW
THESE LARGE SCALE VARIATION IS

456

00:28:28,370 --> 00:28:37,070

ALSO SEEN IN SMALLER SCALE SO
THIS IS A FIRST COLOR IMAGE AND

457

00:28:37,070 --> 00:28:44,830

IF YOU LOOK AT THESE, YOU SEE
THAT WE HAVE A LOT OF DIFFERENT

458

00:28:44,830 --> 00:28:49,140

MORE OFOLOGY AND THESE DIFFERENT
FOR OF FOLLOWING IS DIFFERENT

459

00:28:49,140 --> 00:28:50,409

COLORS.

460

00:28:50,409 --> 00:28:54,899

IF WE LOOK IN THE BOXES, IN THE
NEXT SLIDE YOU WILL SEE -- I'LL

461

00:28:54,899 --> 00:28:58,440

ZOOM ON THIS BOX.

462

00:28:58,440 --> 00:29:00,850

THIS HAS BEEN DONE.

463

00:29:00,850 --> 00:29:03,409

THE TWILIGHT DIFFERENCES.

464

00:29:03,409 --> 00:29:07,379

THE FIRST ONE IS THE BRIGHTNESS
AND THE VISIBLE AWARENESS.

465

00:29:07,379 --> 00:29:11,940

YOU SEE THAT WE HAVE A BRIGHT
REGION AND DARKER REGION WHILE

466

00:29:11,940 --> 00:29:17,110

THE CENTER IS MADE USING
DIFFERENT COLOR COMBINATION AND

467

00:29:17,110 --> 00:29:27,559

I LIKE THE DIFFERENT ROCKS SO
YOU SEE ON ONE SIDE THAT IS

468

00:29:27,559 --> 00:29:30,879

COMPLETELY DIFFERENT WITH
RESPECT THE REST OF IT.

469

00:29:30,879 --> 00:29:37,059

AND THE LAST IS DONE IN ORDER TO
SEE THE VARIATION.

470

00:29:37,059 --> 00:29:41,289

THAT'S REALLY IMPORTANT BECAUSE

IT TELLS US ABOUT THE HISTORY OF

471

00:29:41,289 --> 00:29:49,659

VEST A, THE EVOLUTION OF VEST A.
TO CONCLUDE, NEXT SLIDE PLEASE.

472

00:29:49,659 --> 00:29:55,960

THE SCALE VARIATION, THE FACT
THAT WE HAVE ALSO THIS ON VEST

473

00:29:55,960 --> 00:30:04,530

A, TELL US THAT VEST A IS A
COMPLEX MIXTURE OF DYE OJ GER

474

00:30:04,530 --> 00:30:06,600

NIGHTS AND U KA RIGHTS.

475

00:30:06,600 --> 00:30:16,330

THE OCCURRENCE OF THE PROPULSION
OF THIS MATERIAL TELL US THAT

476

00:30:16,330 --> 00:30:19,190

THESE ARE CRITICAL.

477

00:30:19,190 --> 00:30:28,880

IT'S RATHER CONSISTENT WITH THE
POSSIBILITY THAT VEST A WAS IN

478

00:30:28,880 --> 00:30:34,470

THE SOLAR SYSTEM AND GIVES NEW
RESULTS ALLOW ADDITIONAL INSIGHT

479

00:30:34,470 --> 00:30:38,840

IN THE PROCESS.

480

00:30:38,840 --> 00:30:46,600

AND NOW WE WILL GO BACK TO CAROL
THAT WILL GIVE US SOME REMARKS.

481

00:30:46,600 --> 00:30:47,600

>> THANK YOU.

482

00:30:47,600 --> 00:30:51,519

I HOPE WE CONVEYED HOW EXCITED
WE ARE ABOUT THIS NEW DATA AND

483

00:30:51,519 --> 00:30:52,519

ITS SIGNIFICANCE.

484

00:30:52,519 --> 00:30:55,899

I JUST WANTED TO WRAP UP WITH A
FEW KEY POINTS.

485

00:30:55,899 --> 00:31:01,379

AND THE FIRST IS THAT VEST A IS
AN INTACT PLANETARY BODY THAT IS

486

00:31:01,379 --> 00:31:06,190

TRANSITIONAL BETWEEN ASTEROIDS
AND PLANETS.

487

00:31:06,190 --> 00:31:09,840

VEST A IS THE PARENT BODY OF THE
HED METEOR RIGHTS WHICH ALLOWS

488

00:31:09,840 --> 00:31:13,600

US TO INTERPRET DAWN DATA IN FAR
GREATER DEPTH THAN WOULD

489

00:31:13,600 --> 00:31:16,450

OTHERWISE BE POSSIBLE.

490

00:31:16,450 --> 00:31:20,799

THAT VEST A HAS DISPLAYED
UNEXPECTEDLY LARGE BRIGHTNESS

491

00:31:20,799 --> 00:31:22,669

VARIATIONS.

492

00:31:22,669 --> 00:31:26,119

AND THAT THE GIANT REA SYLVIA
BASIN IS SIGNIFICANTLY YOUNGER

493

00:31:26,119 --> 00:31:30,960

THAN LARGE IMPACT BASINS ON THE
MOON AND THIS WAS ALSO

494

00:31:30,960 --> 00:31:34,090

UNEXPECTED, AND PROVIDES
FUNDAMENTAL CONSTRAINTS ON

495

00:31:34,090 --> 00:31:38,490

MODELS OF THE DYNAMICS OF THE
SOLAR SYSTEM.

496

00:31:38,490 --> 00:31:41,069

AND THAT WRAPS UP OUR REMARKS.

497

00:31:41,069 --> 00:31:42,069

>> THANK YOU ALL.

498

00:31:42,069 --> 00:31:43,069

>> OKAY.

499

00:31:43,069 --> 00:31:44,069

NOW IT'S TIME FOR QUESTIONS.

500

00:31:44,069 --> 00:31:46,179

AND, AGAIN, I WANT TO WELCOME
OUR SOCIAL MEDIA AUDIENCE.

501

00:31:46,179 --> 00:31:51,919

IF YOU HAVE A QUESTION, BRING
THEM ON IN AT #ASK NASA.

502

00:31:51,919 --> 00:31:55,649

THE CONVERSATION WILL NOT STOP
HERE, LADIES AND GENTLEMEN.

503

00:31:55,649 --> 00:31:58,679

THE TWITTER FEED, I WILL GIVE
THAT OUT AT THE END OF THE SHOW.

504

00:31:58,679 --> 00:32:01,360

YOU CAN JOIN THE CONVERSATION
AND ASK QUESTIONS IN THE

505

00:32:01,360 --> 00:32:04,090

CONVERSATION WITH THE SCIENTISTS
AND THE TEAM.

506

00:32:04,090 --> 00:32:05,090

STAND BY FOR THAT.

507

00:32:05,090 --> 00:32:07,580

RIGHT NOW, WE'RE GOING TO OPEN
THE PHONE LINES AND THEN WE'RE

508

00:32:07,580 --> 00:32:11,539

GOING TO TAKE SOME QUESTIONS
FROM OUR SOCIAL MEDIA AUDIENCE.

509

00:32:11,539 --> 00:32:13,230

AND FIRST UP WILL BE MIKE WALLS.

510

00:32:13,230 --> 00:32:14,230

>> HI.

511

00:32:14,230 --> 00:32:15,230

THIS IS MIKE WALLS FROM
SPACE.COM.

512

00:32:15,230 --> 00:32:16,230

THIS IS FOR CAROL.

513

00:32:16,230 --> 00:32:22,009

YOU MENTIONED VEST A'S PROBABLY

THE LAST SURVIVING MEMBER OF A

514

00:32:22,009 --> 00:32:28,919

CLASS OF OBJECTS THAT USED TO
EXIST IN THE SOLAR SYSTEM.

515

00:32:28,919 --> 00:32:33,549

I WONDER IF YOU COULD JUST TALK
A LITTLE BIT ABOUT WHAT HAPPENED

516

00:32:33,549 --> 00:32:36,649

TO THE REST OF THE OBJECTS AND
WHERE DOES GERES FIT INTO THAT

517

00:32:36,649 --> 00:32:39,039

PICTURE.

518

00:32:39,039 --> 00:32:41,440

>> SURE.

519

00:32:41,440 --> 00:32:45,410

WE KNOW THAT FROM THE DEBRIS
FIELD THAT'S LEFT IN THE

520

00:32:45,410 --> 00:32:50,100

ASTEROID BELT INDICATING
THERE -- THERE WERE OTHER BODIES

521

00:32:50,100 --> 00:32:53,289

THAT WERE DIFFERENTIATED SIMILAR
TO VEST A, WE KNOW THIS BECAUSE

522

00:32:53,289 --> 00:32:57,360

THERE ARE IRON METEORITES THAT
LOOK LIKE THE CORES OF THESE

523

00:32:57,360 --> 00:33:00,340

BODIES, STONEY METEORITES THAT
LOOK LIKE THE CRUST OF THESE

524

00:33:00,340 --> 00:33:04,460

BODIES, AND WITH COMPOSITIONS
THAT ARE ROUGHLY SIMILAR.

525

00:33:04,460 --> 00:33:11,789

SO WE COULD INFER BASED ON THAT
AND JUST OUR IDEAS ABOUT HOW THE

526

00:33:11,789 --> 00:33:16,340

EARLY SOLAR SYSTEM FORMED THAT
THERE WERE MANY OF THESE

527

00:33:16,340 --> 00:33:20,320

PLANETARY EMBRYOS THAT WERE COAL
A LESSING AND FORMING THE ROCKY

528

00:33:20,320 --> 00:33:24,220

PLANETS AND THE CORES OF THE GAS
GIANTS.

529

00:33:24,220 --> 00:33:27,409

BUT WHAT'S CLEAR TO US IS THAT
VEST A APPEARS TO BE THE ONLY

530

00:33:27,409 --> 00:33:32,340

INTACT PROTO PLANET THAT'S LEFT
BECAUSE THE COLLISIONAL

531

00:33:32,340 --> 00:33:36,690

ENVIRONMENT WAS SO INTENSE THAT
MANY OF THESE WERE JUST BLASTED

532

00:33:36,690 --> 00:33:41,539

INTO SMALL PIECES, WHICH IS WHAT
MOST OF THE BELT IS.

533

00:33:41,539 --> 00:33:47,309

SO AS FAR AS SERIES, SERIES IS
ALSO -- IT'S NOT AN IGNEOUSLY

534

00:33:47,309 --> 00:33:48,370

DIFFERENTIATED BODY.

535

00:33:48,370 --> 00:33:51,919

IT STILL HAS A LOT OF ITS WATER.

536

00:33:51,919 --> 00:33:56,049

IT HAS HAD A SIGNIFICANTLY
DIFFERENT EVOLUTION THAN VESTA A

537

00:33:56,049 --> 00:34:01,100

AND THE OTHER PLANETARY EMBRYOS
LIKE VESTA A, BUT IT'S LIKELY

538

00:34:01,100 --> 00:34:06,619

THAT ITS LARGE SIZE WAS A BIG
FACTOR IN THE FACT THAT IT STILL

539

00:34:06,619 --> 00:34:07,750

EXISTS TODAY.

540

00:34:07,750 --> 00:34:12,020

>> IF I COULD ADD SOMETHING TOO.

541

00:34:12,020 --> 00:34:17,050

VESTA IS DAZE BASICALLY A
LEFTOVER PLANETARY BUILDING

542

00:34:17,050 --> 00:34:18,450

BLOCK.

543

00:34:18,450 --> 00:34:21,640

WHAT'S HAPPENED TO A LOT OF THE
BODIES THAT PROBABLY RESEMBLED

544

00:34:21,640 --> 00:34:25,030

VEST A IN THE EARLY SOLAR SYSTEM
IS THAT THEY HAVE ALREADY BEEN

545

00:34:25,030 --> 00:34:28,740

INCORPORATED EARLIER INTO
PLANETS, INTO THE GROWTH OF

546

00:34:28,740 --> 00:34:29,840

PLANETS.

547

00:34:29,840 --> 00:34:35,070

SO IN THIS WAY, THIS ALLOWS US
TO SEE FARTHER BACK IN TIME,

548

00:34:35,070 --> 00:34:39,270

WHICH IS, OF COURSE, THE BASIS
FOR THE NAME DAWN OF THE

549

00:34:39,270 --> 00:34:40,270

MISSION.

550

00:34:40,270 --> 00:34:44,170

THIS IS A MISSION IN TIME AS
WELL AS IN SPACE.

551

00:34:44,170 --> 00:34:50,040

>> OUR NEXT QUESTION IS FROM KEN
KRAMER, SPACE FLIGHT MAGAZINE.

552

00:34:50,040 --> 00:34:51,040

KEN?

553

00:34:51,040 --> 00:34:52,040

>> HI.

554

00:34:52,040 --> 00:34:53,320

THANKS FOR TAKING MY QUESTION.

555

00:34:53,320 --> 00:34:54,320

GREAT RESULTS.

556

00:34:54,320 --> 00:34:59,260
I WONDER IF YOU COULD TALK A
LITTLE BIT ABOUT EVIDENCE -- IS

557

00:34:59,260 --> 00:35:03,010
IS THERE ANY EVIDENCE ELSEWHERE
IN THE SOLAR SYSTEM OF THIS

558

00:35:03,010 --> 00:35:05,110
MASSIVE IMPACT ONE BILLION YEARS
AGO?

559

00:35:05,110 --> 00:35:11,420
AND WHAT CONSEQUENCE COULD THAT
HAVE BEEN FOR THE EARTH?

560

00:35:11,420 --> 00:35:12,420
THANKS.

561

00:35:12,420 --> 00:35:13,420
>> OKAY.

562

00:35:13,420 --> 00:35:17,700
I THINK THE -- THE IMPACT ON
VESTA WAS PROBABLY NOT PART OF

563

00:35:17,700 --> 00:35:19,240
A SOLAR SYSTEM-WIDE PHENOMENON.

564

00:35:19,240 --> 00:35:22,320
I THINK IT WAS JUST SORT OF A
SINGLE IMPACT ON VESTA THAT

565

00:35:22,320 --> 00:35:25,260
HAPPENED TO OCCUR AT THAT TIME.

566

00:35:25,260 --> 00:35:31,730
UNLIKE THE LATE HEAVY
BOMBARDMENT WHICH IS SORT OF ONE

567

00:35:31,730 --> 00:35:34,080

OF THE MODELS FOR THE
BOMBARDMENT HISTORY IS THE MOON

568

00:35:34,080 --> 00:35:38,490

AND THE INNER SOLAR SYSTEM WHERE
A LOT OF -- A LOT OF IMPACTS

569

00:35:38,490 --> 00:35:44,190

OCCUR, SAY, AROUND 4 BILLION
YEARS TO 3.5 BILLION YEARS AGO.

570

00:35:44,190 --> 00:35:46,520

SO THIS WASN'T NECESSARILY PART
OF THAT, I THINK IT WAS JUST

571

00:35:46,520 --> 00:35:50,490

SORT OF A LATER SARCASTIC IMPACT
THAT HAPPENED TO OCCUR AT THAT

572

00:35:50,490 --> 00:35:51,970

TIME.

573

00:35:51,970 --> 00:35:53,450

>> OKAY.

574

00:35:53,450 --> 00:35:55,619

>> IN TERMS OF --

>> I'M SORRY, GO AHEAD.

575

00:35:55,619 --> 00:36:00,050

>> IN TERMS OF THE EFFECT ON THE
EARTH, IT'S HARD TO SAY BECAUSE

576

00:36:00,050 --> 00:36:03,000

IT WOULD HAVE LAUNCHED A LOT OF
METEORITES INTO SPACE THAT WOULD

577

00:36:03,000 --> 00:36:04,140

HAVE EVENTUALLY MADE THEIR WAY
INTO SPACE.

578

00:36:04,140 --> 00:36:08,520

THERE WOULD HAVE BEEN A NUMBER
OF METEORITES FALLING ON EARTH

579

00:36:08,520 --> 00:36:14,040

BUT IN TERMS OF LARGE IMPACTS,
LIKE EXTINGION IMPACTS, I DON'T

580

00:36:14,040 --> 00:36:16,890

THINK THE VEST A IMPACT WOULD
HAVE HAD ANY EFFECT LIKE THAT.

581

00:36:16,890 --> 00:36:17,890

>> OKAY.

582

00:36:17,890 --> 00:36:22,460

AS I MENTIONED EARLIER, WE ARE
INCORPORATING SOMETHING NEW HERE

583

00:36:22,460 --> 00:36:26,380

IN OUR SCIENCE BRIEFINGS AND
THAT IS BRINGING IN THE

584

00:36:26,380 --> 00:36:29,940

INCREDIBLE REACH AND AUDIENCE OF
SOCIAL MEDIA, SO I'M GOING TO

585

00:36:29,940 --> 00:36:32,050

ASK CAROL TO DRIVE THE BUS HERE.

586

00:36:32,050 --> 00:36:33,910

WE'VE GOT SEVERAL QUESTIONS
COMING IN.

587

00:36:33,910 --> 00:36:35,250

FOR OUR SOCIAL MEDIA AUDIENCE.

588

00:36:35,250 --> 00:36:37,970

FORGIVE ME IF I BOTCH THE NAMES.

589

00:36:37,970 --> 00:36:41,500

WE ARE COLORFUL NAMES.

590

00:36:41,500 --> 00:36:44,320

CAROL WILL DIVVY OUT THE
QUESTIONS AS YOU SEE FIT.

591

00:36:44,320 --> 00:36:45,410

WELCOME SOCIAL MEDIA AUDIENCE.

592

00:36:45,410 --> 00:36:50,450

THE FIRST ONE IS FROM @RYE IN
SPACE.

593

00:36:50,450 --> 00:36:54,980

WHAT IS THE PREDICTED MINERALOGY
OF VEST A NOW AND WHAT ARE THE

594

00:36:54,980 --> 00:36:59,190

REGULAR AND DUST DEPTHS?

595

00:36:59,190 --> 00:37:07,750

>> WHO WANTS TO TAKE THIS?

596

00:37:07,750 --> 00:37:16,340

>> MINERALOGY, WE HAVE EVIDENCE
OF MINERALOGIES IN DIFFERENT

597

00:37:16,340 --> 00:37:19,400

KINDS OF PYROX.

598

00:37:19,400 --> 00:37:20,430

ESPECIALLY MAGNESIUM.

599

00:37:20,430 --> 00:37:31,930

WHILE WE DO NOT HAVE LARGE
EVIDENCE FOR OTHER BLOCKS OF

600

00:37:31,930 --> 00:37:33,160

DIFFERENT KIND OF MINERALS.

601

00:37:33,160 --> 00:37:37,990

I THINK THAT DAVE CAN SAY
SOMETHING MORE.

602

00:37:37,990 --> 00:37:38,990

>> OKAY.

603

00:37:38,990 --> 00:37:42,240

I DON'T HAVE A GOOD GLOBAL
ESTIMATE OFF THE TOP OF MY HEAD.

604

00:37:42,240 --> 00:37:46,530

ONE NUMBER THAT I CAN GIVE
THOUGH IS THAT IN THE REGION

605

00:37:46,530 --> 00:37:50,500

AROUND THE REA SYLVIA IMPACT
BASIN WE'VE ESTIMATED FROM THE

606

00:37:50,500 --> 00:37:52,630

SIZES OF CRATERS THAT HAVE BEEN
ERASED BY THE FORMATION OF REA

607

00:37:52,630 --> 00:37:56,900

SYLVIA THAT THE EJECT A BLANKET
OVER THAT REGION IS MAYBE ABOUT

608

00:37:56,900 --> 00:37:58,020

5 KILOMETERS THICK.

609

00:37:58,020 --> 00:38:00,700

THAT'S ABOUT 3 MILES THICK.

610

00:38:00,700 --> 00:38:03,500
THAT WOULDN'T NECESSARILY BE
FINE POWDER.

611
00:38:03,500 --> 00:38:06,890
A LOT OF IT MIGHT BE LARGE
BLOCKS BUT IT WOULD BE SORT OF A

612
00:38:06,890 --> 00:38:09,870
LOT OF RUBBLE AND SMALLER
MATERIAL THAT WOULD BE THROWN

613
00:38:09,870 --> 00:38:11,420
OVER THAT.

614
00:38:11,420 --> 00:38:14,040
>> LET ME ADD SOMETHING ABOUT
THE MINERALOGY.

615
00:38:14,040 --> 00:38:19,060
THE HEDs TELL US THAT ANOTHER
MAJOR MINERAL THAT SHOULD OCCUR

616
00:38:19,060 --> 00:38:24,330
ON THE SURFACE IS STEALTH SPAR,
PLEDGE GI GLAZE STEALTH SPAR.

617
00:38:24,330 --> 00:38:28,430
WE DON'T HAVE AN INSTRUMENT THAT
IS CAPABLE OF SEEING THAT.

618
00:38:28,430 --> 00:38:33,450
SO THIS IS A PLACE WHERE THE
METEORITES ARE PROVIDING

619
00:38:33,450 --> 00:38:37,850
ADDITIONAL INFORMATION THAT WILL
COMPLIMENT WHAT WE GET FROM

620
00:38:37,850 --> 00:38:39,370

REMOTE SENSING.

621

00:38:39,370 --> 00:38:43,130

ANOTHER THING THAT WE SEE --
ANOTHER MINERAL THAT WE SEE IN

622

00:38:43,130 --> 00:38:49,520

SOME OF THE HE DERKS MEET OR
RIGHTS ARE IS OLLIE CONVENIENT.

623

00:38:49,520 --> 00:38:54,300

ITS PRESENCE IS IMPORTANT
BECAUSE IF WE ACTUALLY EXCAVATE

624

00:38:54,300 --> 00:38:58,750

DOWN INTO THE MANTLE OF THIS
BODY, WE EXPECT TO SEE A LOT OF

625

00:38:58,750 --> 00:38:59,750

OLLIE CONVENIENT.

626

00:38:59,750 --> 00:39:04,100

WE SEE SMALL AMOUNTS OF OLLIE
VOOEN IN THE HED METEORITES, BUT

627

00:39:04,100 --> 00:39:07,600

OUR INSTRUMENTS HAVE NOT YET
ALLOWED US TO SEE OLLIE VOOEN ON

628

00:39:07,600 --> 00:39:09,960

THE SURFACE OF VEST A.
WE'RE LOOKING CURRENT FOR IT,

629

00:39:09,960 --> 00:39:12,300

BUT WE HAVEN'T FOUND IT YET.

630

00:39:12,300 --> 00:39:13,300

>> OKAY.

631

00:39:13,300 --> 00:39:18,170
AGAIN, A REMINDER TO SEND YOUR
QUESTION IN TO #ASKNASA.

632
00:39:18,170 --> 00:39:21,600
AGAIN, THE CONVERSATION DOESN'T
STOP THERE.

633
00:39:21,600 --> 00:39:25,400
TWITTER, FACEBOOK, YOUTUBE AND
IN PARTICULAR AND I'LL GIVE YOU

634
00:39:25,400 --> 00:39:29,250
THE TWITTER FEED NOW AND AGAIN
AT THE END OF THE PROGRAM,

635
00:39:29,250 --> 00:39:35,500
FOLLOW THE CONVERSATION @NASA
UNDERSCORE DAWN.

636
00:39:35,500 --> 00:39:43,970
NEXT QUESTION FROM OUR #ASKNASA
IS FROM @LW UNDERSCORE RDCP.

637
00:39:43,970 --> 00:39:47,740
WHAT IS THE IMPORTANCE OF
TODAY'S DISCOVERIES FOR FUTURE

638
00:39:47,740 --> 00:39:50,150
INVESTIGATION?

639
00:39:50,150 --> 00:39:55,810
>> WELL, I CAN OFFER MY OPINION.

640
00:39:55,810 --> 00:39:59,720
WHAT WE'RE SEEING AT VESTA IS --
HAS -- HAS REALLY EXPANDED

641
00:39:59,720 --> 00:40:06,420
THE -- THE IDEAS ABOUT THE

DIVERSITY THAT WE MIGHT

642

00:40:06,420 --> 00:40:11,120

ENCOUNTER AS WE GO OUT INTO THE
ASTEROID BELT AND START LOOKING

643

00:40:11,120 --> 00:40:17,860

AT THE MYRIAD PIECES THAT MIGHT
BE PROVIDING US ADDITIONAL

644

00:40:17,860 --> 00:40:20,590

INFORMATION ABOUT THE EARLY
SOLAR SYSTEM.

645

00:40:20,590 --> 00:40:25,160

AND, YOU KNOW, THE SERIES IS AN
EXTREMELY INTERESTING BODY THAT

646

00:40:25,160 --> 00:40:30,450

WE'RE ALREADY GOING TO AND
STUDYING, AND SO THAT IS ONE --

647

00:40:30,450 --> 00:40:35,930

IS GOING TO BE ANOTHER PIECE OF
THE PUZZLE, BUT THERE ARE MANY

648

00:40:35,930 --> 00:40:41,060

ASTEROIDS THAT HAVE INTERESTING
SURFACES AS SEEN FROM

649

00:40:41,060 --> 00:40:42,060

TELESCOPES.

650

00:40:42,060 --> 00:40:45,890

THERE ARE MANY RELATIONSHIPS OF
THE TYPES OF ASTEROIDS YOU

651

00:40:45,890 --> 00:40:50,120

ENCOUNTER WITH DISTANCE FROM THE
SUN, WHICH IS ALSO TELLING US

652

00:40:50,120 --> 00:40:54,690

SOMETHING FUNDAMENTAL ABOUT THE
GRADIENTS IN THE MATERIAL AND

653

00:40:54,690 --> 00:40:57,260

THE TYPES OF PROCESSES LIKE
COLLISIONAL PROCESSES THAT ARE

654

00:40:57,260 --> 00:40:58,260

OCCURRING.

655

00:40:58,260 --> 00:41:02,350

SO WHAT WE'RE LEARNING FROM VEST
A THAT'S HONING OUR KNOWLEDGE OF

656

00:41:02,350 --> 00:41:06,340

THE DYNAMICS AND OF THE
POSSIBILITIES OF WHAT THESE

657

00:41:06,340 --> 00:41:11,280

SURFACES MIGHT HOLD IS GOING TO
HELP US TO FORMULATE STRATEGIES

658

00:41:11,280 --> 00:41:15,590

FOR HOW WE CAN, YOU KNOW, NARROW
DOWN TO THE FEW BODIES THAT WE

659

00:41:15,590 --> 00:41:18,530

WANT TO GO EXPLORE IN DETAIL
LATER.

660

00:41:18,530 --> 00:41:21,810

AND I'LL ALSO MENTION AND OTHERS
MAY WANT TO CHIME IN THAT

661

00:41:21,810 --> 00:41:24,920

TELESCOPES ARE ALSO STILL
EXTREMELY IMPORTANT FOR US

662

00:41:24,920 --> 00:41:28,760

BECAUSE THEY RIGHT NOW ARE
REALLY OUR EYES ON THE SOLAR

663

00:41:28,760 --> 00:41:29,880

SYSTEM.

664

00:41:29,880 --> 00:41:33,520

WE DON'T HAVE THE RESOURCES TO
SPEND SPACECRAFT OUT TO MANY

665

00:41:33,520 --> 00:41:38,150

BODIES SO THEY'RE GOING TO STILL
BE THE WORKHORSES TO REALLY

666

00:41:38,150 --> 00:41:41,300

REVEAL MORE INFORMATION ABOUT
ALL OF THE BODIES OUT THERE.

667

00:41:41,300 --> 00:41:42,300

>> YEAH.

668

00:41:42,300 --> 00:41:44,990

I JUST WANT TO ADD THAT WE DID A
LOT OF OBSERVATIONS OF VESTA

669

00:41:44,990 --> 00:41:49,430

USING THE NASA INFRARED
TELESCOPE PRIOR TO ARRIVAL.

670

00:41:49,430 --> 00:41:51,880

ONE OF THE THINGS LIKE CAROL
SAID, WE CANNOT GO TO EVERY

671

00:41:51,880 --> 00:41:54,780

ASTEROID OUT THERE BUT IF YOU
HAVE GROUND PROOF OF

672

00:41:54,780 --> 00:41:58,720

CONFIRMATION OF WHAT WE SEE FROM
THE EARTH VERSUS SENDING A BIG

673

00:41:58,720 --> 00:42:01,760

SPACECRAFT OUT THERE, WE CAN DO
SIMILAR THINGS WITH OTHER

674

00:42:01,760 --> 00:42:02,760

OBJECTS.

675

00:42:02,760 --> 00:42:03,930

THERE'S ABOUT A MILLION
ASTEROIDS.

676

00:42:03,930 --> 00:42:07,190

WE CAN STUDY THEM FROM THE
EARTH, EXTRAPOLATE, WE CAN KNOW

677

00:42:07,190 --> 00:42:09,450

WHAT THE DIFFERENCES ARE AND
WHAT THE LIMITATIONS ARE THAT WE

678

00:42:09,450 --> 00:42:10,450

CAN DO.

679

00:42:10,450 --> 00:42:13,200

SO FAR IT'S REALLY EXCITING TO
SEE THAT A LOT OF OUR

680

00:42:13,200 --> 00:42:16,970

OBSERVATIONS HAVE BEEN CONFIRMED
BY DAWN.

681

00:42:16,970 --> 00:42:19,740

IT'S A REALLY IMPORTANT
DISCOVERY.

682

00:42:19,740 --> 00:42:27,880

>> ANOTHER POSSIBLE PAYOFF,
ALTHOUGH IT'S ARGUABLE, IS THAT

683

00:42:27,880 --> 00:42:32,320

EVENTUALLY WE'LL HAVE THE
ABILITY TO MINE ASTEROIDS THAT

684

00:42:32,320 --> 00:42:34,680

WE WILL FIND VALUABLE RESOURCES
ON THEM.

685

00:42:34,680 --> 00:42:42,760

THERE WAS AN ARTICLE IN THE "USA
TODAY" ABOUT THAT.

686

00:42:42,760 --> 00:42:46,000

I THINK IT'S A TOUGH SELL, BUT
THERE ARE PEOPLE WHO ARE PUTTING

687

00:42:46,000 --> 00:42:49,970

LARGE AMOUNTS OF MONEY INTO THIS
IDEA AND IT WILL BE INTERESTING

688

00:42:49,970 --> 00:42:53,700

TO SEE IF THIS MIGHT HAVE A
PAYOFF IN THE FUTURE, BUT

689

00:42:53,700 --> 00:43:00,270

CERTAINLY MISSIONS LIKE DAWN
THAT CHARACTERIZE THE MATERIALS

690

00:43:00,270 --> 00:43:04,670

IN ASTEROIDS ARE OBVIOUS
PRECURSORS BEFORE WE SEND OUT

691

00:43:04,670 --> 00:43:08,690

SPACECRAFT THAT ARE GOING TO TRY
TO BRING MATERIALS BACK FOR

692

00:43:08,690 --> 00:43:10,610

COMMERCIAL PURPOSES.

693

00:43:10,610 --> 00:43:12,140

>> OKAY.

694

00:43:12,140 --> 00:43:17,150

WE'RE GOING TO TAKE A QUESTION
FROM A REPORTER WHO SENT IN FROM

695

00:43:17,150 --> 00:43:18,210

DWATH NASA.

696

00:43:18,210 --> 00:43:21,430

WE'LL GO TO THE PHONE LINES.

697

00:43:21,430 --> 00:43:23,480

THIS QUESTION IS DIRECTED TO DR.

698

00:43:23,480 --> 00:43:30,250

JIM GREEN FROM BBC CORRESPONDENT
JONATHAN AMOS, THE SCIENCE

699

00:43:30,250 --> 00:43:31,840

CORRESPONDENT AT BBC.

700

00:43:31,840 --> 00:43:32,840

DR.

701

00:43:32,840 --> 00:43:35,250

GREEN, JUST AN EXTRA TWO
WEEKS AT VEST A WOULD ENABLE THE

702

00:43:35,250 --> 00:43:38,200

DAWN TEAM TO FULLY IMAGE THE
NORTH POLE.

703

00:43:38,200 --> 00:43:41,220

WILL YOU GIVE IT TO THEM?

704

00:43:41,220 --> 00:43:48,240

>> WELL, OF COURSE IT IS A NEW
DAWN IN THAT WE HAVE ALLOWED

705

00:43:48,240 --> 00:43:50,140
THAT EXTENSION TO OCCUR.

706

00:43:50,140 --> 00:43:54,420
THERE WAS A CRITICAL ANALYSIS
THAT WENT ON THAT ALLOWED US TO

707

00:43:54,420 --> 00:43:57,870
MAKE THAT DECISION VERY EASY,
AND THAT IS THE FACT THAT WE CAN

708

00:43:57,870 --> 00:44:01,870
MAKE IT TO SERIES, WHICH IS A
MAJOR PART OF THE MISSION.

709

00:44:01,870 --> 00:44:05,980
AS YOU KNOW, SERIES IS SORT OF
ON THE OUTER PART OF THE

710

00:44:05,980 --> 00:44:06,980
ASTEROID BELT.

711

00:44:06,980 --> 00:44:10,420
DAWN IS ON THE INNER PART OF THE
ASTEROID BELT AND THE DYNAMICS

712

00:44:10,420 --> 00:44:15,280
ARE SUCH THAT THOSE THINGS
CONTINUALLY MOVE APART AND WITH

713

00:44:15,280 --> 00:44:18,290
DAWN'S ION ENGINES THAT ARE
RUNNING MUCH BETTER THAN

714

00:44:18,290 --> 00:44:23,920
PREDICTED, THAT REALLY ENABLES
US TO STAY AT VESTALONG GER.

715

00:44:23,920 --> 00:44:27,440

SO WE'RE VERY EXCITED ABOUT THAT
BECAUSE IT WILL MAP THAT UNKNOWN

716

00:44:27,440 --> 00:44:28,440

REGION.

717

00:44:28,440 --> 00:44:31,310

THAT REGION NOW IS VERY
IMPORTANT TO LOOK AT BECAUSE NOW

718

00:44:31,310 --> 00:44:34,850

WE KNOW ABOUT THE REA SYLVIA
IMPACT AND HOW THAT MIGHT AFFECT

719

00:44:34,850 --> 00:44:37,740

THE NORTHERN HEMISPHERE WILL NOW
BE REVEALED.

720

00:44:37,740 --> 00:44:41,430

SO, INDEED, IT WAS AN EASY
DECISION TO MAKE BECAUSE THE

721

00:44:41,430 --> 00:44:45,510

SPACECRAFT IS FAR MORE CAPABLE
THAN ITS BASELINE AND WE'RE

722

00:44:45,510 --> 00:44:48,300

REALLY EXSITED ABOUT THAT
NEXT -- THAT NEXT STEP FOR DAWN.

723

00:44:48,300 --> 00:44:49,410

>> THANK YOU, DR.

724

00:44:49,410 --> 00:44:50,410

GREEN.

725

00:44:50,410 --> 00:44:51,410

OKAY.

726

00:44:51,410 --> 00:44:52,910

WE'RE GOING TO GO BACK TO THE
PHONE LINES AND THEN WE'LL COME

727

00:44:52,910 --> 00:44:55,720

BACK FOR A FEW MORE QUESTIONS
BEFORE WE WRAP UP AND WE'RE

728

00:44:55,720 --> 00:44:59,520

GOING TO GO BACK TO KEN KRAMER
FROM SPACE FLIGHT MAGAZINE.

729

00:44:59,520 --> 00:45:00,520

KEN?

730

00:45:00,520 --> 00:45:01,520

>> OKAY.

731

00:45:01,520 --> 00:45:02,520

THANKS.

732

00:45:02,520 --> 00:45:05,152

ACTUALLY, ONE OF MY QUESTIONS
WAS ABOUT THE EXTENDED MISSION

733

00:45:05,152 --> 00:45:06,152

BUT LET ME ASK IT A LITTLE BIT
DIFFERENTLY.

734

00:45:06,152 --> 00:45:09,300

I BELIEVE YOU'VE BEEN GIVEN 40
DAYS.

735

00:45:09,300 --> 00:45:11,190

CAN YOU TALK ABOUT WHAT YOU'LL
BE DOING IN THE 40 DAYS?

736

00:45:11,190 --> 00:45:13,940
AND I WOULD LIKE TO KNOW
SPECIFICALLY ABOUT THE

737
00:45:13,940 --> 00:45:17,560
ILLUMINATION OF THE NORTH POLE.

738
00:45:17,560 --> 00:45:19,020
WILL IT BE FULLY ILLUMINATED OR
PARTIALLY ILLUMINATED?

739
00:45:19,020 --> 00:45:21,200
MY SECOND QUESTION IS, AND YOU
MAY HAVE TOUCHED ON THIS, I'M

740
00:45:21,200 --> 00:45:28,550
SORRY, TALK A LITTLE BIT ABOUT
ANY EVIDENCE FOR MATERIAL THAT

741
00:45:28,550 --> 00:45:33,540
YOU'VE SEEN EXCAVATED FROM THE
DEEP INTERIOR.

742
00:45:33,540 --> 00:45:40,370
NOT THE FIRST FEW METERS, BUT
I'M TALKING ABOUT MILES DEEP,

743
00:45:40,370 --> 00:45:41,370
MAYBE TO THE CORE.

744
00:45:41,370 --> 00:45:42,370
DO YOU SEE ANY EVIDENCE FOR
THAT?

745
00:45:42,370 --> 00:45:43,370
THANK YOU.

746
00:45:43,370 --> 00:45:44,370
>> OKAY.

747

00:45:44,370 --> 00:45:45,370

I HAVE AN ANSWER TO THE FIRST
QUESTION.

748

00:45:45,370 --> 00:45:48,470

AS JIM ALREADY DISCUSSED, WE DID
ALREADY EXTEND THE MISSION

749

00:45:48,470 --> 00:45:52,280

SIGNIFICANTLY, ABOUT 40 DAYS,
WITHOUT ANY IMPACT ON THE

750

00:45:52,280 --> 00:45:56,570

MISSION TIME LINE, AND THAT IS
ALLOWING US TO DO MAPPING LATER

751

00:45:56,570 --> 00:45:58,090

THAN WAS PREVIOUSLY PLANNED.

752

00:45:58,090 --> 00:46:05,150

THAT'S GOING TO ACHIEVE
ELIMINATION TO ABOUT 85 DEGREES

753

00:46:05,150 --> 00:46:08,830

NORTH LATITUDE AT THE SAME
RESOLUTION AS WE'VE BEEN

754

00:46:08,830 --> 00:46:10,940

DISCUSSING TODAY.

755

00:46:10,940 --> 00:46:16,560

THERE WILL BE A SMALL AREA AT
THE VERY NORTH POLE WHICH WILL

756

00:46:16,560 --> 00:46:19,100

ONLY BE IMAGED A LITTLE BIT
LATER WHEN IT BECOMES

757

00:46:19,100 --> 00:46:25,590

ILLUMINATED ADEQUATELY AT A
LOWER RESOLUTION, BUT THE

758

00:46:25,590 --> 00:46:29,710
EXPECTATION IS, IF EVERYTHING
GOES AS PLANNED, THERE WILL NOT

759

00:46:29,710 --> 00:46:35,550
BE ANY UNILLUMINATED AREAS OF
VESTA THAT ARE LEFT BEHIND.

760

00:46:35,550 --> 00:46:44,460
>> AND NOW THE SECOND PART OF
THE QUESTION.

761

00:46:44,460 --> 00:46:47,260
WE SEE THIS IN THE CRUST OF
VESTA.

762

00:46:47,260 --> 00:46:57,460
WE SEE ALL THE FRACTURING IN THE
EDGES.

763

00:46:57,460 --> 00:47:03,150
WE ARE LOOKING TO SEARCH FOR
EVIDENCE OF MATERIAL.

764

00:47:03,150 --> 00:47:11,600
WE HAVE CONCLUDED THE MAPPING
PHASE A FEW DAYS AGO.

765

00:47:11,600 --> 00:47:17,720
ESPECIALLY CONCERNING THE
SPECIAL MAPPING IN THE SOUTH AND

766

00:47:17,720 --> 00:47:23,230
WE NEED TO LOOK AT THIS DATA
CAREFULLY BECAUSE THOSE DATA HAS

767

00:47:23,230 --> 00:47:29,270

THE HIGHEST RESOLUTION AND
BECAUSE WE EXPECTED TO HAVE SOME

768

00:47:29,270 --> 00:47:34,660

MATERIALS FROM THE MANTLE BUT
THEY LIMITED QUANTITY.

769

00:47:34,660 --> 00:47:38,070

THIS IS WHAT WE ARE SHOWING THE
METEORITE.

770

00:47:38,070 --> 00:47:40,420

WE NEED TO HAVE AS LARGE A
RESOLUTION AS POSSIBLE.

771

00:47:40,420 --> 00:47:46,180

I THINK THAT THE ONLY WAY TO
DETECT EVENTUALLY THIS KIND OF

772

00:47:46,180 --> 00:47:51,390

MANTLE MATERIAL IS GOING INTO
THE INTERIOR REGIONS OF THIS

773

00:47:51,390 --> 00:47:53,030

LAST ACQUIRED DATA.

774

00:47:53,030 --> 00:47:59,360

>> I'D JUST LIKE TO ADD A QUICK
POINT THAT EVEN WITH THE BEST

775

00:47:59,360 --> 00:48:00,360

RESOLUTION.

776

00:48:00,360 --> 00:48:04,020

ONE OF THE THINGS HAP POINTED
OUT, IN THE METEORITE IS THE

777

00:48:04,020 --> 00:48:06,720

EVIDENCE OF MANTLE MATERIAL
COMES FROM OLIVE VOOEN.

778

00:48:06,720 --> 00:48:12,540

IT IS RELATIVELY LESS.

779

00:48:12,540 --> 00:48:16,720

ONE OF THE REASONS WHY WE DON'T
SEE OLIVE VOEN IS THE FACT THAT

780

00:48:16,720 --> 00:48:18,540

THERE'S PROBABLY VERY LITTLE OF
IT EXPOSED.

781

00:48:18,540 --> 00:48:22,470

THE SECOND FACTOR IS EVEN IF IT
WAS EXPOSED A BILLION YEARS AGO,

782

00:48:22,470 --> 00:48:26,380

WE HAVE SUBSEQUENT IMPACTS THAT
MIXED IT UP WITH THE SURFACE.

783

00:48:26,380 --> 00:48:29,330

THE FOOTPRINT SIZE, THE BEST
RESOLUTION WE CAN GET EVEN WITH

784

00:48:29,330 --> 00:48:32,160

THE FRAMING CAMERA IS 16 METEER
TERGS.

785

00:48:32,160 --> 00:48:36,950

THIS HAS TO BE SUBSTANTIALLY
LARGER THAN WHAT WE CAN RESOLVE

786

00:48:36,950 --> 00:48:39,540

TO CLEARLY DISTINCTLY SEE IT.

787

00:48:39,540 --> 00:48:42,730

IF YOU HAVE AN IMAGE THAT'S
1,000 PICKSLESS BY 1,000 PICKLES

788

00:48:42,730 --> 00:48:50,190
ACROSS, TRYING TO IDENTIFY A
SPECIFIC PIXEL, IT'S A LOT MORE

789
00:48:50,190 --> 00:48:51,190
CHALLENGING.

790
00:48:51,190 --> 00:48:53,280
LIKE CHRISTINA SAID, WE NEED
BETTER RESOLUTION.

791
00:48:53,280 --> 00:48:57,150
AS FAR AS YOUR QUESTION, IF WE
SEE ANYTHING BEYOND THE MANTDLE,

792
00:48:57,150 --> 00:48:58,740
THE ANSWER IS NO.

793
00:48:58,740 --> 00:49:01,420
THAT'S WHY WE STILL HAVE THE
ASTEROID INTACT.

794
00:49:01,420 --> 00:49:03,140
>> OKAY.

795
00:49:03,140 --> 00:49:05,650
WE'RE GOING TO DO A COUPLE OF
MORE.

796
00:49:05,650 --> 00:49:07,800
I WANT TO FIRST OF ALL THANK OUR
SOCIAL MEDIA.

797
00:49:07,800 --> 00:49:10,060
YOUR QUESTIONS ARE COMING IN
FAST AND FURIOUS.

798
00:49:10,060 --> 00:49:14,050
I WON'T GET TO ALL OF THEM BUT
REMEMBER THE CONVERSATION

799

00:49:14,050 --> 00:49:15,970
DOESN'T STOP HERE TODAY.

800

00:49:15,970 --> 00:49:19,230
FOLLOW THE TWITTER FEED AT WATT
NASA UNDERSCORE DAWN.

801

00:49:19,230 --> 00:49:24,690
THE SCIENCE TEAM MEMBERS WILL
TAKE A COUPLE OF MORS.

802

00:49:24,690 --> 00:49:27,460
FOLLOW US@NASA UNDERSCORE DAWN.

803

00:49:27,460 --> 00:49:29,420
SEND IN YOUR QUESTIONS.

804

00:49:29,420 --> 00:49:32,100
THIS NEXT QUESTION IS FOR DR.

805

00:49:32,100 --> 00:49:34,070
GREEN AGAIN.

806

00:49:34,070 --> 00:49:40,580
FROM CS -- I'M SORRY@S OBSERVER.

807

00:49:40,580 --> 00:49:46,350
WILL NASA BE LOOKING AT THE HAPS
AT VEST A FOR THE POSSIBLE

808

00:49:46,350 --> 00:49:51,400
TARGET FOR HUMAN EXPLORATION?

809

00:49:51,400 --> 00:49:57,210
>> THE ASTEROID BELT IS WELL
BEYOND THE ORBIT OF MARS AND OF

810

00:49:57,210 --> 00:50:00,970
COURSE THE ADMINISTRATION AND
NASA IS VERY EXCITED ABOUT THE

811
00:50:00,970 --> 00:50:06,810
PLANS FOR HUMAN EXPLORATION OF
THE LOWER ORBIT.

812
00:50:06,810 --> 00:50:11,810
CONSIDERATION OF GOING TO
ASTEROIDS IS REALLY LIMITED TO

813
00:50:11,810 --> 00:50:17,250
MORE NEARER OBJECTS, THINGS THAT
ARE MUCH CLOSER THAN VEST A.

814
00:50:17,250 --> 00:50:22,670
IN THE LONG RUN I WOULD LOVE TO
SEE HUMANS TREK OUT OF THE SOLAR

815
00:50:22,670 --> 00:50:26,060
SYSTEM WELL BEYOND MARS AND
PERHAPS THE OBSERVATIONS FROM

816
00:50:26,060 --> 00:50:31,630
VEST A THAT WE'RE MAKING TODAY
WILL ALLOW FUTURE GENERATIONS TO

817
00:50:31,630 --> 00:50:34,800
THINK OF THE IMPORTANCE THAT
VEST A MIGHT PLAY IN THAT

818
00:50:34,800 --> 00:50:38,039
EXPLORATION, BUT THAT WILL BE
WELL INTO THE FUTURE.

819
00:50:38,039 --> 00:50:39,930
>> THANK YOU, SIR.

820
00:50:39,930 --> 00:50:40,930

OKAY.

821

00:50:40,930 --> 00:50:45,330

THIS NEXT QUESTION IS FROM@SKY
TELESCOPE.

822

00:50:45,330 --> 00:50:47,930

SO GOING TO NEED YOUR HELP HERE,
CAROL, TO DRIVE THE BUS HERE.

823

00:50:47,930 --> 00:50:52,910

GIVEN THE CONFIRMATION OF VEST
A'S CONNECTION TO HEDS, DO YOU

824

00:50:52,910 --> 00:50:59,640

EXPECT TO FIND METEORITE ANNA
LOGS AFTER SEEING SERIES UP

825

00:50:59,640 --> 00:51:00,640

CLOSE?

826

00:51:00,640 --> 00:51:03,610

>> BOY, I WISH.

827

00:51:03,610 --> 00:51:07,540

IT WOULD MAKE THE EXPLORATION OF
SERIES A LOT EASIER IF WE

828

00:51:07,540 --> 00:51:12,840

THOUGHT WE HAD PIECES IN HAND
THAT COULD HELP GUIDE OUR

829

00:51:12,840 --> 00:51:18,720

INTERPRETATIONS AND EVEN HELP
CALIBRATE OUR INSTRUMENTS.

830

00:51:18,720 --> 00:51:22,980

WE THOUGHT ABOUT IT BUT -- AND
THERE ARE SOME CLASSES OF MEET

831
00:51:22,980 --> 00:51:26,180
OR RIGHTS THAT MIGHT BE SIMILAR.

832
00:51:26,180 --> 00:51:30,020
THE CARBONACEOUS CONDRIITES COME O
TO MIND.

833
00:51:30,020 --> 00:51:37,880
WE DON'T HAVE ANY REASON TO
BELIEVE THAT ANY OF THE MEET OR

834
00:51:37,880 --> 00:51:42,190
RIGHTS IN OUR COLLECTIONS NOW
ACTUALLY DERIVE FROM SERIES.

835
00:51:42,190 --> 00:51:43,420
>> YEAH.

836
00:51:43,420 --> 00:51:46,470
I'D ALSO LIKE TO ADD, TOO, THAT
VEST A IS IN A UNIQUE POSITION.

837
00:51:46,470 --> 00:51:51,010
WE HAVE MULTIPLE LARGE IMPACTS
AT THE SOUTH POLE.

838
00:51:51,010 --> 00:51:54,060
WHEN WE LOOK AT THE DISTRIBUTION
OF ASTEROIDS IN THE MAIN BELT,

839
00:51:54,060 --> 00:52:01,160
WE HAVE THESE FAMILY MEMBERS
THAT STRETCH FROM VES STAY TO

840
00:52:01,160 --> 00:52:03,220
MANY RESIDENCES.

841
00:52:03,220 --> 00:52:05,220
WE DON'T SEE A SIMILAR THING

WHEN WE LOOK AT SERIES.

842

00:52:05,220 --> 00:52:07,750

THERE DOESN'T SEEM TO BE A
DYNAMICAL FAMILY ASSOCIATED WITH

843

00:52:07,750 --> 00:52:13,329

IT THAT HAS A CONVENIENT ESCAPE
ROUTE TO BRING THINGS TO EARTH.

844

00:52:13,329 --> 00:52:15,690

>> I'M GOING TO DO TWO MORE
HERE.

845

00:52:15,690 --> 00:52:18,490

THESE QUESTIONS ARE FANTASTIC
AND, AGAIN, THANK YOU FOR

846

00:52:18,490 --> 00:52:19,780

JOINING OUR SOCIAL MEDIA
AUDIENCE.

847

00:52:19,780 --> 00:52:22,420

WE'LL SEE YOU AGAIN.

848

00:52:22,420 --> 00:52:26,600

FROM@GERBIN 1997.

849

00:52:26,600 --> 00:52:29,770

IS THE CONCENTRATION OF MINERALS
EXTRAORDINARY?

850

00:52:29,770 --> 00:52:31,340

NEW?

851

00:52:31,340 --> 00:52:32,910

EXTRAORDINARY?

852

00:52:32,910 --> 00:52:34,480

SURPRISING?

853

00:52:34,480 --> 00:52:36,050

>> YES.

854

00:52:36,050 --> 00:52:42,990

YES, ABSOLUTELY EXTRAORDINARY,
THE FACT THAT WE ARE ABLE TO

855

00:52:42,990 --> 00:52:49,970

RECOGNIZE MINER ROW LOGICAL
REGION.

856

00:52:49,970 --> 00:52:55,440

I THINK THAT IT'S REALLY
SURPRISING THE FACT THAT THERE

857

00:52:55,440 --> 00:53:06,680

ARE A LOT OF EVENTS, A LOT OF --
THAT WE ARE STILL ABLE TO SEE

858

00:53:06,680 --> 00:53:11,310

CONCENTRATION OF MINERALS,
PARTICULARLY IN PLACES OF VESTA.

859

00:53:11,310 --> 00:53:15,011

SO I THINK IT IS REALLY
SURPRISING, MOSTLY BECAUSE ALL

860

00:53:15,011 --> 00:53:20,610

THE OTHER ASTEROIDS THAT HAS
BEEN VISITED SO FAR ARE MORE OR

861

00:53:20,610 --> 00:53:22,090

LESS UNIFORM.

862

00:53:22,090 --> 00:53:31,690

ALSO THAT WE VISITED NOT LONG
TIME AGO IS A LARGE ASTEROID,

863

00:53:31,690 --> 00:53:37,660

100 KILOMETERS, AND IN MANY
CASES THE SURFACE IS COMPLETELY

864

00:53:37,660 --> 00:53:38,660

UNIFORM.

865

00:53:38,660 --> 00:53:42,380

SO VESTA IS REALLY A SURPRISE.

866

00:53:42,380 --> 00:53:44,530

>> OKAY.

867

00:53:44,530 --> 00:53:46,900

LAST ONE IS FROM@ABRIELLARETAT.

868

00:53:46,900 --> 00:53:50,930

I HOPE I GOT THAT RIGHT,
ABRIELLA.

869

00:53:50,930 --> 00:53:56,080

IF VESTA MADE THE SAME START AS
EARTH-LIKE PLANETS, WHY DID IT

870

00:53:56,080 --> 00:54:02,390

NOT DEVELOP INTO A PLANET?

871

00:54:02,390 --> 00:54:03,390

>> MADE THE SAME START?

872

00:54:03,390 --> 00:54:04,390

>> START, YEAH.

873

00:54:04,390 --> 00:54:05,780

DO YOU WANT TO --

>> OH, OKAY.

874

00:54:05,780 --> 00:54:09,900

SO IF THEY STARTED IN THE SAME WAY, WHY DID THEY NOT -- WELL,

875

00:54:09,900 --> 00:54:13,460
THE -- PART OF IT IS GIVEN VEST A'S LOCATION IN THE ASTEROID

876

00:54:13,460 --> 00:54:14,760
BELT.

877

00:54:14,760 --> 00:54:17,770
THE ASTEROID BELT IS VERY CLOSE TO JUPITER AND JUPITER'S A VERY

878

00:54:17,770 --> 00:54:20,630
POWERFUL GRAVITATIONAL INFLUENCE.

879

00:54:20,630 --> 00:54:23,760
IN THE INNER SOLAR SYSTEM WHERE EARTH, VENUS, MARS, MERCURY

880

00:54:23,760 --> 00:54:27,760
FORMED THINGS WEREN'T REALLY STIRRED UP THAT MUCH SO THEY

881

00:54:27,760 --> 00:54:31,810
WERE ABLE TO ACCRETION TOGETHER AND FORM THE TERRESTRIAL PLANETS.

882

00:54:31,810 --> 00:54:36,070
IN THE ASTEROID BELT JUPITER STIRRED THINGS UP SO MUCH THAT

883

00:54:36,070 --> 00:54:38,060
THEY WEREN'T BE ABLE TO ACCRETION TOGETHER.

884

00:54:38,060 --> 00:54:40,540
THE VELOCITIES WERE HIGH.

885

00:54:40,540 --> 00:54:42,980

THE HIGHER THE VELOCITIES ARE
THE HARDER IT IS TO MERGE

886

00:54:42,980 --> 00:54:45,540

TOGETHER UNDER THEIR OWN
GRAVITY.

887

00:54:45,540 --> 00:54:50,930

THERE WERE PROBABLY MANY THINGS
LIKE VEST A THAT WERE AROUND

888

00:54:50,930 --> 00:54:52,559

THAT ARE NOW PART OF EARTH.

889

00:54:52,559 --> 00:54:53,559

>> OKAY.

890

00:54:53,559 --> 00:54:59,480

LADIES AND GENTLEMEN, I'M GOING
TO WRAP IT UP HERE.

891

00:54:59,480 --> 00:55:02,290

AGAIN, I APOLOGIZE FOR NOT
GETTING ALL THE THE QUESTIONS

892

00:55:02,290 --> 00:55:05,890

FROM SOCIAL MEDIA, BUT REMEMBER
THE CONVERSATION DOESN'T END

893

00:55:05,890 --> 00:55:06,890

HERE.

894

00:55:06,890 --> 00:55:09,290

IF YOU HAVE ANY QUESTIONS OR ANY
OTHER OBSERVATIONS AND WANT TO

895

00:55:09,290 --> 00:55:11,510

FOLLOW A CONVERSATION ABOUT
THESE EXTRAORDINARY RESULTS

896

00:55:11,510 --> 00:55:15,500

ABOUT VESTA A FROM THE NASA DAWN
SPACECRAFT, FOLLOW THE TWITTER

897

00:55:15,500 --> 00:55:18,800

FEED AT AT NASA UNDERSCORE DAUN.

898

00:55:18,800 --> 00:55:21,940

OF COURSE ALL OF THIS
INFORMATION IS AVAILABLE ON

899

00:55:21,940 --> 00:55:29,490

WWW.NASA.GOV/DAWN AND FOR
VARIOUS SOCIAL MEDIA SITES,

900

00:55:29,490 --> 00:55:32,940

YOUTUBE, FACEBOOK, TWITTER.

901

00:55:32,940 --> 00:55:33,940

IT'S ALL THERE.

902

00:55:33,940 --> 00:55:37,980

LADIES AND GENTLEMEN, YOU'VE
HEARD THE INFORMATION ABOUT

903

00:55:37,980 --> 00:55:40,970

VESTA UP CLOSE AND PERSONAL.