1
00:00:10,250 --> 00:00:07,460
hello I'm Ronnie gran welcome to the

2
00:00:12,440 --> 00:00:10,260
Landsat data continuity mission science

3
00:00:15,230 --> 00:00:12,450
briefing we are coming to you from

4
00:00:16,849 --> 00:00:15,240
Vandenberg Air Force Base today you're

5
00:00:18,529 --> 00:00:16,859
going to hear about how this new

6
00:00:21,800 --> 00:00:18,539
satellite is going to help us understand

7
00:00:25,519 --> 00:00:21,810
our changing planet and also manage our

8
00:00:28,599 --> 00:00:25,529
food and water resources better after

9
00:00:30,620 --> 00:00:28,609
our presentations from our four speakers

10
00:00:32,510 --> 00:00:30,630
we're going to take questions here in

11
00:00:35,959 --> 00:00:32,520
the audience but also on twitter at

12
00:00:38,990 --> 00:00:35,969
hashtag ask NASA now I'd like to turn

13
00:00:42,139 --> 00:00:39,000

this presentation over to my earns Thank

14
00:00:43,459 --> 00:00:42,149
You Ronny I'm Jim irons i'm the project

15
00:00:45,830 --> 00:00:43,469
scientist for the Landsat data

16
00:00:48,020 --> 00:00:45,840
continuity mission and I'm thrilled to

17
00:00:50,869 --> 00:00:48,030
be here at Vandenberg Air Force Base for

18
00:00:54,860 --> 00:00:50,879
the launch of the mission which we also

19
00:00:58,160 --> 00:00:54,870
call ldcm Monday's launch will be the

20
00:01:01,549 --> 00:00:58,170
culmination of years of hard effort by a

21
00:01:03,500 --> 00:01:01,559
skilled workforce at NASA the US

22
00:01:06,609 --> 00:01:03,510
Geological Survey in the Department of

23
00:01:09,170 --> 00:01:06,619
Interior orbital sciences corporation

24
00:01:12,340 --> 00:01:09,180
ball aerospace and technologies

25
00:01:15,320 --> 00:01:12,350
corporation the United Launch Alliance

26
00:01:17,840 --> 00:01:15,330
hammers corporation Vandenberg Air Force

27
00:01:20,600 --> 00:01:17,850
Base and all of our other industry

28
00:01:24,260 --> 00:01:20,610
partners I want to express my deepest

29
00:01:27,679 --> 00:01:24,270
appreciation to these organizations and

30
00:01:29,870 --> 00:01:27,689
in particular to their employees for the

31
00:01:33,249 --> 00:01:29,880
dedication and devotion that they have

32
00:01:37,580 --> 00:01:33,259
shown to the success of this mission and

33
00:01:40,039 --> 00:01:37,590
while for me the launch on monday will

34
00:01:42,020 --> 00:01:40,049
be heart-stopping as it will be for all

35
00:01:44,840 --> 00:01:42,030
of us have been involved in this effort

36
00:01:47,660 --> 00:01:44,850
from cradle to ignition the real

37
00:01:49,550 --> 00:01:47,670
adventure will begin when people like my

38
00:01:52,550 --> 00:01:49,560

distinguished colleagues on this panel

39
00:01:56,200 --> 00:01:52,560
have an opportunity to get their hands

40
00:01:59,870 --> 00:01:56,210
on the data from ldcm and begin to

41
00:02:02,270 --> 00:01:59,880
advance their scientific investigations

42
00:02:05,630 --> 00:02:02,280
and improve their resource management

43
00:02:10,609 --> 00:02:05,640
applications with the best data yet from

44
00:02:12,860 --> 00:02:10,619
a Landsat satellite now we have operated

45
00:02:13,760 --> 00:02:12,870
Landsat satellites for over 40 years

46
00:02:17,350 --> 00:02:13,770
begin

47
00:02:19,460 --> 00:02:17,360
with the launch of Landsat one in 1972

48
00:02:23,930 --> 00:02:19,470
during that time there has always been

49
00:02:26,690 --> 00:02:23,940
at least one Landsat operation Landsat

50
00:02:29,030 --> 00:02:26,700
satellite in operation observing the

51
00:02:32,720 --> 00:02:29,040
global land surface and we have never

52
00:02:35,420 --> 00:02:32,730
suffered a gap in the continuity of

53
00:02:39,530 --> 00:02:35,430
these observations the launch of the

54
00:02:42,890 --> 00:02:39,540
ldcm is particularly timely we recently

55
00:02:47,300 --> 00:02:42,900
decommissioned Lance s5 after a

56
00:02:49,580 --> 00:02:47,310
remarkable 28 years in service and the

57
00:02:52,130 --> 00:02:49,590
only Landsat satellite that remains in

58
00:02:54,590 --> 00:02:52,140
operation is Landsat 7 which was

59
00:02:59,050 --> 00:02:54,600
launched from right right here at

60
00:03:04,100 --> 00:02:59,060
Vandenberg Air Force Base 14 years ago

61
00:03:08,450 --> 00:03:04,110
meanwhile our forests are being

62
00:03:10,880 --> 00:03:08,460
disturbed irrigation is placing

63
00:03:14,930 --> 00:03:10,890

increasing demands on our scarce water

64
00:03:18,040 --> 00:03:14,940
resources cities are expanding to

65
00:03:21,830 --> 00:03:18,050
accommodate growing populations

66
00:03:25,910 --> 00:03:21,840
ecosystems and are changing and glaciers

67
00:03:28,840 --> 00:03:25,920
are retreating in advance of climate

68
00:03:30,830 --> 00:03:28,850
change and all of these changes are

69
00:03:34,760 --> 00:03:30,840
currently occurring at rates

70
00:03:37,100 --> 00:03:34,770
unprecedented in human history due to an

71
00:03:42,260 --> 00:03:37,110
increasing population advancing

72
00:03:44,990 --> 00:03:42,270
technologies and climate change we will

73
00:03:48,140 --> 00:03:45,000
be able to monitor to these changes to

74
00:03:51,260 --> 00:03:48,150
continue to observe these changes from

75
00:03:55,520 --> 00:03:51,270
ldcm from the best Landsat satellite

76
00:03:59,000 --> 00:03:55,530
ever launched why do I make that claim I

77
00:04:00,830 --> 00:03:59,010
call ldcm the best Landsat satellite

78
00:04:03,590 --> 00:04:00,840
ever launched because we have

79
00:04:05,170 --> 00:04:03,600
incorporated technological advancements

80
00:04:09,410 --> 00:04:05,180
into the two instruments on the

81
00:04:14,150 --> 00:04:09,420
satellites payload the operational land

82
00:04:18,890 --> 00:04:14,160
imager or oli built by Ball Aerospace

83
00:04:22,010 --> 00:04:18,900
and technologies corporation in Boulder

84
00:04:25,430 --> 00:04:22,020
Colorado and by the thermal infrared

85
00:04:27,140 --> 00:04:25,440
sensor or tears built by NASA Goddard

86
00:04:31,580 --> 00:04:27,150
Space Flight Center on

87
00:04:34,249 --> 00:04:31,590
right at greenbelt maryland these

88
00:04:37,790 --> 00:04:34,259

technical advancements that I referred

89
00:04:39,920 --> 00:04:37,800
to will increase the ability to describe

90
00:04:42,980 --> 00:04:39,930
the landscape and prove the ability to

91
00:04:45,950 --> 00:04:42,990
describe the Lance I escape of ldcm data

92
00:04:50,540 --> 00:04:45,960
and will render the data more sensitive

93
00:04:52,939 --> 00:04:50,550
to land cover change over time it's not

94
00:04:55,909 --> 00:04:52,949
called however the data continuity

95
00:04:59,689 --> 00:04:55,919
mission for no reason the data from the

96
00:05:02,810 --> 00:04:59,699
ldcm will be compatible with and

97
00:05:06,560 --> 00:05:02,820
comparable to the data collected by all

98
00:05:10,129 --> 00:05:06,570
the earlier Landsat satellites and the

99
00:05:13,250 --> 00:05:10,139
data will the u.s. geological surveys

100
00:05:16,520 --> 00:05:13,260
archive of this data to which ldcm will

101
00:05:20,330 --> 00:05:16,530
add data will allow us to reach back 40

102
00:05:22,670 --> 00:05:20,340
years into that archive to study 40

103
00:05:25,040 --> 00:05:22,680
years of change to understand where

104
00:05:29,420 --> 00:05:25,050
we've been and to better predict where

105
00:05:32,260 --> 00:05:29,430
we're going I will now turn this press

106
00:05:35,779 --> 00:05:32,270
briefing over to the rest of the panel

107
00:05:37,760 --> 00:05:35,789
in order to discuss in more detail how

108
00:05:41,390 --> 00:05:37,770
will we will put this wonderful new

109
00:05:44,149 --> 00:05:41,400
Observatory to work next is my good

110
00:05:47,420 --> 00:05:44,159
colleague from our partner agency the US

111
00:05:50,420 --> 00:05:47,430
Geological Survey dr. Tom Loveland thank

112
00:05:53,089 --> 00:05:50,430
you Jim I want to tell you how happy I

113
00:05:55,129 --> 00:05:53,099

am to be here today and on behalf of the

114
00:05:57,260 --> 00:05:55,139
many many Landsat users around the world

115
00:06:00,920 --> 00:05:57,270
I would also like to express my

116
00:06:02,540 --> 00:06:00,930
appreciation to the many people both

117
00:06:04,930 --> 00:06:02,550
within industry and governments that

118
00:06:07,070 --> 00:06:04,940
contributed to the development of ldcm

119
00:06:10,010 --> 00:06:07,080
with the launch of the Landsat data

120
00:06:14,629 --> 00:06:10,020
continuity mission which the USGS will

121
00:06:18,140 --> 00:06:14,639
rename Landsat 8 sometime this spring we

122
00:06:20,570 --> 00:06:18,150
expect to have more data better data and

123
00:06:22,310 --> 00:06:20,580
new measurements that will lead to new

124
00:06:24,980 --> 00:06:22,320
science and applications with worldwide

125
00:06:27,170 --> 00:06:24,990
benefits perhaps more important than

126
00:06:28,909 --> 00:06:27,180
anything else though is that the Landsat

127
00:06:32,689 --> 00:06:28,919
data continuity mission really lives up

128
00:06:34,850 --> 00:06:32,699
to its name with the addition of the

129
00:06:36,950 --> 00:06:34,860
imagery from this mission to the current

130
00:06:38,830 --> 00:06:36,960
Landsat archive in Sioux Falls South

131
00:06:41,290 --> 00:06:38,840
Dakota within the u.s.

132
00:06:43,960 --> 00:06:41,300
yes our record will move from 40 years

133
00:06:47,560 --> 00:06:43,970
to 45 to 50 years or hopefully beyond

134
00:06:49,600 --> 00:06:47,570
and that should allow us to have far

135
00:06:51,700 --> 00:06:49,610
better information to understand the

136
00:06:57,490 --> 00:06:51,710
causes and consequences of environmental

137
00:06:59,500 --> 00:06:57,500
change since 1972 the US Landsat archive

138
00:07:02,820 --> 00:06:59,510

in Sioux Falls South Dakota has

139
00:07:05,980 --> 00:07:02,830
accumulated close to 3.5 million images

140
00:07:09,100 --> 00:07:05,990
those images are available to anybody in

141
00:07:11,200 --> 00:07:09,110
the world at no cost and in fact the

142
00:07:14,590 --> 00:07:11,210
importance of this is illustrated by the

143
00:07:17,080 --> 00:07:14,600
fact that we distribute now over three

144
00:07:20,860 --> 00:07:17,090
million images per year to users and

145
00:07:23,860 --> 00:07:20,870
over 180 country so we really truly have

146
00:07:27,150 --> 00:07:23,870
a worldwide resource through the Landsat

147
00:07:29,620 --> 00:07:27,160
program the ldcm data quality

148
00:07:32,590 --> 00:07:29,630
improvements and data quantity increases

149
00:07:35,740 --> 00:07:32,600
are going to be very valuable as we try

150
00:07:37,300 --> 00:07:35,750
to study the changing earth ldcm offers

151
00:07:38,950 --> 00:07:37,310
significant benefits to all users

152
00:07:41,260 --> 00:07:38,960
whether it's scientists trying to

153
00:07:43,779 --> 00:07:41,270
understand the underpinnings of climate

154
00:07:45,909 --> 00:07:43,789
change or resource managers trying to

155
00:07:48,340 --> 00:07:45,919
develop strategies for sustaining the

156
00:07:51,490 --> 00:07:48,350
natural resources of the planet all

157
00:07:54,700 --> 00:07:51,500
requires continuing flow of imagery and

158
00:07:56,589 --> 00:07:54,710
ldcm will meet that need the new

159
00:08:00,250 --> 00:07:56,599
capabilities with ldcm that were

160
00:08:01,960 --> 00:08:00,260
mentioned by dr. irons are expected to

161
00:08:04,930 --> 00:08:01,970
be especially important in a couple of

162
00:08:06,360 --> 00:08:04,940
areas one being agricultural monitoring

163
00:08:10,300 --> 00:08:06,370

and the other water resources management

164
00:08:12,300 --> 00:08:10,310
let me talk briefly about water water is

165
00:08:14,950 --> 00:08:12,310
essential for survival quite obviously

166
00:08:16,659 --> 00:08:14,960
about seventy percent of our planet is

167
00:08:18,279 --> 00:08:16,669
covered with water yet only a small

168
00:08:21,760 --> 00:08:18,289
fraction of that is actually available

169
00:08:24,420 --> 00:08:21,770
for human consumption ensuring the wise

170
00:08:27,310 --> 00:08:24,430
use of that scarce resource and

171
00:08:30,219 --> 00:08:27,320
maintaining the quality of our waters

172
00:08:32,469 --> 00:08:30,229
within our water supply is a critical

173
00:08:35,260 --> 00:08:32,479
societal goal some of the new

174
00:08:38,380 --> 00:08:35,270
capabilities on the operational land

175
00:08:40,630 --> 00:08:38,390
imager are showing us through some of

176
00:08:43,719 --> 00:08:40,640
the early research that we are going to

177
00:08:45,790 --> 00:08:43,729
have the opportunity to use Landsat

178
00:08:47,980 --> 00:08:45,800
imagery to better understand water

179
00:08:50,560 --> 00:08:47,990
quality in the United States and around

180
00:08:51,220 --> 00:08:50,570
the world some major advance in

181
00:08:53,830 --> 00:08:51,230
application

182
00:08:57,640 --> 00:08:53,840
shins the Landsat data continuity

183
00:09:00,490 --> 00:08:57,650
mission 'he's second measure instrument

184
00:09:02,260 --> 00:09:00,500
the thermal infrared sensor or tears is

185
00:09:04,170 --> 00:09:02,270
also going to have a significant

186
00:09:07,270 --> 00:09:04,180
contribution water resources management

187
00:09:09,790 --> 00:09:07,280
it will allow more precise and more

188
00:09:11,770 --> 00:09:09,800

accurate measurements of water use on a

189
00:09:14,560 --> 00:09:11,780
field by field basis this is

190
00:09:17,230 --> 00:09:14,570
particularly important to western states

191
00:09:20,710 --> 00:09:17,240
in the United in the u.s. that are

192
00:09:23,500 --> 00:09:20,720
trying to manage a water source that is

193
00:09:26,020 --> 00:09:23,510
in demand for agriculture for industry

194
00:09:29,020 --> 00:09:26,030
and for residential use and so our

195
00:09:31,720 --> 00:09:29,030
ability to improve our estimation of

196
00:09:34,090 --> 00:09:31,730
water you should improve all sectors we

197
00:09:36,540 --> 00:09:34,100
also expect to see significant advances

198
00:09:39,880 --> 00:09:36,550
of in agricultural applications

199
00:09:41,310 --> 00:09:39,890
domestically and internationally when we

200
00:09:44,470 --> 00:09:41,320
look at the United States for example

201
00:09:48,100 --> 00:09:44,480
the agricultural production in this

202
00:09:51,280 --> 00:09:48,110
country is in excess of 200 billion

203
00:09:54,550 --> 00:09:51,290
dollars per year and so our federal

204
00:09:57,460 --> 00:09:54,560
programs that map the types and the

205
00:10:00,070 --> 00:09:57,470
extent of crops needed to understand

206
00:10:01,720 --> 00:10:00,080
what the the food supply will be and the

207
00:10:04,450 --> 00:10:01,730
impacts on the market will benefit

208
00:10:06,190 --> 00:10:04,460
greatly from this and as well our crop

209
00:10:08,530 --> 00:10:06,200
insurance programs that need timely

210
00:10:11,650 --> 00:10:08,540
information on the condition of crops

211
00:10:15,490 --> 00:10:11,660
will also make strong effective use of

212
00:10:17,440 --> 00:10:15,500
ldcm internationally it's even a bigger

213
00:10:19,150 --> 00:10:17,450

deal with the increased quantity of data

214
00:10:20,980 --> 00:10:19,160
that are going to be available our

215
00:10:23,260 --> 00:10:20,990
ability to monitor in a more timely

216
00:10:25,720 --> 00:10:23,270
fashion agricultural production around

217
00:10:27,700 --> 00:10:25,730
the world is is going to be much

218
00:10:30,100 --> 00:10:27,710
improved and that's a big deal when we

219
00:10:32,320 --> 00:10:30,110
think about the fact that we have seven

220
00:10:35,440 --> 00:10:32,330
billion people on this planet we're

221
00:10:38,050 --> 00:10:35,450
increasing that population by about 75

222
00:10:40,840 --> 00:10:38,060
million people a year meeting the food

223
00:10:44,320 --> 00:10:40,850
security needs of the planet is

224
00:10:49,060 --> 00:10:44,330
obviously a critical issue one that ldcm

225
00:10:51,130 --> 00:10:49,070
will benefit about 40 and a half years

226
00:10:54,130 --> 00:10:51,140
ago here at Vandenberg Air Force Base

227
00:10:57,340 --> 00:10:54,140
the first Landsat was put into orbit and

228
00:10:59,320 --> 00:10:57,350
since then six other lancets we've had

229
00:11:01,930 --> 00:10:59,330
and since then we've had six land SATs

230
00:11:03,610 --> 00:11:01,940
that have effectively created this

231
00:11:06,340 --> 00:11:03,620
unprecedented record of

232
00:11:08,890 --> 00:11:06,350
condition of the earth surface those

233
00:11:10,810 --> 00:11:08,900
that record has had a huge impact and

234
00:11:12,850 --> 00:11:10,820
modernizing Natural Resources Management

235
00:11:16,120 --> 00:11:12,860
and improving our scientific

236
00:11:19,930 --> 00:11:16,130
understanding of environmental change we

237
00:11:22,350 --> 00:11:19,940
know that ldcm or landsat 8 in just a

238
00:11:25,810 --> 00:11:22,360

few months we'll continue this record

239
00:11:27,010 --> 00:11:25,820
again an unprecedented fashion with that

240
00:11:28,870 --> 00:11:27,020
I'd like to turn it over to my colleague

241
00:11:31,600 --> 00:11:28,880
cast green that's going to talk about

242
00:11:34,630 --> 00:11:31,610
the extensive use of Landsat in both

243
00:11:36,820 --> 00:11:34,640
public and private sector yes thanks Tom

244
00:11:40,480 --> 00:11:36,830
well first I want to offer my heartfelt

245
00:11:43,450 --> 00:11:40,490
thanks to NASA the Air Force Department

246
00:11:44,890 --> 00:11:43,460
of Interior USGS and all the contractors

247
00:11:47,500 --> 00:11:44,900
and public servants who have made this

248
00:11:51,780 --> 00:11:47,510
launch possible this is an incredible

249
00:11:54,790 --> 00:11:51,790
event and the launch of ldcm will

250
00:11:57,100 --> 00:11:54,800
continue the record of Landsat earth

251
00:11:59,170 --> 00:11:57,110
observations a record as my colleagues

252
00:12:02,200 --> 00:11:59,180
have mentioned is over 40 years long

253
00:12:05,140 --> 00:12:02,210
starting in 1972 it's an incredible data

254
00:12:07,840 --> 00:12:05,150
set its data set the US government

255
00:12:10,540 --> 00:12:07,850
agencies use to ensure our country's

256
00:12:12,910 --> 00:12:10,550
environmental security food security and

257
00:12:15,490 --> 00:12:12,920
homeland security in terms of our

258
00:12:17,710 --> 00:12:15,500
environmental security NOAA has a

259
00:12:19,810 --> 00:12:17,720
coastal change analysis program that

260
00:12:22,090 --> 00:12:19,820
monitors change in Coast Lance over time

261
00:12:25,120 --> 00:12:22,100
the Forest Service uses Landsat data to

262
00:12:28,060 --> 00:12:25,130
monitor forest health the Caliph data

263
00:12:30,100 --> 00:12:28,070

California can consistently monitors

264
00:12:32,190 --> 00:12:30,110
land cover change throughout the state

265
00:12:34,750 --> 00:12:32,200
and Idaho and other western states

266
00:12:37,269 --> 00:12:34,760
monitor water use using Landsat data

267
00:12:42,940 --> 00:12:37,279
today the resource is incredibly

268
00:12:46,630 --> 00:12:42,950
important to state local and excuse me

269
00:12:48,640 --> 00:12:46,640
federal agencies for food security the

270
00:12:51,340 --> 00:12:48,650
Department of Agriculture has several

271
00:12:53,019 --> 00:12:51,350
programs one uses Landsat data to

272
00:12:55,570 --> 00:12:53,029
monitor fruit production in the United

273
00:12:57,340 --> 00:12:55,580
States so that we all know what kite

274
00:13:00,250 --> 00:12:57,350
what amount of food is being produced

275
00:13:03,460 --> 00:13:00,260
here another looks at food production

276
00:13:05,140 --> 00:13:03,470
globally so that farmers in the United

277
00:13:08,199 --> 00:13:05,150
States can know where they sit within

278
00:13:09,699 --> 00:13:08,209
the global agricultural market on the

279
00:13:13,390 --> 00:13:09,709
other side of agriculture you've got

280
00:13:15,640 --> 00:13:13,400
USAID fews net who uses Landsat data as

281
00:13:17,090 --> 00:13:15,650
part of their package of resources to

282
00:13:20,300 --> 00:13:17,100
monitor famine worldwide

283
00:13:22,610 --> 00:13:20,310
trying to ensure that we can stop hunger

284
00:13:26,030 --> 00:13:22,620
throughout the world in terms of

285
00:13:29,930 --> 00:13:26,040
Homeland Security FEMA has a flood valid

286
00:13:33,320 --> 00:13:29,940
flood mitigation project program that

287
00:13:36,710 --> 00:13:33,330
and USGS has the fire landfire program

288
00:13:39,260 --> 00:13:36,720

both of these programs measure risk use

289
00:13:41,360 --> 00:13:39,270
lance add data to measure risk and help

290
00:13:43,130 --> 00:13:41,370
our country as a whole to avoid those

291
00:13:46,070 --> 00:13:43,140
risks and to respond to natural

292
00:13:49,130 --> 00:13:46,080
disasters when they occur so the country

293
00:13:50,450 --> 00:13:49,140
has a major requirement for landsat data

294
00:13:52,580 --> 00:13:50,460
and even though most of those

295
00:13:56,540 --> 00:13:52,590
requirements are from government

296
00:13:59,750 --> 00:13:56,550
agencies the free and open data policy

297
00:14:01,610 --> 00:13:59,760
of landsat data has invigorated a whole

298
00:14:04,190 --> 00:14:01,620
investment in the commercial sector and

299
00:14:05,690 --> 00:14:04,200
that's been really really interesting to

300
00:14:07,070 --> 00:14:05,700
watch there's all kinds of innovation

301
00:14:08,630 --> 00:14:07,080
there are all kinds of things that

302
00:14:11,450 --> 00:14:08,640
nobody ever thought about that have

303
00:14:13,370 --> 00:14:11,460
occurred only with the free and open

304
00:14:15,250 --> 00:14:13,380
data policy purrs I'm going to give you

305
00:14:17,660 --> 00:14:15,260
some examples and show you some examples

306
00:14:19,460 --> 00:14:17,670
11 that's familiar to probably all of us

307
00:14:21,500 --> 00:14:19,470
is Google Earth whenever you're on

308
00:14:22,760 --> 00:14:21,510
Google Earth you go into a regional

309
00:14:24,050 --> 00:14:22,770
level where you're looking at a state

310
00:14:26,390 --> 00:14:24,060
you know what you're looking at you're

311
00:14:29,150 --> 00:14:26,400
looking at Landsat data another example

312
00:14:30,650 --> 00:14:29,160
is MDA information systems they have a

313
00:14:33,230 --> 00:14:30,660

product that they sell to their clients

314
00:14:37,430 --> 00:14:33,240
that monitors annual change and goes

315
00:14:39,110 --> 00:14:37,440
back for a 40 year period the next one

316
00:14:42,410 --> 00:14:39,120
which I want to show on a slide here on

317
00:14:45,950 --> 00:14:42,420
image here is a er's product which is

318
00:14:48,830 --> 00:14:45,960
called land fire fire excusing fire line

319
00:14:50,510 --> 00:14:48,840
and fire line is used by the insurance

320
00:14:54,290 --> 00:14:50,520
industry throughout the western United

321
00:14:57,350 --> 00:14:54,300
States to monitor and manage their

322
00:14:59,420 --> 00:14:57,360
portfolio risk to wildfires and then

323
00:15:01,580 --> 00:14:59,430
finally I want to talk about ESRI's

324
00:15:05,180 --> 00:15:01,590
change matters which is a website that

325
00:15:07,520 --> 00:15:05,190
allows anyone in the world to look at

326
00:15:09,860 --> 00:15:07,530
change anywhere in the world so it's a

327
00:15:12,230 --> 00:15:09,870
free website and go on site and you can

328
00:15:15,800 --> 00:15:12,240
look at change from the 1970s all the

329
00:15:17,240 --> 00:15:15,810
way up to 2010 and then when the new

330
00:15:19,070 --> 00:15:17,250
satellites come up we'll be able to

331
00:15:24,110 --> 00:15:19,080
continue to update that over time the

332
00:15:27,410 --> 00:15:24,120
first image is of the outlook fire which

333
00:15:29,360 --> 00:15:27,420
would occurred in 2006 in the North Rim

334
00:15:31,040 --> 00:15:29,370
of the Grand Canyon it was an explosive

335
00:15:34,009 --> 00:15:31,050
fire and you could see on

336
00:15:37,910 --> 00:15:34,019
the image 1990 before the fire and then

337
00:15:40,310 --> 00:15:37,920
we've got a 2000 must win 1996 was the

338
00:15:43,670 --> 00:15:40,320

fire then we've got the two thousand and

339
00:15:46,009 --> 00:15:43,680
you can see to the far right an image

340
00:15:48,470 --> 00:15:46,019
which is a comparison of the of the

341
00:15:51,170 --> 00:15:48,480
before fire and after fire image and it

342
00:15:53,300 --> 00:15:51,180
shows the extent of the fire and that

343
00:15:55,240 --> 00:15:53,310
helps the Park Service go back and

344
00:15:58,220 --> 00:15:55,250
regenerate that area following the fire

345
00:16:00,829 --> 00:15:58,230
the next image is of redwood

346
00:16:02,540 --> 00:16:00,839
regeneration in Northern California here

347
00:16:04,250 --> 00:16:02,550
we're looking at an area near Court Bell

348
00:16:06,829 --> 00:16:04,260
California it's part of the redwood

349
00:16:09,290 --> 00:16:06,839
region and in 1990 most of that area has

350
00:16:12,019 --> 00:16:09,300
been cut over it's a clear-cut redwood

351
00:16:14,000 --> 00:16:12,029
forest but now we get to 2010 and that

352
00:16:16,670 --> 00:16:14,010
redwood forest is completely regenerated

353
00:16:18,620 --> 00:16:16,680
and it's full of young healthy trees so

354
00:16:21,579 --> 00:16:18,630
you can see just the change in forest

355
00:16:24,530 --> 00:16:21,589
over time then we can look at the

356
00:16:27,170 --> 00:16:24,540
conversion of farm lands to suburbs

357
00:16:30,440 --> 00:16:27,180
outside the Washington DC area again

358
00:16:32,180 --> 00:16:30,450
we're looking at 1992 2005 you can see

359
00:16:33,949 --> 00:16:32,190
the expansion of Dulles Airport on this

360
00:16:35,870 --> 00:16:33,959
imagery you can see in the nineteen

361
00:16:38,720 --> 00:16:35,880
ninety imagery of a pattern of small

362
00:16:41,030 --> 00:16:38,730
farms and you get to the 2005 imagery

363
00:16:45,590 --> 00:16:41,040

and it's completely suburbs so you can

364
00:16:48,380 --> 00:16:45,600
monitor land use cover over time next

365
00:16:51,250 --> 00:16:48,390
images of lake level fall as most of us

366
00:16:54,260 --> 00:16:51,260
know the Colorado Rockies have been

367
00:16:57,050 --> 00:16:54,270
experiencing a drought over the last 15

368
00:16:58,880 --> 00:16:57,060
years that's caused it a huge impact to

369
00:17:02,090 --> 00:16:58,890
Lake Mead and Lake Mead has dropped over

370
00:17:04,460 --> 00:17:02,100
time so these images you see in 1975

371
00:17:07,309 --> 00:17:04,470
Lake Mead at fairly full then we go to

372
00:17:08,960 --> 00:17:07,319
2010 it's dropped significantly in the

373
00:17:10,880 --> 00:17:08,970
image on the far right with the green

374
00:17:13,220 --> 00:17:10,890
bathtub ring we call that the bathtub

375
00:17:15,140 --> 00:17:13,230
ring around Lake Mead is showing the

376
00:17:18,319 --> 00:17:15,150
drop in Lake Mead over that time period

377
00:17:21,169 --> 00:17:18,329
and then my last image is of late of

378
00:17:23,449 --> 00:17:21,179
mendenhall glacier in Alaska and you can

379
00:17:25,460 --> 00:17:23,459
see the glacier retreat again over 20

380
00:17:27,290 --> 00:17:25,470
year period only 20 years this is an

381
00:17:28,820 --> 00:17:27,300
infrared image which is a different way

382
00:17:31,490 --> 00:17:28,830
of looking at the different bands on

383
00:17:33,919 --> 00:17:31,500
Lance at and you can see the significant

384
00:17:38,450 --> 00:17:33,929
retreat of the glacier over this 20-year

385
00:17:40,549 --> 00:17:38,460
period so this imagery has been I'm in

386
00:17:44,540 --> 00:17:40,559
the private sector this imagery has been

387
00:17:44,820 --> 00:17:44,550
amazingly important to my career it was

388
00:17:47,279 --> 00:17:44,830

the

389
00:17:48,810 --> 00:17:47,289
foundation of my first company it is

390
00:17:52,649 --> 00:17:48,820
critically important to my second

391
00:17:57,539 --> 00:17:52,659
company it's now get teary-eyed I hope

392
00:17:59,759 --> 00:17:57,549
not but I and even more important it's

393
00:18:02,940 --> 00:17:59,769
important to the citizens of the United

394
00:18:06,029 --> 00:18:02,950
States and I think now what we must all

395
00:18:08,370 --> 00:18:06,039
do is is look forward and we must ensure

396
00:18:10,380 --> 00:18:08,380
that there is another Landsat and many

397
00:18:13,049 --> 00:18:10,390
more Lance hats to come there must be a

398
00:18:14,340 --> 00:18:13,059
lance at nine in the Landsat 10 we need

399
00:18:17,700 --> 00:18:14,350
to make sure that there's a Landsat

400
00:18:21,090 --> 00:18:17,710
program that will ensure that future

401
00:18:23,789 --> 00:18:21,100
generations can look back and see what

402
00:18:26,250 --> 00:18:23,799
where we've been so they can plan where

403
00:18:28,200 --> 00:18:26,260
we're going now I've spent most of my

404
00:18:30,120 --> 00:18:28,210
time talking about the domestic needs

405
00:18:31,740 --> 00:18:30,130
for landsat data and i'm going to turn

406
00:18:34,100 --> 00:18:31,750
over to my colleague Mike wheeler who's

407
00:18:36,570 --> 00:18:34,110
going to talk more about the

408
00:18:39,600 --> 00:18:36,580
International damn it needs for landsat

409
00:18:41,700 --> 00:18:39,610
thanks Cass Cass mentions I'm Mike

410
00:18:43,289 --> 00:18:41,710
waldrum with the Canadian Forest Service

411
00:18:45,269 --> 00:18:43,299
of Natural Resources Canada and I've

412
00:18:46,769 --> 00:18:45,279
been asked to speak to international and

413
00:18:49,409 --> 00:18:46,779

science perspectives on the Landsat

414
00:18:50,759 --> 00:18:49,419
program and before doing that I'd really

415
00:18:52,440 --> 00:18:50,769
like to thank the organizers for that

416
00:18:54,240 --> 00:18:52,450
invitation and really quite honored and

417
00:18:56,580 --> 00:18:54,250
really honored as well to be

418
00:18:58,799 --> 00:18:56,590
representing the the vast community of

419
00:19:01,919 --> 00:18:58,809
global Landsat users both in the

420
00:19:03,360 --> 00:19:01,929
monitoring and science communities so of

421
00:19:06,090 --> 00:19:03,370
the environmental issues that face

422
00:19:08,669 --> 00:19:06,100
humanity today climate change pressures

423
00:19:10,860 --> 00:19:08,679
upon biodiversity sustainable use and

424
00:19:13,080 --> 00:19:10,870
stewardship of Natural Resources just to

425
00:19:15,299 --> 00:19:13,090
mention a few Landsat data plays a

426
00:19:18,840 --> 00:19:15,309
critical role in enabling scientific

427
00:19:21,269 --> 00:19:18,850
inquiry how so well Landsat data is a

428
00:19:25,500 --> 00:19:21,279
global resource empowering nations to

429
00:19:27,210 --> 00:19:25,510
individually monitor and report further

430
00:19:28,500 --> 00:19:27,220
Landsat data allows us to see what the

431
00:19:30,539 --> 00:19:28,510
world looks like and how it has changed

432
00:19:33,060 --> 00:19:30,549
over time and if you could roll the

433
00:19:37,470 --> 00:19:33,070
video that shows Las Vegas we can see a

434
00:19:39,750 --> 00:19:37,480
change example and what you see there as

435
00:19:42,230 --> 00:19:39,760
well is that Landsat imagery portrays

436
00:19:45,090 --> 00:19:42,240
the world to us at human scales and

437
00:19:47,820 --> 00:19:45,100
another thing to recall is that Landsat

438
00:19:49,649 --> 00:19:47,830

images are not just pictures each pixel

439
00:19:53,299 --> 00:19:49,659
relates scientifically calibrated

440
00:19:55,649 --> 00:19:53,309
wavelengths specific physical values

441
00:19:57,899 --> 00:19:55,659
innovative in innovative image

442
00:19:58,740 --> 00:19:57,909
processing opportunities facilitated by

443
00:20:01,350 --> 00:19:58,750
the usg

444
00:20:04,680 --> 00:20:01,360
s free and open access to landsat

445
00:20:06,530 --> 00:20:04,690
imagery are really resulting in a number

446
00:20:08,250 --> 00:20:06,540
of novel processes that we can apply for

447
00:20:10,710 --> 00:20:08,260
understanding the information that's

448
00:20:12,900 --> 00:20:10,720
available in these images with that

449
00:20:14,700 --> 00:20:12,910
availability of the imagery I'd really

450
00:20:16,860 --> 00:20:14,710
foresee over the next decade the

451
00:20:18,300 --> 00:20:16,870
capacity of our community to reconstruct

452
00:20:21,570 --> 00:20:18,310
the history of the globe using this

453
00:20:24,330 --> 00:20:21,580
Landsat data so you can really consider

454
00:20:26,850 --> 00:20:24,340
right now as being a watershed in the

455
00:20:28,650 --> 00:20:26,860
use of Landsat data the free and open

456
00:20:31,020 --> 00:20:28,660
access to the imagery has fostered

457
00:20:32,970 --> 00:20:31,030
several key innovations that have loud

458
00:20:34,650 --> 00:20:32,980
the science and applications communities

459
00:20:37,050 --> 00:20:34,660
to increase their impacts in terms of

460
00:20:40,530 --> 00:20:37,060
space time and the information that can

461
00:20:42,120 --> 00:20:40,540
be generated so over space our capacity

462
00:20:44,160 --> 00:20:42,130
is increased through a novel pixel

463
00:20:47,010 --> 00:20:44,170

centric view and I can see we've started

464
00:20:48,720 --> 00:20:47,020
the video here showing web-enabled

465
00:20:51,540 --> 00:20:48,730
Landsat data in which you can see here

466
00:20:54,600 --> 00:20:51,550
is where multiple overlapping images are

467
00:20:56,400 --> 00:20:54,610
used to create image composites that

468
00:20:59,550 --> 00:20:56,410
then can be used for our applications

469
00:21:01,590 --> 00:20:59,560
and scientific work over time the

470
00:21:02,850 --> 00:21:01,600
systematic collection and archiving of

471
00:21:04,590 --> 00:21:02,860
imagery since the inception of the

472
00:21:06,870 --> 00:21:04,600
Landsat program has enabled

473
00:21:08,910 --> 00:21:06,880
sophisticated time series analysis to be

474
00:21:11,280 --> 00:21:08,920
undertaken not only can we see

475
00:21:14,100 --> 00:21:11,290
catastrophic or discrete events like

476
00:21:15,630 --> 00:21:14,110
wildfire or urban expansion we can also

477
00:21:18,120 --> 00:21:15,640
see gradual changes that would be

478
00:21:22,950 --> 00:21:18,130
related more to vegetation stress or or

479
00:21:25,110 --> 00:21:22,960
changes in water levels further

480
00:21:26,640 --> 00:21:25,120
regarding the information generated the

481
00:21:28,890 --> 00:21:26,650
production of land cover maps is

482
00:21:30,510 --> 00:21:28,900
increasingly automated with additional

483
00:21:32,760 --> 00:21:30,520
richness incorporated through modeling

484
00:21:35,640 --> 00:21:32,770
and the inclusion of other complementary

485
00:21:37,920 --> 00:21:35,650
datasets the physical nature of the land

486
00:21:39,690 --> 00:21:37,930
set measures also allows us to model

487
00:21:41,400 --> 00:21:39,700
important climate variables such as

488
00:21:43,500 --> 00:21:41,410

surface temperature and reflectance as

489
00:21:46,860 --> 00:21:43,510
well as the estimation of biophysical

490
00:21:48,960 --> 00:21:46,870
attributes such as biomass so combining

491
00:21:50,790 --> 00:21:48,970
all these aspects through intelligent

492
00:21:53,160 --> 00:21:50,800
data processing and modeling will

493
00:21:54,600 --> 00:21:53,170
provide us with unique information that

494
00:21:58,020 --> 00:21:54,610
is not readily available from any other

495
00:22:00,470 --> 00:21:58,030
data source a spatially comprehensive

496
00:22:02,370 --> 00:22:00,480
temporally deep and categorically rich

497
00:22:04,350 --> 00:22:02,380
recreation of the history of the globe's

498
00:22:07,380 --> 00:22:04,360
and seeing the inception of the Landsat

499
00:22:10,590 --> 00:22:07,390
program is now within sight it will

500
00:22:12,700 --> 00:22:10,600
certainly keep many of us busy the USGS

501
00:22:14,340 --> 00:22:12,710
arrow statistics show a very

502
00:22:16,480 --> 00:22:14,350
high number of academic downloads

503
00:22:18,399 --> 00:22:16,490
indicating that many new investigators

504
00:22:20,409 --> 00:22:18,409
are learning with and about Landsat

505
00:22:22,320 --> 00:22:20,419
imagery and will certainly be poised to

506
00:22:24,430 --> 00:22:22,330
help with tackling this ambitious vision

507
00:22:26,440 --> 00:22:24,440
so if you'd roll the next video it

508
00:22:27,789 --> 00:22:26,450
really shows the global reach of the

509
00:22:30,039 --> 00:22:27,799
measures that we do from the polar ice

510
00:22:33,430 --> 00:22:30,049
caps all the way through to two

511
00:22:34,960 --> 00:22:33,440
uninhabited forest environments and with

512
00:22:36,760 --> 00:22:34,970
this information that national and

513
00:22:38,740 --> 00:22:36,770

international bodies are increasingly

514
00:22:41,560 --> 00:22:38,750
implementing national mapping programs

515
00:22:43,480 --> 00:22:41,570
the use of the same data allows the

516
00:22:46,299 --> 00:22:43,490
outcomes between these endeavors to be

517
00:22:48,279 --> 00:22:46,309
readily compared and a dialogue

518
00:22:50,769 --> 00:22:48,289
regarding the statistics generated can

519
00:22:51,970 --> 00:22:50,779
be undertaken recently the United

520
00:22:53,980 --> 00:22:51,980
Nations Food and Agricultural

521
00:22:56,320 --> 00:22:53,990
organization implemented a remote

522
00:22:58,990 --> 00:22:56,330
sensing survey based upon samples of

523
00:23:01,620 --> 00:22:59,000
Landsat imagery to produce global

524
00:23:05,110 --> 00:23:01,630
statistics for both regional and global

525
00:23:07,269 --> 00:23:05,120
statistics on forest resources at the

526
00:23:10,330 --> 00:23:07,279
national level many nations have

527
00:23:12,100 --> 00:23:10,340
long-standing programs and actually

528
00:23:13,930 --> 00:23:12,110
quite successful programs from forest

529
00:23:16,810 --> 00:23:13,940
monitoring that are based upon landsat

530
00:23:19,450 --> 00:23:16,820
imagery as a large and sparsely

531
00:23:22,510 --> 00:23:19,460
inhabited nation canada uses lands

532
00:23:24,399 --> 00:23:22,520
Landsat imagery for creating maps and in

533
00:23:27,070 --> 00:23:24,409
support of a wide range of scientific

534
00:23:29,080 --> 00:23:27,080
inquiries for instance the most detailed

535
00:23:33,340 --> 00:23:29,090
map of land cover ever produced in

536
00:23:36,010 --> 00:23:33,350
canada utilized landsat imagery so in

537
00:23:38,470 --> 00:23:36,020
conclusion in canada as with many other

538
00:23:40,930 --> 00:23:38,480

nations landsat is considered integral

539
00:23:42,820 --> 00:23:40,940
to our national programs and continues

540
00:23:44,740 --> 00:23:42,830
to allow for reporting applications

541
00:23:47,730 --> 00:23:44,750
policy development and of course

542
00:23:50,049 --> 00:23:47,740
scientific discovery the continuity and

543
00:23:53,049 --> 00:23:50,059
improvement of landsat measures result

544
00:23:55,090 --> 00:23:53,059
resulting from the ldcm is anticipated

545
00:23:57,580 --> 00:23:55,100
to enhance the range and quality across

546
00:24:01,570 --> 00:23:57,590
all of these activities so thank you for

547
00:24:04,950 --> 00:24:01,580
that and back to you Jim thank you you

548
00:24:08,169 --> 00:24:04,960
know Tom Cass and Mike your three

549
00:24:11,159 --> 00:24:08,179
representatives of a crowd I expect to

550
00:24:15,130 --> 00:24:11,169
ultimately number in the millions a

551
00:24:20,649 --> 00:24:15,140
crowd that will directly and freely

552
00:24:23,560 --> 00:24:20,659
access ldcm images from the Landsat data

553
00:24:25,610 --> 00:24:23,570
archive maintained and operated by the

554
00:24:28,549 --> 00:24:25,620
US Geological Survey

555
00:24:31,190 --> 00:24:28,559
and I expect that you along with the

556
00:24:34,640 --> 00:24:31,200
rest of this crowd will use those images

557
00:24:37,340 --> 00:24:34,650
to conduct the analyses that we need to

558
00:24:41,690 --> 00:24:37,350
understand the causes and the impacts of

559
00:24:43,850 --> 00:24:41,700
global landscape change these changes

560
00:24:48,049 --> 00:24:43,860
have profound consequences for our

561
00:24:51,799 --> 00:24:48,059
global society that they impact our food

562
00:24:55,750 --> 00:24:51,809
and fibre production they impact human

563
00:24:58,160 --> 00:24:55,760

wealth health and welfare impact the

564
00:25:01,100 --> 00:24:58,170
availability and quality of our water

565
00:25:04,430 --> 00:25:01,110
resources the impact our global

566
00:25:08,510 --> 00:25:04,440
economies and our sustainability of our

567
00:25:11,150 --> 00:25:08,520
resources we need is information that

568
00:25:14,180 --> 00:25:11,160
will come from the ldcm data and its

569
00:25:16,570 --> 00:25:14,190
analyses to make informed daily

570
00:25:22,549 --> 00:25:16,580
decisions about how we conduct ourselves

571
00:25:27,560 --> 00:25:22,559
to use our resources wisely and to plan

572
00:25:29,930 --> 00:25:27,570
and adapt to inevitable change our world

573
00:25:32,750 --> 00:25:29,940
population now exceeds seven billion

574
00:25:35,780 --> 00:25:32,760
people and I expect that all seven

575
00:25:39,710 --> 00:25:35,790
billion of us and on into future

576
00:25:41,630 --> 00:25:39,720
generations will directly benefit from

577
00:25:45,230 --> 00:25:41,640
the results of the Landsat data

578
00:25:47,990 --> 00:25:45,240
continuity mission I further expect that

579
00:25:51,320 --> 00:25:48,000
those benefits will continue through the

580
00:25:53,870 --> 00:25:51,330
operational life of the satellite as its

581
00:25:57,380 --> 00:25:53,880
operated by the US Geological Survey

582
00:25:59,600 --> 00:25:57,390
under its new name Landsat 8 thank you i

583
00:26:02,750 --> 00:25:59,610
can't wait to get started and back to

584
00:26:04,730 --> 00:26:02,760
you Ronnie thank you Jim we will now

585
00:26:06,440 --> 00:26:04,740
take questions here in the room and also

586
00:26:08,390 --> 00:26:06,450
through Twitter if you have a question

587
00:26:12,290 --> 00:26:08,400
through Twitter just go to through

588
00:26:14,030 --> 00:26:12,300

hashtag ask NASA start with questions in

589
00:26:21,230 --> 00:26:14,040
the room

590
00:26:23,210 --> 00:26:21,240
I Nora Wallace Santa Barbara news-press

591
00:26:26,300 --> 00:26:23,220
so I'll repeat my question from the

592
00:26:28,850 --> 00:26:26,310
previous panel about a lot of you spoke

593
00:26:29,990 --> 00:26:28,860
about the the interest in this data from

594
00:26:32,210 --> 00:26:30,000
the kind of the government and

595
00:26:33,500 --> 00:26:32,220
commercial aspect business aspect but

596
00:26:34,910 --> 00:26:33,510
tell us a little bit about the

597
00:26:37,940 --> 00:26:34,920
fascination that you see in just the

598
00:26:39,860 --> 00:26:37,950
general public like schools or you know

599
00:26:41,780 --> 00:26:39,870
it's a little bit of a time suck when I

600
00:26:43,730 --> 00:26:41,790
go on the website and and start looking

601
00:26:45,860 --> 00:26:43,740
at data as suddenly an hour's gone by so

602
00:26:47,840 --> 00:26:45,870
do you see that a lot in the general

603
00:26:51,980 --> 00:26:47,850
public or what kind of interest do you

604
00:26:53,990 --> 00:26:51,990
see in this information just starting to

605
00:26:56,570 --> 00:26:54,000
I mean not just starting to but it's I

606
00:26:59,150 --> 00:26:56,580
it's really starting to explode once the

607
00:27:01,490 --> 00:26:59,160
data became free and open that that's

608
00:27:02,810 --> 00:27:01,500
been the huge difference so people are

609
00:27:04,280 --> 00:27:02,820
just starting to really mine that data

610
00:27:06,620 --> 00:27:04,290
but I have a neighbor who's a

611
00:27:08,210 --> 00:27:06,630
schoolteacher she teaches seventh and

612
00:27:10,610 --> 00:27:08,220
eighth graders and she uses Landsat data

613
00:27:12,860 --> 00:27:10,620

in her courses all the time she's a

614
00:27:15,230 --> 00:27:12,870
science teacher to just show the kids

615
00:27:17,630 --> 00:27:15,240
how you know populations changing our

616
00:27:19,970 --> 00:27:17,640
resources are really stressed so you

617
00:27:22,430 --> 00:27:19,980
think especially with this launch it's

618
00:27:24,380 --> 00:27:22,440
going to really really explode but it's

619
00:27:26,360 --> 00:27:24,390
the ABE you see it from the users you

620
00:27:28,400 --> 00:27:26,370
know from the chart of the users taking

621
00:27:31,430 --> 00:27:28,410
off and had the imagery is just so

622
00:27:33,920 --> 00:27:31,440
beautiful you know I get sucked into a

623
00:27:37,280 --> 00:27:33,930
TI just like ah I can't believe how

624
00:27:40,880 --> 00:27:37,290
beautiful it is I'm glad you brought up

625
00:27:45,520 --> 00:27:40,890
education because we make a concerted

626
00:27:50,240 --> 00:27:45,530
effort to conduct educational outreach

627
00:27:53,660 --> 00:27:50,250
in order to facilitate the use of this

628
00:27:56,780 --> 00:27:53,670
information to aid in education I think

629
00:27:58,460 --> 00:27:56,790
that and since I go back a few years on

630
00:28:00,860 --> 00:27:58,470
this program I think when the Landsat

631
00:28:02,870 --> 00:28:00,870
satellites were first launched there was

632
00:28:05,960 --> 00:28:02,880
a fascination in the public with the

633
00:28:07,910 --> 00:28:05,970
revelation of the beauty of the

634
00:28:11,420 --> 00:28:07,920
landscape and its landforms its

635
00:28:14,540 --> 00:28:11,430
geomorphology I think that fascination

636
00:28:18,950 --> 00:28:14,550
has transferred a bit in more recent

637
00:28:22,190 --> 00:28:18,960
years to understanding the impact of our

638
00:28:24,440 --> 00:28:22,200

human population on that landscape so as

639
00:28:27,740 --> 00:28:24,450
we've built up a record of observations

640
00:28:30,260 --> 00:28:27,750
and we begin to reveal the changes

641
00:28:32,570 --> 00:28:30,270
dramatic changes that are occurring on

642
00:28:35,390 --> 00:28:32,580
that landscape I think the fascination

643
00:28:38,050 --> 00:28:35,400
now is is more with what what we're

644
00:28:40,700 --> 00:28:38,060
doing on it rather than just the natural

645
00:28:43,250 --> 00:28:40,710
and inherent beauty of those landscapes

646
00:28:45,950 --> 00:28:43,260
I think we have another question in the

647
00:28:48,110 --> 00:28:45,960
audience here Janine Scully santa maria

648
00:28:50,690 --> 00:28:48,120
times the Lompoc record we try to is

649
00:28:53,260 --> 00:28:50,700
regular reporters for mainstream media

650
00:28:56,870 --> 00:28:53,270
we try to bring this down to why should

651
00:28:58,730 --> 00:28:56,880
the farmer a vegetable farmer in Santa

652
00:29:01,430 --> 00:28:58,740
Maria the forest ranger up in the Los

653
00:29:03,110 --> 00:29:01,440
Padres National Forest why why should

654
00:29:07,550 --> 00:29:03,120
they be excited about this and how will

655
00:29:10,040 --> 00:29:07,560
this satellite help them there's a

656
00:29:12,980 --> 00:29:10,050
number of reasons but one of the the

657
00:29:15,260 --> 00:29:12,990
goals we all have is to improve the

658
00:29:17,150 --> 00:29:15,270
sustainability of our resources whether

659
00:29:21,710 --> 00:29:17,160
it's agricultural land for us or

660
00:29:23,930 --> 00:29:21,720
rangelands the the other is to to try to

661
00:29:27,370 --> 00:29:23,940
make the wise as possible uses the

662
00:29:29,570 --> 00:29:27,380
benefit futures of future generations

663
00:29:31,010 --> 00:29:29,580

you know the challenge we face in

664
00:29:34,160 --> 00:29:31,020
resource management whether it's

665
00:29:36,200 --> 00:29:34,170
agriculture forestry is that those are

666
00:29:38,510 --> 00:29:36,210
the kinds of activities that tend to

667
00:29:41,090 --> 00:29:38,520
operate on smaller budgets than many and

668
00:29:44,390 --> 00:29:41,100
so what we really need is to achieve

669
00:29:46,370 --> 00:29:44,400
some efficiencies and what looking at

670
00:29:48,230 --> 00:29:46,380
the condition of our resources checking

671
00:29:50,960 --> 00:29:48,240
the effectiveness of management programs

672
00:29:53,300 --> 00:29:50,970
and and fine-tuning those as we move

673
00:29:55,730 --> 00:29:53,310
into the future with free access to

674
00:29:59,690 --> 00:29:55,740
Landsat data what we're seeing is a huge

675
00:30:04,010 --> 00:29:59,700
increase in forestry a growing interest

676
00:30:06,440 --> 00:30:04,020
in agriculture and much greater uses in

677
00:30:08,900 --> 00:30:06,450
range management all because we finally

678
00:30:10,610 --> 00:30:08,910
have a timely resource that's readily

679
00:30:13,760 --> 00:30:10,620
available with a long term commitment

680
00:30:15,500 --> 00:30:13,770
behind it that allows resource managers

681
00:30:18,680 --> 00:30:15,510
to make the investments in time and

682
00:30:21,200 --> 00:30:18,690
staff and therefore come up with the

683
00:30:23,780 --> 00:30:21,210
decisions they need to better use their

684
00:30:26,060 --> 00:30:23,790
lands can I follow up just specific

685
00:30:28,310 --> 00:30:26,070
responses to for the Los Padres National

686
00:30:29,960 --> 00:30:28,320
Forest and tell you the foresters there

687
00:30:32,450 --> 00:30:29,970
are already using products that use

688
00:30:35,120 --> 00:30:32,460

Landsat data to monitor forest health so

689
00:30:37,310 --> 00:30:35,130
the Forest Service in this region uses

690
00:30:38,810 --> 00:30:37,320
Landsat data to map the National Forest

691
00:30:41,000 --> 00:30:38,820
and to monitor force health so the

692
00:30:41,900 --> 00:30:41,010
foresters very interested in it and the

693
00:30:45,500 --> 00:30:41,910
farmer

694
00:30:48,530 --> 00:30:45,510
their agricultural products and that

695
00:30:51,890 --> 00:30:48,540
price is largely determined by the

696
00:30:54,320 --> 00:30:51,900
global price so you have US Department

697
00:30:56,900 --> 00:30:54,330
of Agriculture monitoring global

698
00:30:58,520 --> 00:30:56,910
production worldwide those numbers go

699
00:31:00,080 --> 00:30:58,530
into what's called lock up every month

700
00:31:04,730 --> 00:31:00,090
and then they're released to the press

701
00:31:07,370 --> 00:31:04,740
into the public so so that you put every

702
00:31:08,960 --> 00:31:07,380
farmer on a level playing field because

703
00:31:10,970 --> 00:31:08,970
that information is out there and they

704
00:31:12,680 --> 00:31:10,980
know it's determining prices so there

705
00:31:15,280 --> 00:31:12,690
that both that farmer in that forest are

706
00:31:17,600 --> 00:31:15,290
directly impacted by Landsat data today

707
00:31:19,550 --> 00:31:17,610
yeah it out a little bit about the

708
00:31:20,960 --> 00:31:19,560
forest perspectives on it you're

709
00:31:23,060 --> 00:31:20,970
probably to stop me at some point here

710
00:31:25,700 --> 00:31:23,070
I'll just kept going but there's a wide

711
00:31:28,040 --> 00:31:25,710
range of users that can actually utilize

712
00:31:29,630 --> 00:31:28,050
the imagery right from just putting the

713
00:31:32,600 --> 00:31:29,640

imagery in your computer as a backdrop

714
00:31:33,950 --> 00:31:32,610
to see the context of their woodshed all

715
00:31:35,930 --> 00:31:33,960
the way through to people that are

716
00:31:38,090 --> 00:31:35,940
putting together the 40-year stack of

717
00:31:39,620 --> 00:31:38,100
imagery to look at very subtle changes

718
00:31:42,320 --> 00:31:39,630
over time that have been occurring so

719
00:31:44,480 --> 00:31:42,330
say a slowly encroaching insect that

720
00:31:47,780 --> 00:31:44,490
might be coming into a particular part

721
00:31:49,670 --> 00:31:47,790
of the landscape beetles that might come

722
00:31:51,020 --> 00:31:49,680
in or other defoliator they can see

723
00:31:52,760 --> 00:31:51,030
where that is and they can see how that

724
00:31:55,010 --> 00:31:52,770
might relate to their their actual

725
00:31:56,420 --> 00:31:55,020
planned operations so that there's a

726
00:31:57,890 --> 00:31:56,430
wide range of different users so it's

727
00:31:59,450 --> 00:31:57,900
really hard just to say this is the one

728
00:32:02,450 --> 00:31:59,460
thing that gets done because the imagery

729
00:32:04,280 --> 00:32:02,460
is is really allowing them to tackle

730
00:32:07,520 --> 00:32:04,290
different problems with the number of

731
00:32:09,410 --> 00:32:07,530
different approaches so even aerial

732
00:32:11,480 --> 00:32:09,420
sketch mappers before used to just have

733
00:32:13,160 --> 00:32:11,490
a map on their lap and then they draw

734
00:32:14,840 --> 00:32:13,170
where they thought the infestation was

735
00:32:16,550 --> 00:32:14,850
now they can have a Landsat image in a

736
00:32:18,350 --> 00:32:16,560
digital environment in the background

737
00:32:20,300 --> 00:32:18,360
and they can use all the contextual

738
00:32:21,710 --> 00:32:20,310

clues that are there in the imagery to

739
00:32:24,110 --> 00:32:21,720
better depict where the insect

740
00:32:25,820 --> 00:32:24,120
infestations occurring so that's just

741
00:32:29,720 --> 00:32:25,830
one one example of how it's getting used

742
00:32:32,360 --> 00:32:29,730
in a management context I believe we

743
00:32:35,720 --> 00:32:32,370
have some questions on Twitter you have

744
00:32:38,060 --> 00:32:35,730
quite a few actually first one when will

745
00:32:41,720 --> 00:32:38,070
at first light image from ldcm be

746
00:32:45,440 --> 00:32:41,730
released yeah we expect to open the

747
00:32:49,340 --> 00:32:45,450
shutters to view the earth with oli in

748
00:32:52,310 --> 00:32:49,350
tears some day sometime around the 25th

749
00:32:55,250 --> 00:32:52,320
day in orbit and will release a JPEG

750
00:32:58,460 --> 00:32:55,260
image of the first light image

751
00:33:00,680 --> 00:32:58,470
when that event occurs and a related

752
00:33:04,700 --> 00:33:00,690
image is when will LD Sam data become

753
00:33:09,020 --> 00:33:04,710
available regularly to the world go

754
00:33:11,390 --> 00:33:09,030
ahead the we are expecting to begin

755
00:33:12,950 --> 00:33:11,400
providing operational imagery about a

756
00:33:17,240 --> 00:33:12,960
hundred days from launch so that would

757
00:33:19,310 --> 00:33:17,250
put us in toward the end of May okay

758
00:33:21,020 --> 00:33:19,320
thank you uh next question is how much

759
00:33:24,020 --> 00:33:21,030
longer do you expect the remaining

760
00:33:27,320 --> 00:33:24,030
Landsat satellite landsat-7 to continue

761
00:33:31,430 --> 00:33:27,330
operating analyses have indicated that

762
00:33:34,510 --> 00:33:31,440
there's enough fuel aboard landsat 7 to

763
00:33:38,600 --> 00:33:34,520

keep it in its operational orbit through

764
00:33:43,280 --> 00:33:38,610
2016 yeah let me just had on that point

765
00:33:46,640 --> 00:33:43,290
to weave with the young with the end of

766
00:33:48,610 --> 00:33:46,650
the Landsat 5 mission discontinuing the

767
00:33:51,080 --> 00:33:48,620
acquisitions of imagery about a year ago

768
00:33:52,940 --> 00:33:51,090
we've been into a rare period in the

769
00:33:55,070 --> 00:33:52,950
Landsat history where we're only getting

770
00:33:56,990 --> 00:33:55,080
16 day coverage we don't have that those

771
00:34:00,110 --> 00:33:57,000
two images that give us the 8th day

772
00:34:02,420 --> 00:34:00,120
coverage now that will be back with ldcm

773
00:34:05,000 --> 00:34:02,430
through the end of Landsat 7 we're

774
00:34:06,890 --> 00:34:05,010
returning to that that eight day

775
00:34:08,419 --> 00:34:06,900
coverage which really has significant

776
00:34:11,750 --> 00:34:08,429
benefits when we're trying to monitor

777
00:34:13,850 --> 00:34:11,760
the condition of our landscape okay and

778
00:34:17,720 --> 00:34:13,860
and what is the expected mission life of

779
00:34:20,659 --> 00:34:17,730
ldcm the design life of the spacecraft

780
00:34:24,649 --> 00:34:20,669
and the operational land imager is five

781
00:34:27,220 --> 00:34:24,659
years the design life of the thermal

782
00:34:30,950 --> 00:34:27,230
infrared sensor or tears is three years

783
00:34:33,889 --> 00:34:30,960
there's enough fuel onboard the

784
00:34:38,379 --> 00:34:33,899
spacecraft to maintain its orbit for at

785
00:34:41,540 --> 00:34:38,389
least 10 years and so we hope that the

786
00:34:44,210 --> 00:34:41,550
spacecraft and the instruments will last

787
00:34:46,909 --> 00:34:44,220
well beyond their design lives and we

788
00:34:50,060 --> 00:34:46,919

can continue to collect data for for at

789
00:34:52,040 --> 00:34:50,070
least 10 years okay the next question is

790
00:34:54,830 --> 00:34:52,050
is there a technology that you'd like to

791
00:35:03,440 --> 00:34:54,840
get on a future Landsat mission that you

792
00:35:11,839 --> 00:35:07,700
how do we like you guys III think it's

793
00:35:13,339 --> 00:35:11,849
universally yes but but at the same time

794
00:35:16,130 --> 00:35:13,349
you know what we do need to always

795
00:35:17,839 --> 00:35:16,140
recognize is the importance of Landsat

796
00:35:20,900 --> 00:35:17,849
is building this long-term record of the

797
00:35:23,270 --> 00:35:20,910
condition of the earth and so we put at

798
00:35:27,050 --> 00:35:23,280
the top of our wishlist data continuity

799
00:35:29,000 --> 00:35:27,060
the ability to continue the same types

800
00:35:30,920 --> 00:35:29,010
of observations that are backward

801
00:35:35,660 --> 00:35:30,930
compatible to the first images acquired

802
00:35:38,450 --> 00:35:35,670
in 1972 is critical what we want what we

803
00:35:40,329 --> 00:35:38,460
need after that is incremental advances

804
00:35:42,200 --> 00:35:40,339
in capabilities that will help us

805
00:35:44,300 --> 00:35:42,210
understand the complexity of the

806
00:35:46,400 --> 00:35:44,310
landscape the structure of the landscape

807
00:35:48,620 --> 00:35:46,410
and that leads to a lot of other imaging

808
00:35:52,700 --> 00:35:48,630
opportunities but continuity always

809
00:35:54,890 --> 00:35:52,710
drives Landsat another question with

810
00:35:57,230 --> 00:35:54,900
readily available high-resolution

811
00:35:59,390 --> 00:35:57,240
imagery of Earth available through

812
00:36:02,319 --> 00:35:59,400
google earth how do you convince the

813
00:36:05,870 --> 00:36:02,329

public of the usefulness of Landsat data

814
00:36:10,309 --> 00:36:05,880
well that data that you find on Google

815
00:36:13,550 --> 00:36:10,319
Earth our Landsat data so the reason

816
00:36:15,890 --> 00:36:13,560
google earth is able to display that

817
00:36:19,540 --> 00:36:15,900
data is because we've operated the

818
00:36:22,640 --> 00:36:19,550
lancets landsat satellites for so long

819
00:36:24,680 --> 00:36:22,650
what what Google Earth does not yet do

820
00:36:28,910 --> 00:36:24,690
and may do in the futures they don't

821
00:36:31,220 --> 00:36:28,920
update that as often as we require for

822
00:36:35,780 --> 00:36:31,230
our scientific applications and for our

823
00:36:39,980 --> 00:36:35,790
resource management applications so yeah

824
00:36:42,079 --> 00:36:39,990
I mean we are you know Google Earth has

825
00:36:44,720 --> 00:36:42,089
taken full advantage of the Landsat

826
00:36:46,430 --> 00:36:44,730
program in order to create their service

827
00:36:51,530 --> 00:36:46,440
and we understand they're coming to the

828
00:36:53,839 --> 00:36:51,540
launch good the high-resolution data

829
00:36:55,970 --> 00:36:53,849
does not have the temporal resolution of

830
00:36:58,069 --> 00:36:55,980
Landsat data by that I mean with the

831
00:36:59,870 --> 00:36:58,079
with a launch of Landsat 8 we'll have

832
00:37:02,150 --> 00:36:59,880
pictures of the earth every eight days

833
00:37:04,160 --> 00:37:02,160
you cannot do that with high-resolution

834
00:37:06,859 --> 00:37:04,170
data because the footprint is so much

835
00:37:08,960 --> 00:37:06,869
smaller so you see more detail but it

836
00:37:10,700 --> 00:37:08,970
takes a very very small picture of the

837
00:37:12,920 --> 00:37:10,710
earth and none of the commercial

838
00:37:14,599 --> 00:37:12,930

satellites or airborne can we get the

839
00:37:16,400 --> 00:37:14,609
kind of temporal resolution that we get

840
00:37:17,180 --> 00:37:16,410
with Landsat data and that that's

841
00:37:18,700 --> 00:37:17,190
critically

842
00:37:21,230 --> 00:37:18,710
to be able to take that big picture

843
00:37:24,440 --> 00:37:21,240
often enough to manage resources and

844
00:37:26,089 --> 00:37:24,450
monitor resources over time okay the

845
00:37:29,059 --> 00:37:26,099
next question is what is the expected

846
00:37:32,000 --> 00:37:29,069
partnership between ldcm and the

847
00:37:34,309 --> 00:37:32,010
european sentinel to mission to improve

848
00:37:37,250 --> 00:37:34,319
intra annual observations and perhaps

849
00:37:42,620 --> 00:37:37,260
you could tell the viewers what that

850
00:37:44,300 --> 00:37:42,630
central node to mission is well sure the

851
00:37:48,859 --> 00:37:44,310
sentinel to mission is a mission of the

852
00:37:53,720 --> 00:37:48,869
european your european space agency they

853
00:37:55,609 --> 00:37:53,730
plan to ultimately launch two satellites

854
00:38:01,760 --> 00:37:55,619
with the first one going up in the

855
00:38:03,380 --> 00:38:01,770
summer of 2014 that will take these

856
00:38:05,690 --> 00:38:03,390
satellites have an instrument called a

857
00:38:07,520 --> 00:38:05,700
multispectral image or msi that will

858
00:38:11,380 --> 00:38:07,530
collect data comparable to the

859
00:38:16,309 --> 00:38:11,390
operational land imager but not exactly

860
00:38:18,829 --> 00:38:16,319
like it the this the sentinel spacecraft

861
00:38:21,859 --> 00:38:18,839
will not carry a thermal imager however

862
00:38:24,500 --> 00:38:21,869
they will not collect thermal data we

863
00:38:29,200 --> 00:38:24,510

have initiated discussions with the

864
00:38:34,250 --> 00:38:29,210
european space agency for cooperation we

865
00:38:38,390 --> 00:38:34,260
just this past fall conducted an

866
00:38:42,559 --> 00:38:38,400
exercise with their vendor for the msi

867
00:38:45,200 --> 00:38:42,569
to facilitate cross calibration between

868
00:38:47,900 --> 00:38:45,210
oli and msi we actually send some

869
00:38:50,359 --> 00:38:47,910
instruments over to their facility in

870
00:38:53,230 --> 00:38:50,369
Toulouse France to make measurements of

871
00:38:58,460 --> 00:38:53,240
their calibration reference sources and

872
00:39:01,099 --> 00:38:58,470
so we are hoping and looking forward to

873
00:39:03,490 --> 00:39:01,109
increased cooperation and learning how

874
00:39:06,290 --> 00:39:03,500
to use the data from from both systems

875
00:39:08,450 --> 00:39:06,300
synergistically together yeah just a

876
00:39:10,069 --> 00:39:08,460
follow on that it comes down to temporal

877
00:39:11,630 --> 00:39:10,079
resolution as cast mentioned as well

878
00:39:13,220 --> 00:39:11,640
that the more opportunities you could

879
00:39:14,780 --> 00:39:13,230
look at a particular place on the land

880
00:39:17,809 --> 00:39:14,790
based the better you can understand it

881
00:39:19,160 --> 00:39:17,819
and there's also the the complication

882
00:39:21,620 --> 00:39:19,170
that we get it remote sensing because of

883
00:39:23,870 --> 00:39:21,630
clouds so if we have an opportunity to

884
00:39:25,460 --> 00:39:23,880
see a location more times we have an

885
00:39:26,720 --> 00:39:25,470
opportunity to clear the clouds find

886
00:39:28,069 --> 00:39:26,730
clear pixels that we can use for our

887
00:39:29,780 --> 00:39:28,079
applications and then for things like

888
00:39:30,890 --> 00:39:29,790

agriculture where they need to know

889
00:39:32,900 --> 00:39:30,900
quite rapidly

890
00:39:34,460 --> 00:39:32,910
what's changing on the landscape how the

891
00:39:36,620 --> 00:39:34,470
crops are developing they can see that

892
00:39:38,150 --> 00:39:36,630
with those multiple looks so that's one

893
00:39:40,490 --> 00:39:38,160
of the key things that will get from the

894
00:39:43,039 --> 00:39:40,500
synergy with the land set and Sentinel

895
00:39:44,809 --> 00:39:43,049
measures okay i know i've got one more

896
00:39:47,029 --> 00:39:44,819
question this seems a bit more technical

897
00:39:50,059 --> 00:39:47,039
so it might need some help from you all

898
00:39:53,150 --> 00:39:50,069
how do the alterations to ldcm band

899
00:39:55,609 --> 00:39:53,160
widths and band locations affect the

900
00:40:03,380 --> 00:39:55,619
data continuity across missions if it

901
00:40:10,510 --> 00:40:03,390
has any effect at all yeah we've made

902
00:40:13,819 --> 00:40:10,520
some revisions to the band widths of the

903
00:40:17,329 --> 00:40:13,829
sense by the operational land imager in

904
00:40:20,779 --> 00:40:17,339
order to avoid atmospheric absorption

905
00:40:23,450 --> 00:40:20,789
features so that our observations from

906
00:40:26,900 --> 00:40:23,460
the ldcm will we expect to be less

907
00:40:28,730 --> 00:40:26,910
sensitive to atmospheric conditions we

908
00:40:32,329 --> 00:40:28,740
they're close enough though that we hope

909
00:40:35,480 --> 00:40:32,339
that the changes will not impact our

910
00:40:39,170 --> 00:40:35,490
ability to compare ldcm data with data

911
00:40:43,210 --> 00:40:39,180
from the earlier satellites learn more

912
00:40:49,150 --> 00:40:45,740
Roger record the Arcada I have a

913
00:40:52,850 --> 00:40:49,160

question you've talked about the

914
00:40:56,450 --> 00:40:52,860
increase in use of images since they've

915
00:41:03,110 --> 00:40:56,460
become free whose idea was that and how

916
00:41:05,630 --> 00:41:03,120
hard a cell was that the the decision to

917
00:41:08,540 --> 00:41:05,640
move to free data was made within the US

918
00:41:12,230 --> 00:41:08,550
Geological Survey in around two thousand

919
00:41:15,820 --> 00:41:12,240
seven or eight and it was a

920
00:41:18,230 --> 00:41:15,830
recommendation by one of our senior

921
00:41:19,730 --> 00:41:18,240
administrators that realize that the

922
00:41:22,670 --> 00:41:19,740
value of lands that would be greatly

923
00:41:24,530 --> 00:41:22,680
enhanced if it were in more hands so we

924
00:41:26,900 --> 00:41:24,540
began the process of designing the

925
00:41:30,950 --> 00:41:26,910
systems part of the process of that is

926
00:41:33,830 --> 00:41:30,960
to make data free we needed to reduce

927
00:41:35,680 --> 00:41:33,840
costs significantly the primary way of

928
00:41:39,620 --> 00:41:35,690
doing that is to make it available

929
00:41:41,870 --> 00:41:39,630
through internet distribution and so we

930
00:41:44,240 --> 00:41:41,880
essentially modernized our systems as

931
00:41:46,610 --> 00:41:44,250
rapidly as possible and in late two

932
00:41:49,610 --> 00:41:46,620
thousand eight made that happen and the

933
00:41:52,370 --> 00:41:49,620
first year we distributed over a million

934
00:41:55,610 --> 00:41:52,380
images that compares to our best sales

935
00:41:57,170 --> 00:41:55,620
year of about twenty thousand images and

936
00:41:59,990 --> 00:41:57,180
now we're at the point where three

937
00:42:03,560 --> 00:42:00,000
million images per year being used the

938
00:42:07,420 --> 00:42:03,570

investment is the ability the system's

939
00:42:09,770 --> 00:42:07,430
putting satellites into orbit and

940
00:42:12,170 --> 00:42:09,780
operating those systems through the

941
00:42:14,330 --> 00:42:12,180
operational phase the return on the

942
00:42:16,280 --> 00:42:14,340
investment is the effective use of that

943
00:42:19,970 --> 00:42:16,290
in all sectors and that's where we are

944
00:42:23,330 --> 00:42:19,980
with free data any more questions in the

945
00:42:24,980 --> 00:42:23,340
room all right it's going to close our

946
00:42:27,350 --> 00:42:24,990
briefing want to thank our panelists and

947
00:42:29,540 --> 00:42:27,360
think the people asking questions online

948
00:42:31,880 --> 00:42:29,550
and here in the room if you'd like to

949
00:42:36,680 --> 00:42:31,890
learn more about Landsat data continuity