
Going for
GOLD
NASA
Goddard
SPACE FLIGHT CENTER

1
00:00:00,210 --> 00:00:07,230
Hello and welcome! We are talking today
about NASA's newest mission GOLD.

2
00:00:07,230 --> 00:00:10,170
GOLD will be exploring our interface to
space.

3
00:00:10,170 --> 00:00:14,490
I'm Karen Fox I'm here today at NASA's
Goddard Space Flight Center in Greenbelt,

4
00:00:14,490 --> 00:00:17,640
Maryland. We will be taking your
questions you can put them in the

5
00:00:17,640 --> 00:00:23,189
comments down below or on the sides. You can also use hashtag ask NASA we'll be

6
00:00:23,189 --> 00:00:26,970
answering your questions a little bit later
on in the show. So we're talking today

7
00:00:26,970 --> 00:00:32,040
about space and I don't mean the
farthest reaches of space that Hubble

8
00:00:32,040 --> 00:00:36,120
takes pictures of I'm actually talking
about the very fabric of space between

9
00:00:36,120 --> 00:00:42,180
the planets. Today especially that
space around Earth increasingly this is

10
00:00:42,180 --> 00:00:46,410
the domain of humans. We have satellites
traveling through there. We have radio

11

00:00:46,410 --> 00:00:49,530
communication waves traveling through
there and it's a really dynamic place.

12
00:00:49,530 --> 00:00:53,820
The upper atmosphere affects it space
weather affects it from above and we

13
00:00:53,820 --> 00:00:59,760
need to understand it better which is
what GOLD will be helping us do. To talk

14
00:00:59,760 --> 00:01:07,590
a little bit more about that today we
have Richard Eastes. Richard Eastes, as

15
00:01:07,590 --> 00:01:11,130
the person who conceived of the GOLD
mission and has been watching it all the

16
00:01:11,130 --> 00:01:15,960
way through development I want to start
out just hearing a little bit about the

17
00:01:15,960 --> 00:01:20,009
beginnings. What were you inspired by? What was it that

18
00:01:20,009 --> 00:01:23,159
you wanted to study with this mission?
Well, what we want to do is get the big

19
00:01:23,159 --> 00:01:25,590
picture. We've been for years, we've been studying

20
00:01:25,590 --> 00:01:29,340
the Earth's upper atmosphere.

21
00:01:29,340 --> 00:01:34,409
We've been looking at
those in detail and from the ground and

22
00:01:34,409 --> 00:01:38,460
from on low Earth orbit missions we
wanted to be able to back off and look

23
00:01:38,460 --> 00:01:41,490
at it from geostationary orbit and get
the big picture gonna hold him a spirit

24
00:01:41,490 --> 00:01:45,509
once let's just put everything put
things into context things that we can't

25
00:01:45,509 --> 00:01:49,259
understand we were just looking one
little piece that and also at the same

26
00:01:49,259 --> 00:01:53,640
time we wanted to get pictures of the
temperature which is something we've

27
00:01:53,640 --> 00:01:57,570
never had before that's a unique piece
of this of this mission we'll get to a

28
00:01:57,570 --> 00:02:00,689
various pieces of information some of
which have been done before but the

29
00:02:00,689 --> 00:02:02,880
temperature is something different we'll
get pictures of the temperature in the

30
00:02:02,880 --> 00:02:06,540
upper atmosphere so that's what's really
inspired us to do this that's really

31
00:02:06,540 --> 00:02:08,959
where we hated when we started doing
this that's what we're trying to do

32
00:02:08,959 --> 00:02:12,709
so we're gonna be getting a bigger
picture a more global scale picture than

33
00:02:12,709 --> 00:02:16,909
we've been able to get before it's
exciting stuff I'd like to talk a little

34
00:02:16,909 --> 00:02:21,439
bit today about why why that matters to
us down on earth why this region of

35
00:02:21,439 --> 00:02:26,599
space actually affects us and to focus
on that we're including Sarah Jones who

36
00:02:26,599 --> 00:02:31,849
will be joining us Sarah Jones is the
mission scientist GOLD here at

37
00:02:31,849 --> 00:02:38,000
NASA Goddard tell us a little bit more
about why this region of space as low

38
00:02:38,000 --> 00:02:44,150
level of space affects us here sure
Karen you know what space isn't just the

39
00:02:44,150 --> 00:02:48,260
home of astronauts and where our
satellites fly it's actually a region

40
00:02:48,260 --> 00:02:54,469
that's very important to us how about we
take a look at this graphic so the

41
00:02:54,469 --> 00:02:58,400
region that we're talking about today is
the region of the upper atmosphere that

42
00:02:58,400 --> 00:03:04,400
starts around 60 miles above us and
extends upward and most of the gas up

43
00:03:04,400 --> 00:03:07,939
there is actually essentially an
extension of the air that we breathe

44
00:03:07,939 --> 00:03:12,409
below but there's actually a small
component there that is created when the

45
00:03:12,409 --> 00:03:17,479
sun's radiation hits the gas in the
atmosphere and breaks it apart into ions

46
00:03:17,479 --> 00:03:22,269
and electrons and this new ionized
component we refer to as the ionosphere

47
00:03:22,269 --> 00:03:27,739
now the ionosphere has major impacts on
the technology that we use today in part

48
00:03:27,739 --> 00:03:31,609
because of the way that if it affects
the way that radio signals travel

49
00:03:31,609 --> 00:03:36,739
through our atmosphere so for example we
have radio signals from our

50
00:03:36,739 --> 00:03:40,790
communication satellites and from our
GPS satellites passing down to the

51
00:03:40,790 --> 00:03:44,329
ground to our cell phones and GPS
navigation systems that have to go

52
00:03:44,329 --> 00:03:49,189
through the ionosphere and the
ionosphere is a very dynamic place with

53
00:03:49,189 --> 00:03:52,549
a lot of structuring and as the
structure develops it can actually

54
00:03:52,549 --> 00:03:57,229
garble all of these signals that are
coming through our atmosphere it's more

55
00:03:57,229 --> 00:04:02,299
variable than we had realized in the
past and it's actually an exciting

56
00:04:02,299 --> 00:04:07,040
opportunity for gold to now take a look
and help us to understand how the

57
00:04:07,040 --> 00:04:13,340
ionosphere affects our day-to-day life
thank you very much if you're just

58
00:04:13,340 --> 00:04:17,750
tuning in we are here today talking
about NASA's newest mission gold it's

59
00:04:17,750 --> 00:04:22,099
going to be launching
at the end of July from French Guiana it

60
00:04:22,099 --> 00:04:25,940
is a mission that has been led by the
University of Central Florida in Orlando

61
00:04:25,940 --> 00:04:30,680
Florida and the instrument itself was
built at the University of Colorado the

62
00:04:30,680 --> 00:04:34,759
laboratory of atmospheric and space
physics we are taking your questions

63
00:04:34,759 --> 00:04:39,289
today you have lots of time to send them
in use hashtag ask NASA or put them in

64
00:04:39,289 --> 00:04:42,710
the comments below and we won't answer
them we actually have our first question

65
00:04:42,710 --> 00:04:49,789
already so I'm gonna ask you Sarah for
this the question we have in is I'm

66
00:04:49,789 --> 00:04:57,379
almost there the question is I thought
space was a vacuum tell us how we can

67
00:04:57,379 --> 00:05:03,379
actually study that ok well space is
actually a vacuum that's true but

68
00:05:03,379 --> 00:05:08,719
actually the vacuum of space is not
completely empty in space we have

69
00:05:08,719 --> 00:05:14,030
particles for example there's energetic
particles that are moving quickly

70
00:05:14,030 --> 00:05:19,039
through space and there are electric and
magnetic fields which kind of guide the

71
00:05:19,039 --> 00:05:23,360
way that those particles move through
space and also in our atmosphere we have

72
00:05:23,360 --> 00:05:27,680
these same particles and fields that are
kind of determining how the earth

73
00:05:27,680 --> 00:05:33,650
interacts with the space environment
around us Richard do you want to add

74
00:05:33,650 --> 00:05:36,020
anything to answer this question with
anything about gold that we want to know

75
00:05:36,020 --> 00:05:40,909
about space for this what makes space
certainly it has a lot of influence on

76
00:05:40,909 --> 00:05:45,860
on our up rap Oh what the systems we use
day to day and also it's a sort of tells

77
00:05:45,860 --> 00:05:49,940
us a lot about what is happening to
other planets earth is our closest

78
00:05:49,940 --> 00:05:53,569
planet we're able to look at it and tell
learn from it that things that we can't

79
00:05:53,569 --> 00:05:57,740
easily learn from other planets because
they're too far away or too difficult to

80
00:05:57,740 --> 00:06:01,940
study so the space matters this stuff
around it it's not completely empty

81
00:06:01,940 --> 00:06:05,449
there's stuff going on in there and it
helps us understand a lot about our

82
00:06:05,449 --> 00:06:11,029
solar system all right with that let's
focus a little bit more Sarah tell us

83
00:06:11,029 --> 00:06:16,879
specifically what gold will be trying to
learn sure the gold mission is studying

84
00:06:16,879 --> 00:06:21,229
what's essentially a new area of
scientific research that has opened up

85
00:06:21,229 --> 00:06:25,940
recently in the past people thought that
this region of the Earth's upper

86
00:06:25,940 --> 00:06:30,469
atmosphere was affected primarily by
what's happening at the Sun and what's

87
00:06:30,469 --> 00:06:34,760
coming to the earth from
son so for example we have an image here

88
00:06:34,760 --> 00:06:39,380
of the sun's radiation coming down and
hitting the Earth's atmosphere the sun's

89
00:06:39,380 --> 00:06:44,150
magnetic field also interacts with the
earth and causes things like geomagnetic

90
00:06:44,150 --> 00:06:49,280
storms and other effects that we refer
to as space weather however in about the

91
00:06:49,280 --> 00:06:53,570
last ten years or so there's been this
growing body of evidence that the upper

92
00:06:53,570 --> 00:06:58,190
atmosphere is also affected by what's
going on below like the terrestrial

93
00:06:58,190 --> 00:07:02,450
weather which is the weather that we
experience every day here on earth so

94
00:07:02,450 --> 00:07:08,900
for example tsunamis create waves in the
air and those waves move upwards and the

95
00:07:08,900 --> 00:07:13,310
waves could potentially cause changes
even at the very boundaries between the

96
00:07:13,310 --> 00:07:20,060
earth and space and so cold is studying
in particular the how to tease out the

97
00:07:20,060 --> 00:07:24,110
effects coming from the Sun above and
the earth below and NASA actually has

98
00:07:24,110 --> 00:07:28,760
two upcoming missions studying this sort
of science one is called Ikon and the

99
00:07:28,760 --> 00:07:33,560
other of course is gold that we're
talking about here today so we learned a

100
00:07:33,560 --> 00:07:38,150
little bit here about what gold
specifically will be studying that's

101
00:07:38,150 --> 00:07:41,990
what we're talking about today our new
mission goal to study the lowest reaches

102
00:07:41,990 --> 00:07:45,350
of space another sort of interesting
thing about gold we'll be talking about

103
00:07:45,350 --> 00:07:50,390
it more as we go on is that this is
actually the first time NASA has put an

104
00:07:50,390 --> 00:07:54,890
instrument like a sorry omission like
this onto a commercial satellite so

105
00:07:54,890 --> 00:07:58,040
we'll be hearing a little more about
that as we go on but in the meantime

106
00:07:58,040 --> 00:08:04,760
let's talk again to Richard Richard East
is coming on to discuss what are you

107
00:08:04,760 --> 00:08:06,950
gonna do with this information so there
you are you get all these great

108
00:08:06,950 --> 00:08:13,520
observations what happens next well the
data we'll be taking these pictures and

109
00:08:13,520 --> 00:08:17,300
using them to help us understand pieces
that basically help us piece the puzzle

110
00:08:17,300 --> 00:08:20,750
together it's a big piece of the puzzle
we haven't had before so there's this

111
00:08:20,750 --> 00:08:24,110
global context it'll also help us put
other pieces of the puzzle that we

112
00:08:24,110 --> 00:08:27,320
already have and just don't know where
they fit you'll help us understand who

113
00:08:27,320 --> 00:08:31,610
are those fit together how it all fits
together so that it will use this what

114
00:08:31,610 --> 00:08:36,140
we learn to develop better models of the
upper atmosphere we have some really

115
00:08:36,140 --> 00:08:39,349
good models now but there we know
they're not adequate we know that they

116
00:08:39,349 --> 00:08:45,380
they fail in a limited timeframe just a
day or so is we can't

117
00:08:45,380 --> 00:08:49,460
very far and predicting what's going to
happen so hope what we plan to do with

118
00:08:49,460 --> 00:08:53,050
this is use those to help us improve the
models and improve our understanding

119
00:08:53,050 --> 00:08:59,870
what antastic so here you are today we
are talking about our newest mission

120
00:08:59,870 --> 00:09:04,880
gold I'm standing here right now at NASA
Goddard in Greenbelt Maryland we are

121
00:09:04,880 --> 00:09:08,120
taking your questions we're gonna be
answering them throughout the show so

122
00:09:08,120 --> 00:09:11,690
please go ahead and put them in the
comments you can use hashtag ask NASA we

123
00:09:11,690 --> 00:09:16,850
will be tracking them we've been talking
about this region of space and we were

124
00:09:16,850 --> 00:09:20,090
talking about how dynamic it is but I
want to give you a bit more of a tour

125
00:09:20,090 --> 00:09:23,870
really give you a sense of geographical
location and what is going on and we

126
00:09:23,870 --> 00:09:28,990
have a special movie for everybody to
look at so we can roll that next

127
00:09:33,820 --> 00:09:40,670
longing for more space open sky is an
exotic travel then look up about 30 to

128
00:09:40,670 --> 00:09:48,110
600 miles straight up at the ionosphere
Earth's interface to space nestled far

129
00:09:48,110 --> 00:09:52,880
above the clouds but below outer space
this little understood destination

130
00:09:52,880 --> 00:09:59,060
invites you to explore its many features
experience both the weather from Earth

131
00:09:59,060 --> 00:10:05,300
and the weather from space marvel at the
ballet of radio waves and navigation

132
00:10:05,300 --> 00:10:12,650
signals like GPS leaping through this
particle paradise sit back relax and

133
00:10:12,650 --> 00:10:17,870
take in the Aurora some satellites and
the International Space Station as they

134
00:10:17,870 --> 00:10:23,480
sail by and you'll want your camera
handy for one of the region's signature

135
00:10:23,480 --> 00:10:29,210
features bright and colourful air glow
this daily show is made possible by the

136
00:10:29,210 --> 00:10:33,170
ionosphere Zone swirling charged
particles because that's what the

137
00:10:33,170 --> 00:10:37,630
ionosphere is it's all charged particles

138
00:10:37,630 --> 00:10:43,730
hello and welcome back we are here today
at NASA Goddard talking about NASA's

139
00:10:43,730 --> 00:10:47,870
newest mission gold which will be
studying that region of space you just

140
00:10:47,870 --> 00:10:53,330
heard about the ionosphere I have with
me Alex Young who is a Helio physicist

141
00:10:53,330 --> 00:10:57,500
here at NASA Goddard and he's going to
give us a little more explanation how

142
00:10:57,500 --> 00:11:02,600
does this ionosphere fit into the
biggest the bigger picture but NASA is

143
00:11:02,600 --> 00:11:08,120
studying about space yeah so let's talk
about what is Helio physics so studying

144
00:11:08,120 --> 00:11:11,780
the ionosphere as part of this bigger
area called Helio physics and Helio

145
00:11:11,780 --> 00:11:15,680
physics is centered around the Sun but
it's much more than just the study of

146
00:11:15,680 --> 00:11:20,839
the Sun so we've got a diagram here
that's showing you all of the energy

147
00:11:20,839 --> 00:11:25,780
light matter and magnetic and electric
fields that are coming off of the Sun

148
00:11:25,780 --> 00:11:29,779
filling the solar system and here's
showing them interacting with the earth

149
00:11:29,779 --> 00:11:34,310
but they in fact interact with every
part of the solar system every planet

150
00:11:34,310 --> 00:11:40,400
every object and this all creates a
great system that we call the

151
00:11:40,400 --> 00:11:45,440
heliosphere and so studying the
ionosphere is one of those parts of this

152
00:11:45,440 --> 00:11:49,280
bigger system
understanding this tells us about the

153
00:11:49,280 --> 00:11:53,840
fundamental processes that are happening
on many different scales from the

154
00:11:53,840 --> 00:11:58,280
smallest scales for the particles in the
fields all the way to the size of the

155
00:11:58,280 --> 00:12:04,880
planets and the Sun itself and all of
this creates this dynamic space that

156
00:12:04,880 --> 00:12:09,920
we're talking about and this is what
makes this non empty space it's all of

157
00:12:09,920 --> 00:12:13,550
the stuff coming off the Sun interacting
with everything in the solar system and

158
00:12:13,550 --> 00:12:18,830
the reason that it's really important is
not only is it telling us about

159
00:12:18,830 --> 00:12:23,930
fundamental science which is pertinent
not just to what happens here in our

160
00:12:23,930 --> 00:12:29,210
solar system but in fact other solar
systems exoplanet systems but also all

161
00:12:29,210 --> 00:12:36,260
of this energy and matter interacts with
our technology so as Richard and Sarah

162
00:12:36,260 --> 00:12:39,110
have mentioned this interact with our
technology when we talk about the

163
00:12:39,110 --> 00:12:44,870
ionosphere and in fact even farther out
and the magnetosphere of the earth or

164
00:12:44,870 --> 00:12:49,220
even in the broadest parts of the
heliosphere all this stuff and all of

165
00:12:49,220 --> 00:12:54,020
this non empty space is messing with
technology it's interacting with

166
00:12:54,020 --> 00:12:58,790
spacecraft sometimes disrupting them and
it even creates a really nasty

167
00:12:58,790 --> 00:13:02,960
environment for astronauts so
understanding that is important also for

168
00:13:02,960 --> 00:13:07,370
space travel near the earth and through
the rest of the solar system so that's

169
00:13:07,370 --> 00:13:11,600
the bigger picture of heliophysics so
with that I have a good question for you

170
00:13:11,600 --> 00:13:15,590
that we got and we are taking your
questions you can use hashtag ask NASA

171
00:13:15,590 --> 00:13:20,030
we have a perfect one that segues right
into this the question is Jay from

172
00:13:20,030 --> 00:13:24,230
Facebook asks how do the results of this
mission contribute to space weather

173
00:13:24,230 --> 00:13:29,900
prediction well that's a great question
because and and even Sarah and Richard

174
00:13:29,900 --> 00:13:34,810
both hinted that this understanding this
interaction is telling us about the

175
00:13:34,810 --> 00:13:40,940
fundamental physics interactions of
plasmas which are this ionized gas also

176
00:13:40,940 --> 00:13:45,050
with neutral gases that actually happens
in many different environments

177
00:13:45,050 --> 00:13:49,190
throughout the socialism even on the Sun
itself so that fundamental physics is

178
00:13:49,190 --> 00:13:56,540
really important but it it tells us
about how our technology how radio waves

179
00:13:56,540 --> 00:14:00,010
interact with its ever-changing
atmosphere so

180
00:14:00,010 --> 00:14:05,200
understanding this is really critical
for us as we continue to expand all the

181
00:14:05,200 --> 00:14:10,300
technology that we use in our society
and understanding this atmosphere tells

182
00:14:10,300 --> 00:14:15,210
us about other atmospheres other planets
in our solar system and exoplanets

183
00:14:15,210 --> 00:14:20,380
fantastic we have some more questions
that we will be taking right now I am

184
00:14:20,380 --> 00:14:30,370
going to throw this one to Richard
welcome this one is from Kevin from

185
00:14:30,370 --> 00:14:34,300
Facebook is there anything in particular
we are looking for in this mission

186
00:14:34,300 --> 00:14:37,630
something specific specific or is it
just more of a general understanding of

187
00:14:37,630 --> 00:14:40,380
the region
well one of the things we're looking for

188
00:14:40,380 --> 00:14:45,250
is for years we've had information about
the oxygen and nitrogen about the

189
00:14:45,250 --> 00:14:50,500
composition of the upper atmosphere we
haven't had really images of we have an

190
00:14:50,500 --> 00:14:53,530
images of those but we haven't had
images of the temperature and the

191
00:14:53,530 --> 00:14:57,250
combination of those two is what makes
the is really so useful to us because

192
00:14:57,250 --> 00:15:02,260
those are really key pieces of
understanding the puzzle of the upper

193
00:15:02,260 --> 00:15:05,860
atmosphere and we have both of those
that's really what the thrust of this is

194
00:15:05,860 --> 00:15:09,970
is to look at that's at the interaction
between those see how those change over

195
00:15:09,970 --> 00:15:13,930
time can be able to watch them
throughout a day to see how that evolves

196
00:15:13,930 --> 00:15:18,340
because our previous missions have
either been very limited in the location

197
00:15:18,340 --> 00:15:22,240
they could cover or they have been very
limited in the amount of time coverage

198
00:15:22,240 --> 00:15:25,420
they can provide us and we know that the
ah perhaps there changes on the order of

199
00:15:25,420 --> 00:15:30,730
an hour very has really large changes in
the order of an hour but we've only been

200
00:15:30,730 --> 00:15:35,110
able to revisit at the cadence of
several hours previously for satellites

201
00:15:35,110 --> 00:15:39,310
so that's that's really the thrust of
the of key piece of what the mission is

202
00:15:39,310 --> 00:15:43,210
doing thank you we are getting lots of
questions in and we are gonna keep

203
00:15:43,210 --> 00:15:47,110
answering them throughout the show but
we're gonna take a break now to move on

204
00:15:47,110 --> 00:15:51,490
to something else very interesting about
gold I mentioned earlier that this is

205
00:15:51,490 --> 00:15:54,820
one of the first it is the first time
that NASA has a mission up on a

206
00:15:54,820 --> 00:15:58,480
commercial satellite and to talk a
little bit more about that we have Todd

207
00:15:58,480 --> 00:16:04,230
Gossett who is joining us to just he is
here from SES Government Solutions

208
00:16:04,230 --> 00:16:09,550
welcome so what this is what gold is is
what's called a hosted payload and Todd

209
00:16:09,550 --> 00:16:14,160
is in charge of hosted payloads so
tell us a little bit about that what how

210
00:16:14,160 --> 00:16:17,100
are we catching this right okay well
first of all I want to explain just a

211
00:16:17,100 --> 00:16:21,180
little bit about what a hosted payload
is it's a piece of space hardware it's a

212
00:16:21,180 --> 00:16:25,830
mission as you were that is has a
function of purpose may be an operating

213
00:16:25,830 --> 00:16:29,370
organization that is distinct and
different from that of the host

214
00:16:29,370 --> 00:16:35,730
spacecraft so for for SCS 14 in gold
gold is operated by university Colorado

215
00:16:35,730 --> 00:16:40,230
on behalf of NASA it's doing the science
mission SCS 14 is owned and operated by

216
00:16:40,230 --> 00:16:45,960
SES we're providing C&K obeying
communications over the Americas over

217
00:16:45,960 --> 00:16:49,250
the transatlantic region with that
satellite so separate and complete

218
00:16:49,250 --> 00:16:55,950
missions further why use these well a
company like SES which opera owns and

219
00:16:55,950 --> 00:16:59,910
operates a dozens of satellites we have
to sustain that fleet and we do that by

220
00:16:59,910 --> 00:17:04,200
procuring and launching on average of
about three satellites per year each of

221
00:17:04,200 --> 00:17:08,910
those satellites affords a a rideshare
opportunity a hitching a ride

222
00:17:08,910 --> 00:17:14,190
opportunity for hosted payload as we're
able to most of the time provide excess

223
00:17:14,190 --> 00:17:19,170
size weight and power that real estate
onboard a spacecraft to a hosted payload

224
00:17:19,170 --> 00:17:22,950
customer and further a hosted payload
customer can also take advantage of our

225
00:17:22,950 --> 00:17:27,420
infrastructure our the the ground
centers that we have set up to command

226
00:17:27,420 --> 00:17:31,260
and control the satellite the
communication services the fiber the

227
00:17:31,260 --> 00:17:34,740
ground stations that we use to move data
around on behalf of our satellite

228
00:17:34,740 --> 00:17:39,000
communications customers etc what does
all this mean well a host of payload

229
00:17:39,000 --> 00:17:43,440
customer can oftentimes use a hosted
payload to save tons of money up to

230
00:17:43,440 --> 00:17:47,310
hundreds of million dollars versus
procuring a dedicated satellite on their

231
00:17:47,310 --> 00:17:52,730
own fantastic
uh tell me a little bit more about how

232
00:17:52,730 --> 00:17:57,830
we even get that instrument up into
space coordinate with SES I said before

233
00:17:57,830 --> 00:18:03,110
sorry I said before that the University
of Central Florida is the lead

234
00:18:03,110 --> 00:18:07,010
institution and it was built at the
University of Colorado's last laboratory

235
00:18:07,010 --> 00:18:12,019
so from there it has to get all the way
up into space and maybe you can walk us

236
00:18:12,019 --> 00:18:16,070
through that process I I just realized I
have one mother important thing to say

237
00:18:16,070 --> 00:18:19,419
and I've cut you off again I'm sorry but
I want to say thank you to our

238
00:18:19,419 --> 00:18:24,620
livestream watchers we have actually
just gotten our stream up on Facebook

239
00:18:24,620 --> 00:18:27,860
and I really appreciate you guys
sticking with us and welcome and stick

240
00:18:27,860 --> 00:18:31,070
with us we've got interesting stuff to
talk about today and now back to you

241
00:18:31,070 --> 00:18:34,909
okay so we left off University of
Colorado laboratory for atmospheric and

242
00:18:34,909 --> 00:18:39,200
space physics built the gold payload
they finished it up around the end of

243
00:18:39,200 --> 00:18:44,269
2016 and they shipped it to Toulouse
France to the Airbus facility now as an

244
00:18:44,269 --> 00:18:49,549
aside Airbus is our contractor for STS
14 they built a satellite for us also

245
00:18:49,549 --> 00:18:56,149
they integrated the gold hosted payload
on to SCS 14 in April of last year and I

246
00:18:56,149 --> 00:18:59,809
think I've got a graphic here this is an
artist's depiction but this shows gold

247
00:18:59,809 --> 00:19:04,789
the instrument on on top of the nadir
deck surrounded completely by SES 14s

248
00:19:04,789 --> 00:19:10,179
mission which is communications so
that's how it got there and in the

249
00:19:10,179 --> 00:19:13,639
throughout the spring and summer and
into the fall the satellite when

250
00:19:13,639 --> 00:19:17,419
underwent what we call assembly
integration and test in Toulouse that

251
00:19:17,419 --> 00:19:21,320
basically finishes construction of the
satellite and also test it out to make

252
00:19:21,320 --> 00:19:25,399
sure it meets our requirements not only
do we make sure we meet our requirements

253
00:19:25,399 --> 00:19:29,960
but there's a compatibility testing that
goes on as a part of this where we made

254
00:19:29,960 --> 00:19:34,519
sure that SES 14 would do no harm to the
gold mission and vice versa that gold

255
00:19:34,519 --> 00:19:38,929
would do no harm to the SES 14 mission
we finished all that up in the fall and

256
00:19:38,929 --> 00:19:44,120
the satellite was packed up and
transported to kuru French Guiana in

257
00:19:44,120 --> 00:19:47,149
December and I think we have a graphic
real quick to show where Kourou French

258
00:19:47,149 --> 00:19:53,240
Guiana is this is the location of the
Guiana Space Centre which is where re &

259
00:19:53,240 --> 00:19:58,100
Spas which is a European company
launches their satellites from launches

260
00:19:58,100 --> 00:20:01,159
of rockets from and this is the launch
infrastructure here to the northwest of

261
00:20:01,159 --> 00:20:05,780
carew satellite was packed up
transported like I said on the 22nd

262
00:20:05,780 --> 00:20:08,870
December arrived in kuru as you can see
here it's being unloaded from the

263
00:20:08,870 --> 00:20:12,830
Antonov aircraft which we contract to
move our satellites around and it's

264
00:20:12,830 --> 00:20:18,170
currently being processed in kuru for a
January 25th launch on an Ariane 5

265
00:20:18,170 --> 00:20:25,970
rocket fantastic and then what happens
next it goes into space exactly January

266
00:20:25,970 --> 00:20:32,360
25th the launch occurs and the Ariane 5
will give SCS 14 and gold a ride to what

267
00:20:32,360 --> 00:20:36,050
we call transfer orbit and over the next
few months that orbit will be

268
00:20:36,050 --> 00:20:40,180
increasingly raised up to its
geostationary spot its final

269
00:20:40,180 --> 00:20:44,360
geostationary spot is going to be at
forty seven point five degrees west over

270
00:20:44,360 --> 00:20:48,200
Brazil in which it'll do those cadets a
light communications mission that I

271
00:20:48,200 --> 00:20:53,960
mentioned earlier but even more interest
to us today is that's when we turn gold

272
00:20:53,960 --> 00:20:57,620
on and put it through its commissioning
process so it'll start its mission for

273
00:20:57,620 --> 00:21:00,950
the next couple of years so let's talk
about that a little bit more because one

274
00:21:00,950 --> 00:21:04,160
of the things that's so fascinating
about a collaboration like this is that

275
00:21:04,160 --> 00:21:08,690
you need to have an orbit that works
both for this telecom satellite and for

276
00:21:08,690 --> 00:21:13,790
the mission itself for the mission to do
its science right so so transfer into

277
00:21:13,790 --> 00:21:17,660
that tell me what gold can do why does
this soar but work for goal why does it

278
00:21:17,660 --> 00:21:21,440
want to be there okay
well the great thing about this orbit is

279
00:21:21,440 --> 00:21:25,580
just a senior orbit stays above one
location on earth and that allows us to

280
00:21:25,580 --> 00:21:30,440
keep reviewing the same locations on
earth over and over we can do plan to do

281
00:21:30,440 --> 00:21:34,610
this half-hour cadence as we've
mentioned earlier I think and that lets

282
00:21:34,610 --> 00:21:39,380
us follow the evolution in time
throughout the day of the of the upper

283
00:21:39,380 --> 00:21:44,150
atmosphere previous missions from low
Earth orbit we have difficulty areas and

284
00:21:44,150 --> 00:21:48,230
we can't tell between changes in time
and changes locations as we're

285
00:21:48,230 --> 00:21:51,800
revisiting different locations
throughout the day and at different

286
00:21:51,800 --> 00:21:54,860
times we don't know which this is really
their source of the change and we know

287
00:21:54,860 --> 00:21:59,600
that both of those things influence what
we're observing so that's the really

288
00:21:59,600 --> 00:22:03,410
great thing about gold and also smart
enough wait let's just view a hemisphere

289
00:22:03,410 --> 00:22:09,650
gets us a large-scale global scale view
from above instrument let's follow up on

290
00:22:09,650 --> 00:22:13,809
this we have a good question that's come
in this is from Kimberly Underwood

291
00:22:13,809 --> 00:22:17,469
and they're asking how do the launching
on a commercial satellite come about for

292
00:22:17,469 --> 00:22:20,889
gold how did that even happen I know you
guys haven't you have been talking to us

293
00:22:20,889 --> 00:22:24,609
for a while can you tell us a little bit
about some of the initial conversation

294
00:22:24,609 --> 00:22:31,570
in the spark there well okay the initial
conversation was I was looking for a

295
00:22:31,570 --> 00:22:35,859
ride actually and that's a call of a few
satellite companies looking for see

296
00:22:35,859 --> 00:22:39,460
who's willing to whose interests who has
satellites and who has who's flying them

297
00:22:39,460 --> 00:22:42,460
and I realized that communications
companies are flying lots of satellites

298
00:22:42,460 --> 00:22:45,700
that was a place to go so we started
talking to some of the communication

299
00:22:45,700 --> 00:22:49,389
satellites companies including SES and
it evolved from there and they were very

300
00:22:49,389 --> 00:22:53,259
helpful very really great to work with
it's been a really good experience for

301
00:22:53,259 --> 00:22:58,419
all of us that's great we are continuing
to take your questions we are here at

302
00:22:58,419 --> 00:23:04,559
NASA Goddard talking about gold
the newest mission launching in January

303
00:23:04,559 --> 00:23:11,469
from French Guiana and in addition to
taking your questions we are continue to

304
00:23:11,469 --> 00:23:17,019
talk about what gold can do you just
gave us this information about what it

305
00:23:17,019 --> 00:23:19,869
can do from its orbit he talked just a
little about the instrument how is it

306
00:23:19,869 --> 00:23:22,710
scanning what is it seeing what's going
on there okay

307
00:23:22,710 --> 00:23:28,570
what it's doing is it scans it's just
like a spectrograph so it guess actually

308
00:23:28,570 --> 00:23:32,200
separates the different wavelengths to
light out different colors are light out

309
00:23:32,200 --> 00:23:36,009
and by using the differences in
different how the colors change over

310
00:23:36,009 --> 00:23:42,210
time and how how that what they look
like as far as the colors we can tell

311
00:23:42,210 --> 00:23:46,239
what the composition is upper atmosphere
is how it changes we can also tell what

312
00:23:46,239 --> 00:23:50,859
the temperature that the atmosphere is
doing and and at night actually we can

313
00:23:50,859 --> 00:23:54,279
see the nighttime air glow so we can see
the structure in the air glow and it

314
00:23:54,279 --> 00:23:57,249
will see the structure in the daytime
too so it's just it scans across the

315
00:23:57,249 --> 00:24:03,099
earth and half an hour cadence and by
combining those those of individual

316
00:24:03,099 --> 00:24:07,089
pictures as we go across we get a
picture of the whole earth and that

317
00:24:07,089 --> 00:24:10,210
cadence so we can use that to tell us
what the temperature in the car give us

318
00:24:10,210 --> 00:24:13,330
pictures of the temperature in
composition and other information about

319
00:24:13,330 --> 00:24:16,779
the upper atmosphere so this is one of
the things that I find particularly

320
00:24:16,779 --> 00:24:22,269
interesting you're talking about these
30 minute scans of the entire disk but

321
00:24:22,269 --> 00:24:27,260
it can be flexible too right it can it
can zoom in it can do faster

322
00:24:27,260 --> 00:24:32,120
one of the things that's so useful about
that is we can coordinate with other

323
00:24:32,120 --> 00:24:35,390
missions and other things that are
looking at the ionosphere and Sarah

324
00:24:35,390 --> 00:24:37,940
Jones recently mentioned at the
beginning of this show that we have

325
00:24:37,940 --> 00:24:42,710
another mission coming up this year
later in 2018 is called the ionosphere a

326
00:24:42,710 --> 00:24:47,330
connection Explorer or icon tell us more
about that how can these two play

327
00:24:47,330 --> 00:24:50,630
together
sure well the Icahn mission is launching

328
00:24:50,630 --> 00:24:55,370
later this year and it consists of a
suite of instruments that will be flying

329
00:24:55,370 --> 00:24:59,179
in low Earth orbit studying a science
that's very similar to what gold is

330
00:24:59,179 --> 00:25:02,960
studying but of course from a different
vantage point low Earth orbit is the

331
00:25:02,960 --> 00:25:08,420
type of orbit that the ISS flies in and
this is right within the upper

332
00:25:08,420 --> 00:25:12,410
atmosphere that we've been talking about
so Ikon will be flying through that very

333
00:25:12,410 --> 00:25:17,900
region directly measuring the particles
there and how they move that means the

334
00:25:17,900 --> 00:25:23,540
Ikon will be getting a very localized
view with fine scales in contrast with

335
00:25:23,540 --> 00:25:29,179
gold which is hovering 22,000 miles
above seeing the whole global scale and

336
00:25:29,179 --> 00:25:33,980
watching everything play out below so
these two missions are very very

337
00:25:33,980 --> 00:25:37,880
complementary and they'll give
scientists a more comprehensive picture

338
00:25:37,880 --> 00:25:42,679
of what's going on here from the global
scales all the way down to meter skills

339
00:25:42,679 --> 00:25:47,510
now Karen mentioned that Ikon is an
Explorer mission and that's actually

340
00:25:47,510 --> 00:25:52,250
part of the Explorer line of missions do
you want to talk about that Alex yeah so

341
00:25:52,250 --> 00:25:57,910
that's a really cool line that NASA has
the Explorer program and it is both

342
00:25:57,910 --> 00:26:02,600
missions that have their own dedicated spacecraft or what's called a mission of

343
00:26:02,600 --> 00:26:06,500
opportunity like gold where in this case we've actually for the first time have

344
00:26:06,500 --> 00:26:11,900
it on a private spacecraft and the cool thing about Explorer missions is they're

345
00:26:11,900 --> 00:26:19,429
designed to be very nimble very quick to come around relatively low cost but

346
00:26:19,429 --> 00:26:25,280
specifically they're designed to answer very specific questions very very

347
00:26:25,280 --> 00:26:30,320
focused scientific questions and so they're a very important part of the

348
00:26:30,320 --> 00:26:34,460
line of missions that nASA has in heliophysics and actually also in

349
00:26:34,460 --> 00:26:40,460
astrophysics and all of these different missions are addressing different part

350
00:26:40,460 --> 00:26:45,529
of kind of the bigger piece as we talked about before of the puzzle of all the

351
00:26:45,529 --> 00:26:51,889
different things that are happening in the in the heliophysics system thank you

352
00:26:51,889 --> 00:26:56,330
guys so much I'm really enjoying this
today we are taking your questions we

353
00:26:56,330 --> 00:27:00,649
are getting so many questions about the
collaboration with the commercial

354
00:27:00,649 --> 00:27:03,440
satellite and I promise you we're going
to get to those there's some good ones

355
00:27:03,440 --> 00:27:07,850
coming in in the meantime you can keep
asking questions by using the hashtag

356
00:27:07,850 --> 00:27:13,730
ask NASA I have a couple of questions
now I've got a nice easy one for you

357
00:27:13,730 --> 00:27:18,860
Richard okay what does the limb and disk
part of a title name

358
00:27:18,860 --> 00:27:24,830
okay the limb is the disk is looking
down at the earth sort of the the most

359
00:27:24,830 --> 00:27:28,309
of the earth that you're seeing the limb
is just the horizon sort of the edge of

360
00:27:28,309 --> 00:27:30,950
the earth when you're a geostationary
orbit or actually can be not at

361
00:27:30,950 --> 00:27:34,070
geostationary but you still see the limb
so that's the best of difference the

362
00:27:34,070 --> 00:27:39,259
limb is is we're all we're seeing there
is is we see up in the atmosphere we can

363
00:27:39,259 --> 00:27:42,980
look at stellar occultation so we can
look at altitude profiles of emissions

364
00:27:42,980 --> 00:27:46,940
but the disk was is where we if there
are actually sort of pictures of what's

365
00:27:46,940 --> 00:27:53,809
happening on earth also getting a
question from jane on instagram who asks

366
00:27:53,809 --> 00:28:03,559
will gold be able to detect the effects
of solar flare oh yes yeah the airglow

367
00:28:03,559 --> 00:28:08,749
that we're looking at that's responsible
and the nighttime air glow or the

368
00:28:08,749 --> 00:28:14,059
daytime air glow both respond to what's
happening in the Sun so the solar flares

369
00:28:14,059 --> 00:28:18,049
will influence those we'll see very
quickly that the daytime angular will

370
00:28:18,049 --> 00:28:23,090
see the changes so that's actually
really cool it's really exciting we've

371
00:28:23,090 --> 00:28:29,690
had a lot of really nice discoveries
recently you know we see oscillations

372
00:28:29,690 --> 00:28:34,070
and solar flares we see that an x-ray
light that comes from the Sun and

373
00:28:34,070 --> 00:28:37,759
recently for the first time we've
started to see those corresponding

374
00:28:37,759 --> 00:28:43,460
oscillations directly connected in the
ionosphere so having more observation of

375
00:28:43,460 --> 00:28:49,090
the atmosphere is really really cool for
seeing this Sun Earth connection in an

376
00:28:49,090 --> 00:28:54,960
away it's exciting one more now though
you can keep asking questions by saying

377
00:28:54,960 --> 00:29:00,490
ask nasha and your hashtag or including
it in the comments below again we are

378
00:29:00,490 --> 00:29:04,990
talking from NASA Goddard about gold
NASA's mission which we'll be launching

379
00:29:04,990 --> 00:29:12,880
at the end of January to study the
interface to space the boundary to space

380
00:29:12,880 --> 00:29:16,960
we have this overlaps with the upper
atmosphere we've talked about how it's

381
00:29:16,960 --> 00:29:20,020
also going to take into consideration
terrestrial weather so we have one last

382
00:29:20,020 --> 00:29:24,790
question for this round and that's Alex
from Twitter who would like to know will

383
00:29:24,790 --> 00:29:29,080
gold improve weather forecasting on
earth

384
00:29:29,080 --> 00:29:35,050
I don't sorry as we know we will not
improve weather forecasting on earth but

385
00:29:35,050 --> 00:29:38,530
the weather forecasting on earth will be
able to we can use that to improve the

386
00:29:38,530 --> 00:29:43,110
weather forecasting in space its way
it's going to work all right fantastic

387
00:29:43,110 --> 00:29:46,780
I'm gonna ask some questions now it's my
turn

388
00:29:46,780 --> 00:29:54,730
all right what I want to know is Richard
what is the thing you're most excited

389
00:29:54,730 --> 00:29:58,120
about you've been with this mission for
a long time it's about to launch what

390
00:29:58,120 --> 00:30:03,190
are you most excited about
I think getting data that's after after

391
00:30:03,190 --> 00:30:06,820
working on this for a lot of several
years I won't go ahead and have any it's

392
00:30:06,820 --> 00:30:10,480
exciting to get data it I think it's
also interesting to get you know it's

393
00:30:10,480 --> 00:30:14,740
fundamental a parameter fundamental of a
piece of information as temperature is

394
00:30:14,740 --> 00:30:17,860
we've never had pictures of the
temperature in the upper atmosphere and

395
00:30:17,860 --> 00:30:20,950
that's you know just it just as
important just because you know the

396
00:30:20,950 --> 00:30:24,550
temperature in California doesn't know
you mean you know the temperature in DC

397
00:30:24,550 --> 00:30:27,460
it's just as important in the upper
atmosphere to understand what those

398
00:30:27,460 --> 00:30:31,570
temperature differences are and we will
finally have that so I'm looking forward

399
00:30:31,570 --> 00:30:35,650
to that fantastic everybody's gonna get
their turn here so get ready for your

400
00:30:35,650 --> 00:30:40,690
answers Sarah what is the thing that is
most exciting for you about this mission

401
00:30:40,690 --> 00:30:45,730
okay well one of the things that I'm
excited about is this opportunity that

402
00:30:45,730 --> 00:30:50,290
we talked about for the gold and icon
missions to work together and being able

403
00:30:50,290 --> 00:30:54,340
to for the first time get a really
global scale of view and a fine scale

404
00:30:54,340 --> 00:30:58,180
local view at the same time and like
Richard said much faster than we ever

405
00:30:58,180 --> 00:31:02,440
have before like getting a picture of
the global scale every 30 minutes

406
00:31:02,440 --> 00:31:06,100
and that's really gonna let us look at
day-to-day effects in addition to the

407
00:31:06,100 --> 00:31:12,000
longer-term effects that we looked at in
the past all right that brings us to

408
00:31:12,000 --> 00:31:16,060
Alex young what are you most looking
forward to what are you most excited

409
00:31:16,060 --> 00:31:20,530
about with this mission well I'm excited
actually it's kind of an extension of

410
00:31:20,530 --> 00:31:25,390
what Sarah said so the cool thing about
the combo between icon and gold is the

411
00:31:25,390 --> 00:31:30,580
the fact that we're getting this global
view that's actually remote sensing and

412
00:31:30,580 --> 00:31:34,420
then where I have the in situ view we're
actually sending something through it so

413
00:31:34,420 --> 00:31:39,580
that's icon flying through it and that's
one of the most important ways that we

414
00:31:39,580 --> 00:31:43,510
have to do heliophysics we have all
these different places in the solar

415
00:31:43,510 --> 00:31:47,950
system in the heliosphere and we have
some spacecraft that are looking at a

416
00:31:47,950 --> 00:31:52,210
distance they're giving us this remote
sensing view and some where we're

417
00:31:52,210 --> 00:31:58,450
actually flying spacecraft through it to
basically scoop up particles and that is

418
00:31:58,450 --> 00:32:04,300
part of the bigger heliophysics fleet so
these two missions goldeneye con are

419
00:32:04,300 --> 00:32:08,460
actually part of this bigger picture so
we have this graphic here that's showing

420
00:32:08,460 --> 00:32:15,340
all of the different missions of what we
call the heliophysics feat or even the

421
00:32:15,340 --> 00:32:19,030
great heliophysics observatory because
really all these different missions are

422
00:32:19,030 --> 00:32:25,570
part of one giant observatory and
they're showing us the Sun both inside

423
00:32:25,570 --> 00:32:30,100
and out all of the stuff that is that is
creating this space and then they're

424
00:32:30,100 --> 00:32:33,520
showing all these different environments
the ionosphere is we've talked about

425
00:32:33,520 --> 00:32:38,530
moving farther out the magnetosphere of
the earth the magnetosphere is an

426
00:32:38,530 --> 00:32:43,270
ionosphere of other planets which can be
vastly different and how all these

427
00:32:43,270 --> 00:32:49,180
things interact as well as the broadest
regions of our local space to the very

428
00:32:49,180 --> 00:32:54,100
edge with even spacecraft like Voyager
which you've now flown out outside of

429
00:32:54,100 --> 00:32:59,140
our solar system and are starting to
touch interstellar matter interstellar

430
00:32:59,140 --> 00:33:05,050
medium so that to me seeing these all
these different viewpoints and pieces

431
00:33:05,050 --> 00:33:11,080
come together to give us that global
scale view is really what's so exciting

432
00:33:11,080 --> 00:33:15,129
and
and last but not least we have Todd

433
00:33:15,129 --> 00:33:20,440
Gossett from SES Government Solutions to
tell us what he finds most interesting

434
00:33:20,440 --> 00:33:26,589
about the upcoming not interesting most
exciting about the upcoming gold launch

435
00:33:26,589 --> 00:33:30,789
in January from French Guiana okay what
what I'm most excited about an SES is

436
00:33:30,789 --> 00:33:35,619
most excited about is is getting SES 14
with a hosted payload as partnership

437
00:33:35,619 --> 00:33:39,969
that we had with NASA we have with NASA
into orbit finally Hardware in space is

438
00:33:39,969 --> 00:33:45,369
awesome SES has been working with with
Richard and the Gold team for the good

439
00:33:45,369 --> 00:33:49,359
part of a decade
dozens of people company-wide and now we

440
00:33:49,359 --> 00:33:52,479
finally get to realize the fruits of
that labor and demonstrate this

441
00:33:52,479 --> 00:33:59,079
commercial partnership with the US
government fantastic it's gonna be an

442
00:33:59,079 --> 00:34:02,499
exciting mission we have a bunch more
questions and we're going to start going

443
00:34:02,499 --> 00:34:07,029
through them I'm going to keep you guys
up here and we will ask each of you the

444
00:34:07,029 --> 00:34:10,569
appropriate questions again you can
still leave them for us use the hash tag

445
00:34:10,569 --> 00:34:15,279
ask NASA or down below we are talking
about this interesting region of space

446
00:34:15,279 --> 00:34:18,399
if you have questions about the science
fair or what's going on or questions

447
00:34:18,399 --> 00:34:22,599
about the mission we're interested in
hearing them a whole bunch we have a

448
00:34:22,599 --> 00:34:25,649
number from some of our press who are
watching as well so we will go through

449
00:34:25,649 --> 00:34:34,240
this we have from Space Flight Insider
what does NASA hope to gain from hosting

450
00:34:34,240 --> 00:34:40,750
a mission aboard a commercial satellite
well really excited about the success of

451
00:34:40,750 --> 00:34:46,029
the gold mission and and how it's been
working out and so I think that Richard

452
00:34:46,029 --> 00:34:50,349
and Todd really talked about what we're
gaining in that case now not every

453
00:34:50,349 --> 00:34:55,539
mission can be a hosted payload some
missions need a special customized bus

454
00:34:55,539 --> 00:34:58,869
others don't
others could potentially fly hosted

455
00:34:58,869 --> 00:35:03,520
payloads and so I think exploring that
space and those options that we have for

456
00:35:03,520 --> 00:35:06,970
getting our instruments into space is
something that we're really excited

457
00:35:06,970 --> 00:35:15,069
about and that we hope to do more
fantastic right we also have I'm gonna

458
00:35:15,069 --> 00:35:21,279
give this one to you Richard this is
from Jean from Twitter okay why couldn't

459
00:35:21,279 --> 00:35:23,440
gold just have been mounted on the
internationalist

460
00:35:23,440 --> 00:35:26,500
station instead of going on a commercial
satellite good question

461
00:35:26,500 --> 00:35:30,250
the international space station of
course is in low-earth orbit so it goes

462
00:35:30,250 --> 00:35:34,180
around it has about a 90 minute orbit so
it doesn't allow us to stay in one over

463
00:35:34,180 --> 00:35:40,000
one location to keep looking and also
it's it's so close to the earth if we

464
00:35:40,000 --> 00:35:45,339
don't get as big of you as wide of you
as we do from geostationary orbit that's

465
00:35:45,339 --> 00:35:49,780
amazing we want to go to geostationary
orbit remind us how high gold is going

466
00:35:49,780 --> 00:35:53,619
to be in its geostationary orbit I think
I've spent twenty two thousand miles is

467
00:35:53,619 --> 00:35:58,690
what it is so it's a quite a ways out
there so it's that's gives us the

468
00:35:58,690 --> 00:36:03,550
perspective that we were looking for you
see almost half the earth essentially

469
00:36:03,550 --> 00:36:09,250
you can't see half the earth from there
fantastic finding some more because

470
00:36:09,250 --> 00:36:15,160
there are a lot this one I will hand off
to Todd what is the actual launch

471
00:36:15,160 --> 00:36:20,980
vehicle it's a five it's a vehicle
provided by a European company called re

472
00:36:20,980 --> 00:36:26,829
& Spas I spelled it re on a are ia any space are in spas and their launch

473
00:36:26,829 --> 00:36:32,890
facility is the guy on Space Center in kuru that we showed earlier I'm gonna

474
00:36:32,890 --> 00:36:40,630
ask you one more question this is from Kendall Russell by a satellite well

475
00:36:40,630 --> 00:36:46,710
benefit for SES is my part of SES s US government solutions we strictly do

476
00:36:46,710 --> 00:36:50,740
business with the US government this is another line of business that we've been

477
00:36:50,740 --> 00:36:56,980
developing for several years it's obviously a source of revenue for the

478
00:36:56,980 --> 00:37:02,640
company but it also extends our partnership with the US government

479
00:37:02,640 --> 00:37:06,760
government beyond just communication services and gets us into new and

480
00:37:06,760 --> 00:37:10,839
interesting areas that could be a potential benefit to the United States

481
00:37:10,839 --> 00:37:18,579
and its partners around the world thank you Carolyn from Twitter asks will

482
00:37:18,579 --> 00:37:23,050
airlines benefit from the gold and icon missions I'm gonna start with you on

483
00:37:23,050 --> 00:37:26,790
that one Sarah unless you want to toss up someone else

484
00:37:31,140 --> 00:37:37,450
absolutely because as was shown in some of the diagrams and animations that

485
00:37:37,450 --> 00:37:42,190
Sarah showed and what both Sarah and Richard have talked about the ionosphere

486
00:37:42,190 --> 00:37:47,079
has a huge influence on radio communications both signals that are

487
00:37:47,079 --> 00:37:51,549
going through the ionosphere as well as signals that we use the ionosphere to

488
00:37:51,549 --> 00:37:54,700
bend to travel around the earth I mean that for example a shortwave radio

489
00:37:54,700 --> 00:37:59,079
that's how we can communicate around the earth using the ionosphere is like a

490
00:37:59,079 --> 00:38:05,260
lens and so when the ionosphere changes and gets disrupted it changes the way

491
00:38:05,260 --> 00:38:10,150
those signals propagate through and around it and that directly affects air

492
00:38:10,150 --> 00:38:17,289
lines in fact it also affects certain
wave bands that are used by navigation

493
00:38:17,289 --> 00:38:26,950
for ships so it is a huge importance for
aviation industry for the maritime

494
00:38:26,950 --> 00:38:31,089
industry and even for the military
because they want to be certain that

495
00:38:31,089 --> 00:38:34,720
their signals are going to get through
that they're always in communication and

496
00:38:34,720 --> 00:38:41,200
so understanding the ionosphere being
able to enrich and improve our models

497
00:38:41,200 --> 00:38:45,130
which are telling us what's happening
over a longer time scale is really

498
00:38:45,130 --> 00:38:51,520
critical so icon and gold are crucial
components to really fleshing that out

499
00:38:51,520 --> 00:38:56,529
and better understanding how this is
going to be impacted this is part of

500
00:38:56,529 --> 00:39:00,880
what we've been talking about right yeah
that FAA is going to a system where they

501
00:39:00,880 --> 00:39:08,770
use GPS to basically help them I guess
manage planes in flight and as they

502
00:39:08,770 --> 00:39:13,059
transition to that if there's times when
they can't be sure they can rely on the

503
00:39:13,059 --> 00:39:17,829
GPS signals that that they're gonna have
to go back to chasten for planes further

504
00:39:17,829 --> 00:39:20,829
apart someone's gonna get lazy sitting
on the ground so of course that

505
00:39:20,829 --> 00:39:23,380
sometimes it'll be necessary but
sometimes if we don't know enough that

506
00:39:23,380 --> 00:39:26,920
would be unnecessary and people be
delayed unnecessarily so it'll

507
00:39:26,920 --> 00:39:30,820
eventually feed into that with NOAA and
FAA

508
00:39:30,820 --> 00:39:35,080
all right we're still going we got a lot
of good questions you can still ask them

509
00:39:35,080 --> 00:39:42,400
hashtag ask NASA we're we're still going
here next one is Cole from Facebook he

510
00:39:42,400 --> 00:39:47,050
wants to know how will gold measurements
be affected by the solar cycle could the

511
00:39:47,050 --> 00:40:00,280
data be interesting during the quiet
period of solar minima but yeah actually

512
00:40:00,280 --> 00:40:05,410
there are certain scientific phenomenon
that are more present during solar

513
00:40:05,410 --> 00:40:09,940
minimum I think isn't that right Richard
and we were able to see that and and so

514
00:40:09,940 --> 00:40:15,910
so looking at the upper atmosphere both
during these dynamic active times and

515
00:40:15,910 --> 00:40:19,780
also seeing the quiet time so that we
can get a baseline understanding of how

516
00:40:19,780 --> 00:40:24,820
the atmosphere is behaving is actually
really important yeah I sort of add to

517
00:40:24,820 --> 00:40:30,010
that I mean it is the case that you know
in some ways we're expecting this to be

518
00:40:30,010 --> 00:40:35,020
a relatively low solar minimum it's the
light the previous solar minimum was

519
00:40:35,020 --> 00:40:40,810
lower than the one before that and this
is actually an opportunity to study you

520
00:40:40,810 --> 00:40:45,160
know a state of the Sun and a state of
what's coming off the Sun in a way that

521
00:40:45,160 --> 00:40:51,280
we couldn't before we've certainly
learned over the past 10 20 years that

522
00:40:51,280 --> 00:40:56,680
space weather is not just these giant
super explosions that happen but in fact

523
00:40:56,680 --> 00:41:01,810
it's the subtle flows and fluctuations
that are happening on the side and so we

524
00:41:01,810 --> 00:41:05,080
really need to understand that during
times of solar minimum not just times

525
00:41:05,080 --> 00:41:09,580
the solar maximum yeah and I'll add that
doing solar minimum accorded the models

526
00:41:09,580 --> 00:41:12,910
as we understand them say that some of
those stuff from the lower atmosphere

527
00:41:12,910 --> 00:41:18,460
will be more of an impact more be easier
to see so it's a benefit to us where the

528
00:41:18,460 --> 00:41:22,420
signals are overall maybe less
yeah actually the some of those signals

529
00:41:22,420 --> 00:41:28,000
will be greater so it's pretty exciting
yeah and you know just from being a you

530
00:41:28,000 --> 00:41:31,030
know studying space weather in general a
lot of people have always thought well

531
00:41:31,030 --> 00:41:34,630
it's solar minimum is gonna be boring
for you you know it's not gonna be all

532
00:41:34,630 --> 00:41:38,710
these flares and CMEs happening but
that's actually not the case you know

533
00:41:38,710 --> 00:41:43,180
it's a not another time to study things
that we couldn't before and to you know

534
00:41:43,180 --> 00:41:46,720
all times
of the cycle are important they all

535
00:41:46,720 --> 00:41:50,140
matter they all have different effects
and we really have to understand them

536
00:41:50,140 --> 00:41:57,450
all to really see the big picture next
one is for me I'm going to answer it

537
00:41:57,450 --> 00:42:01,960
it's Ryan from Facebook and wants to
know how we can watch the launch the

538
00:42:01,960 --> 00:42:06,910
answer is right here on NASA TV we will
be working with SES and Ariane to make

539
00:42:06,910 --> 00:42:10,060
sure we get our own space to make sure
we get some of that food you'll be able

540
00:42:10,060 --> 00:42:14,170
to watch it and we will have information
leading up to the launch as well talking

541
00:42:14,170 --> 00:42:19,060
about gold a little bit more so please
join us for all of that keep asking your

542
00:42:19,060 --> 00:42:26,080
questions below in the comments or using
hashtag ask NASA a question for Richard

543
00:42:26,080 --> 00:42:31,330
Mason from facebook asks how long it
will it take after launch to get data

544
00:42:31,330 --> 00:42:36,480
and will it be publicly available ok
the data will be publicly available

545
00:42:36,480 --> 00:42:40,660
it'll take it takes some time for it to
get into orbit though since we're doing

546
00:42:40,660 --> 00:42:45,100
the orbit as Todd mentioned earlier it's
put into a geostationary transfer orbit

547
00:42:45,100 --> 00:42:49,480
initially from there it has to do a
transfer to a geostationary orbit and

548
00:42:49,480 --> 00:42:54,370
also the satellite has to be checked out
so it'll be as we understand it now

549
00:42:54,370 --> 00:42:58,720
that's scheduled now October the end of
September beginning of October before

550
00:42:58,720 --> 00:43:04,660
the data starts flowing from the goal
instrument and it be able to take the

551
00:43:04,660 --> 00:43:08,110
science team about a month to check out
the data to make sure that they're

552
00:43:08,110 --> 00:43:12,160
understand it there's that the good date
is all good that we've interpreted

553
00:43:12,160 --> 00:43:16,000
things correctly so that's about the
time we'll be getting it will be

554
00:43:16,000 --> 00:43:21,850
available we'll have it available
through a website at UCF and also be

555
00:43:21,850 --> 00:43:28,000
available on the space physics data
facility spdf it's a NASA site that has

556
00:43:28,000 --> 00:43:34,750
it also great looking forward to that we
are running out of questions so if you

557
00:43:34,750 --> 00:43:39,610
want your question asked put it in there
hashtag ask NASA or put it in the

558
00:43:39,610 --> 00:43:44,680
comments below we are still talking
about NASA's newest gold mission but

559
00:43:44,680 --> 00:43:49,330
isn't talking that we'll be looking at
the interface to space the boundary

560
00:43:49,330 --> 00:43:54,640
between our upper atmosphere and space
an area that we care about at NASA

561
00:43:54,640 --> 00:43:57,819
because we've got a lot of stuff going
on in there our radio signals our

562
00:43:57,819 --> 00:44:01,869
satellites and it matters to us but on
earth you have a question okay I won't

563
00:44:01,869 --> 00:44:10,809
ask violets I have a question maybe for
for these two probably it was brought up

564
00:44:10,809 --> 00:44:16,990
in terms of win gold and icon would be
launched if they would be around for the

565
00:44:16,990 --> 00:44:22,019
Eclipse the big total solar eclipse we
just had but since that's not the case

566
00:44:22,019 --> 00:44:26,829
and we do know that eclipses have an
impact on the ionosphere which maybe

567
00:44:26,829 --> 00:44:32,529
we'll talk about so my question to the
two of you have you been sort of

568
00:44:32,529 --> 00:44:38,970
approached by any other eclipse
physicist about future eclipses and

569
00:44:38,970 --> 00:44:43,990
maybe would they get data during another
total solar eclipse that you guys might

570
00:44:43,990 --> 00:44:48,839
be able to use I'm glad you asked that

571
00:44:49,019 --> 00:44:53,109
we've already looked to see when there's
gonna be other eclipses and there's

572

00:44:53,109 --> 00:44:57,609
going to be a one or two during the
prime mission over South America so not

573
00:44:57,609 --> 00:45:00,789
only did we get an eclipse I have an
excuse to go to South America yeah we're

574
00:45:00,789 --> 00:45:06,339
gonna so the 2019 and 2020 eclipses yes
yes fan story but certainly if someone

575
00:45:06,339 --> 00:45:10,809
someone who's interested in science of
eclipses is interested in this data will

576
00:45:10,809 --> 00:45:14,500
be glad to talk to you because we'll
need to do some planning for the

577
00:45:14,500 --> 00:45:18,009
observations make sure we look at the
things that are most productive right

578
00:45:18,009 --> 00:45:22,690
look at right as it as Karen mentioned
earlier the instrument can focus on a

579
00:45:22,690 --> 00:45:27,099
specific area so in that in that during
the Eclipse we would have at least one

580
00:45:27,099 --> 00:45:30,099
of the two channels because there's two
channels at least one maybe both right

581
00:45:30,099 --> 00:45:33,039
and concentrate on the area where the
eclipse is occurring well that's really

582

00:45:33,039 --> 00:45:36,369
exciting
yeah because actually during this past

583
00:45:36,369 --> 00:45:43,000
Eclipse we saw evidence of these waves
propagating into South America from

584
00:45:43,000 --> 00:45:48,670
North America so you possibly would have
seen it yes some some some effect from

585
00:45:48,670 --> 00:45:55,119
it so that's really cool yeah yeah
a lot to look forward to with this

586
00:45:55,119 --> 00:45:58,480
mission I'm now getting back to violet
because I promised I would do violet

587
00:45:58,480 --> 00:46:03,730
violet from Twitter if you're looking
for a bird's eye view how do you tell

588
00:46:03,730 --> 00:46:06,579
the difference between the upper part of
the atmosphere and the lower part of the

589
00:46:06,579 --> 00:46:12,099
atmosphere that's actually a fantastic
question right I mean when I look at the

590
00:46:12,099 --> 00:46:16,749
atmosphere it looks clear it looks blue
when we're looking down from above

591
00:46:16,749 --> 00:46:23,859
actually certain parts of the atmosphere
are composed of of different gases like

592

00:46:23,859 --> 00:46:29,559
hydrogen oxygen nitrogen and when they
get hit by the sun's radiation they glow

593
00:46:29,559 --> 00:46:34,150
in different colors actually so certain
colors will be dominant at certain

594
00:46:34,150 --> 00:46:38,529
altitudes and that's how you can tell
essentially what altitude you're looking

595
00:46:38,529 --> 00:46:42,849
at with a camera that's looking down now
gold is actually looking at far

596
00:46:42,849 --> 00:46:46,779
ultraviolet light which is light that
our eyes can't see but it's the same

597
00:46:46,779 --> 00:46:51,249
situation there there are certain
altitudes that preferentially it emit

598
00:46:51,249 --> 00:46:58,269
that far ultraviolet light it also added
that that part of our light is absorbed

599
00:46:58,269 --> 00:47:03,309
in our lower atmosphere so we know all
the light we're getting is from above

600
00:47:03,309 --> 00:47:10,150
about 60 miles so we sort of by
excluding all that stuff down low you

601
00:47:10,150 --> 00:47:16,890
know not being able to see it then we
know we're seeing the upper atmosphere a

602

00:47:16,890 --> 00:47:22,630
question from mark Koch with historical
airspace news how will Gold's imaging

603
00:47:22,630 --> 00:47:26,400
spectrograph view the ionosphere
differently than previous

604
00:47:26,400 --> 00:47:33,069
instrumentation okay well that the way
the gold Ismet was looking at it it'll

605
00:47:33,069 --> 00:47:36,730
be used some of the same emissions and
some of the same processes so we were

606
00:47:36,730 --> 00:47:40,690
looking at night there's atomic oxygen
is formed during the daytime it

607
00:47:40,690 --> 00:47:44,589
recombines produces oxygen emissions but
the thing that's different about gold is

608
00:47:44,589 --> 00:47:49,299
we'll be able to sit and watch watch it
for hours to see how the atmosphere

609
00:47:49,299 --> 00:47:54,279
balls we'll be able to watch the this
the structures move in the atmosphere

610
00:47:54,279 --> 00:47:58,180
will see the structures change so that's
the what will be different about gold as

611
00:47:58,180 --> 00:48:02,349
being is the viewpoint we have of it and
how we're able to follow the changes and

612

00:48:02,349 --> 00:48:05,750
also follow the changes from the days
what happened on the daytime in the

613
00:48:05,750 --> 00:48:10,310
daytime - over - what happened at night
see how that impacts things how it

614
00:48:10,310 --> 00:48:19,460
changes things we have one more question
this is from Jeff Faust with space news

615
00:48:19,460 --> 00:48:26,569
and is specifically for Todd Gossett the
questions is what lessons learned for

616
00:48:26,569 --> 00:48:31,579
SES will they apply to future hosted
payloads whether it's for NASA or other

617
00:48:31,579 --> 00:48:35,869
US government customers Oh anytime we do
this this is our third at SES GS and the

618
00:48:35,869 --> 00:48:40,339
fifth SES overall and every time we go
through the process we learn a little

619
00:48:40,339 --> 00:48:44,810
something on how to take that process
and apply it for weather that's how to

620
00:48:44,810 --> 00:48:49,220
coordinate schedules it's how to bundle
requirements in early on in the in the

621
00:48:49,220 --> 00:48:53,450
cellar procurement processes how to
synchronize contracts it's you know a

622

00:48:53,450 --> 00:48:58,400
whole host of things how better to be a
good steward of the taxpayers money how

623
00:48:58,400 --> 00:49:04,970
to communicate with the customer etc we
learn something every time this has been

624
00:49:04,970 --> 00:49:09,230
great I've had a really good time
talking to you guys I've been wonderful

625
00:49:09,230 --> 00:49:14,060
it's been wonderful to get the questions
from you our Watchers thank you so much

626
00:49:14,060 --> 00:49:17,750
for being here keep watching for more
information about gold which as we have

627
00:49:17,750 --> 00:49:21,770
said is launching at the end of January
from French Guiana there will be more