



1  
00:00:00,500 --> 00:00:07,140  
[ Music ]

2  
00:00:07,140 --> 00:00:09,700  
[ SOFIA taking off ]

3  
00:00:17,380 --> 00:00:19,010  
>> If you're all listening  
we're going to open the door

4  
00:00:19,020 --> 00:00:21,500  
in about three minutes or so.

5  
00:00:22,640 --> 00:00:24,840  
>> I'd like to make a  
right turn and climb to 4-1

6  
00:00:24,840 --> 00:00:26,720  
or 4-3 if that's possible.

7  
00:00:27,720 --> 00:00:29,720  
[ SOFIA turning ]

8  
00:00:30,360 --> 00:00:31,080  
>> Go ahead.

9  
00:00:31,080 --> 00:00:33,010  
>> I have point one  
on boresight.

10  
00:00:33,010 --> 00:00:33,800  
>> Thank you.

11  
00:00:34,600 --> 00:00:35,280  
>> Observing.

12  
00:00:35,960 --> 00:00:38,140  
>> Some of the trepidation

initially was "oh my gosh are we

13

00:00:38,140 --> 00:00:39,650

going to be able to  
stay up all evening?"

14

00:00:40,240 --> 00:00:42,700

My adrenaline is so  
flowing right now

15

00:00:42,700 --> 00:00:44,440

that that has not been an issue.

16

00:00:44,440 --> 00:00:47,540

I am just as excited here,  
what is it 2:30 in the morning?

17

00:00:48,000 --> 00:00:50,170

as I was at 7:30 in the evening.

18

00:00:50,840 --> 00:00:53,600

I certainly hope that I will  
be able to take that excitement,

19

00:00:53,600 --> 00:00:58,040

that awe of what's going on in  
this 747 this evening and impart

20

00:00:58,040 --> 00:01:01,990

that to the students, whether  
they be young students,

21

00:01:02,000 --> 00:01:04,820

whether they be adults,  
and get them thinking

22

00:01:04,820 --> 00:01:06,550

about "what could I learn

23

00:01:06,560 --> 00:01:11,280  
from the astronomy that's  
being done aboard this program?"

24

00:01:11,760 --> 00:01:14,410  
>> Tonight we have  
everything from learning

25

00:01:14,410 --> 00:01:18,250  
about the FORCAST  
instrument, how SOFIA works,

26

00:01:18,250 --> 00:01:20,790  
what they're imaging, what  
they're trying to learn

27

00:01:20,800 --> 00:01:23,760  
about objects using infrared.

28

00:01:26,316 --> 00:01:31,716  
>> I've learned about how hard  
it is to plan a flight path,

29

00:01:31,720 --> 00:01:34,360  
and all of the different  
targets they have along

30

00:01:34,440 --> 00:01:35,270  
that flight path.

31

00:01:35,280 --> 00:01:37,690  
My students have such  
a limited knowledge

32

00:01:37,690 --> 00:01:39,490  
of the electromagnetic spectrum.

33

00:01:40,680 --> 00:01:43,600  
I want to show them that  
there's so much more

34

00:01:43,600 --> 00:01:46,320

that can be learned beyond  
the visible light spectrum.

35

00:01:46,320 --> 00:01:48,800

[ Music ]

36

00:01:48,800 --> 00:01:51,666

>> We're looking at massive star forming  
regions in the direction

37

00:01:51,666 --> 00:01:55,216

of the Constellation Sagittarius,  
looking toward the center

38

00:01:55,336 --> 00:01:56,576

of the Milky Way Galaxy.

39

00:01:56,666 --> 00:01:59,296

>> The protostars  
and how they develop

40

00:01:59,396 --> 00:02:01,956

and the temperatures they  
develop and what's happening

41

00:02:01,956 --> 00:02:04,776

within those nebulae that  
they're developing within.

42

00:02:04,776 --> 00:02:08,236

Being able to see how they can  
see through the dust clouds

43

00:02:08,596 --> 00:02:10,236

into those little nurseries

44

00:02:10,236 --> 00:02:13,956

of the protostars  
has been fascinating.

45

00:02:14,840 --> 00:02:18,560

>> So one of the advantages  
of using a grism is

46

00:02:18,600 --> 00:02:21,936

that you can just plunk the  
element into a filter wheel.

47

00:02:21,936 --> 00:02:24,596

Right, so you can pop it out, put in an imaging filter

48

00:02:24,716 --> 00:02:26,626

and it functions  
essentially the same way.

49

00:02:27,176 --> 00:02:29,076

If you'd like your students to  
be involved they do have ways

50

00:02:29,076 --> 00:02:30,386

that you can actually  
get involved

51

00:02:30,386 --> 00:02:33,826

with the general  
investigators to have them work

52

00:02:33,966 --> 00:02:35,796

with you directly  
with their data.

53

00:02:36,356 --> 00:02:37,686

>> I can see so many  
different ways

54

00:02:37,726 --> 00:02:39,366

to take this back

into the classroom.

55

00:02:39,576 --> 00:02:42,966

Part of our job as teachers is  
to take science from scientists

56

00:02:43,146 --> 00:02:45,596

and translate it so the general  
public can understand it.

57

00:02:45,876 --> 00:02:49,696

My role, I guess, in addition  
to regular classroom visits

58

00:02:49,866 --> 00:02:52,956

that I would be doing, is  
developing planetarium lessons.

59

00:02:53,096 --> 00:02:55,356

>> ...using SOFIA you can  
see the central regions even

60

00:02:55,356 --> 00:02:55,886

if they're bright....

61

00:02:56,466 --> 00:02:59,316

>> There's specific content  
connections that I can make

62

00:02:59,316 --> 00:03:01,336

with what we're doing  
onboard here on SOFIA

63

00:03:01,916 --> 00:03:04,076

such as learning about  
stellar life cycles

64

00:03:04,166 --> 00:03:07,036

with new stars forming  
in regions within space.

65

00:03:07,286 --> 00:03:09,756

But also just the careers that are onboard.

66

00:03:09,856 --> 00:03:12,596

The different educational backgrounds of all the people

67

00:03:12,596 --> 00:03:14,866

on board, the different jobs they can have.

68

00:03:15,116 --> 00:03:17,776

They don't all have to be astronomers to have a part

69

00:03:17,776 --> 00:03:19,986

in this program in an exciting career

70

00:03:20,016 --> 00:03:21,346

in which they're learning all the time.

71

00:03:23,240 --> 00:03:26,680

>> One of the biggest challenges for students with visual impairments and blindness is

72

00:03:26,680 --> 00:03:28,920

involvement into the STEM fields.

73

00:03:29,040 --> 00:03:35,640

And to get them excited, I think, is probably the most important thing that we can bring back.

74

00:03:35,656 --> 00:03:38,736

>> Science always needs intelligent people.

75

00:03:38,736 --> 00:03:42,126

People that have a different perspective who are going

76

00:03:42,126 --> 00:03:44,186

to think about a problem differently,

77

00:03:44,186 --> 00:03:47,906

and just because they can't see doesn't mean they can't think

78

00:03:47,906 --> 00:03:51,956

about these problems and develop something new or revolutionary.

79

00:03:51,960 --> 00:03:53,520

>> Translating astronomy,

80

00:03:53,520 --> 00:03:55,930

just visual astronomy is challenging enough,

81

00:03:55,930 --> 00:03:59,340

and then translating infrared astronomy adds an extra layer

82

00:03:59,340 --> 00:04:01,460

of difficulty.

83

00:04:03,640 --> 00:04:05,180

One of the things that we've done just

84

00:04:05,180 --> 00:04:09,100

for this trip is we've actually embossed the SOFIA aircraft

85

00:04:09,100 --> 00:04:12,170

complete with the outline of the telescope,

86

00:04:12,170 --> 00:04:14,730

and it's allowed our students  
the opportunity to kind

87

00:04:14,730 --> 00:04:17,850

of feel what the plane is like,  
and where the telescope is

88

00:04:17,850 --> 00:04:20,800

at in relationship  
to the overall plane.

89

00:04:20,800 --> 00:04:23,400

>> Being a space history  
museum, we have a lot

90

00:04:23,400 --> 00:04:25,030

of astronomy opportunities.

91

00:04:25,040 --> 00:04:28,580

SOFIA with the platform  
it operates

92

00:04:28,580 --> 00:04:32,170

on offers an extremely  
unique opportunity

93

00:04:32,170 --> 00:04:36,270

to take those persons who might  
come to one of our star parties

94

00:04:36,280 --> 00:04:40,400

or might want to come to  
one of our solar events

95

00:04:40,640 --> 00:04:43,380

to a far, far different level.

96

00:04:43,380 --> 00:04:46,250

We can take those participants  
in our programs, rather

97

00:04:46,250 --> 00:04:49,530

than just "hey look through  
this lens and see what you see",

98

00:04:49,530 --> 00:04:53,270

"here's what we were able to  
accomplish and see once we were

99

00:04:53,280 --> 00:04:56,900

at 43,000 feet, and how  
infrared astronomy works."

100

00:04:56,900 --> 00:04:59,080

>> I remember being  
taught this way.

101

00:04:59,080 --> 00:05:01,400

Okay open your book  
to chapter whatever.

102

00:05:01,400 --> 00:05:03,400

The first kid reads  
the first paragraph,

103

00:05:03,400 --> 00:05:05,560

the second kid reads the  
second paragraph, the third kid,

104

00:05:05,560 --> 00:05:07,960

if they can, read  
the third paragraph,

105

00:05:07,960 --> 00:05:10,760

and then it wasn't  
particular interesting.

106

00:05:10,760 --> 00:05:12,760

>> ...and how to connect this with...

107

00:05:12,760 --> 00:05:14,520

>> If you can actually do something...

108

00:05:14,520 --> 00:05:16,320

Here's some data  
that was gathered.

109

00:05:16,320 --> 00:05:17,280

Here's how you reduce it.

110

00:05:17,280 --> 00:05:18,030

Here's how you use it.

111

00:05:18,040 --> 00:05:19,580

This is what it's important for,

112

00:05:19,600 --> 00:05:21,840

and look at what  
you get at the end.

113

00:05:21,840 --> 00:05:27,040

I think kids really enjoy real  
things, and that's what this is.

114

00:05:27,040 --> 00:05:28,120

That's my favorite part.

115

00:05:28,120 --> 00:05:33,560

>> Those first two dots indicate that everything after it is a capital letter...

116

00:05:33,560 --> 00:05:38,440

>> Tonight we had Nichelle Nichols, who played Lt. Uhura on the original "Star Trek" series.

117

00:05:38,440 --> 00:05:45,480

>> To have her onboard to encourage education, to encourage involvement, to encourage exploration

118

00:05:45,480 --> 00:05:47,480

just helps everyone out, it's wonderful.

119

00:05:47,480 --> 00:05:50,880

>> ...so this is all emission in the infrared portion of the spectrum...

120

00:05:50,880 --> 00:05:57,000

>> I was a child when "Star Trek" came on, and that sort of helped spur my interest in science,

121

00:05:57,000 --> 00:05:58,360

spur my interest in space.

122

00:05:58,360 --> 00:06:03,040

>> We share in common a passion for getting under-represented groups in STEM.

123

00:06:03,040 --> 00:06:07,280

That's one of my biggest things, is getting women and minorities into STEM fields.

124

00:06:07,280 --> 00:06:14,560

And, so, she's a wonderful ambassador for that, and I'm really proud to have flown with her tonight.

125

00:06:14,560 --> 00:06:20,240

>> She was- still is- just an amazing, lifelong learner.

126

00:06:20,240 --> 00:06:25,720

>> I just hope I'm as enthusiastic and a lifelong learner at 82.

127

00:06:25,720 --> 00:06:27,720

[ Laughter ]