



Hilary Justh

Flight Vehicle Atmospheric Environments

Focus On

Marshall

1
00:00:23,080 --> 00:00:21,189
hi I'm bill hubscher and I'm Lori Meggs

2
00:00:24,609 --> 00:00:23,090
today I'm focus on Marshall will find

3
00:00:26,050 --> 00:00:24,619
out how floating on one of these little

4
00:00:27,970 --> 00:00:26,060
things can help us learn more about

5
00:00:29,259 --> 00:00:27,980
rendezvous and docking in space but

6
00:00:30,999 --> 00:00:29,269
first we're going to visit a lab where

7
00:00:34,479 --> 00:00:31,009
they're predicting the weather on other

8
00:00:36,070 --> 00:00:34,489
planets we're here in the terrestrial

9
00:00:38,049 --> 00:00:36,080
and planetary environments team lab

10
00:00:39,910 --> 00:00:38,059
actually we're in Barry Robert's office

11
00:00:42,069 --> 00:00:39,920
but this is your lab right yeah that's

12
00:00:43,600 --> 00:00:42,079
correct and what we do here in my team

13
00:00:45,910 --> 00:00:43,610

is we provide atmospheric data to the

14

00:00:47,979 --> 00:00:45,920

engineering community that's important

15

00:00:49,240 --> 00:00:47,989

because for aerospace vehicles to get

16

00:00:50,650 --> 00:00:49,250

space you have to fly through the

17

00:00:52,540 --> 00:00:50,660

atmosphere for instance when you're

18

00:00:53,560 --> 00:00:52,550

launching from a surface of planet Earth

19

00:00:55,660 --> 00:00:53,570

you have to go through the atmosphere

20

00:00:56,799 --> 00:00:55,670

same thing when you come back from orbit

21

00:00:58,479 --> 00:00:56,809

you have to fly through the atmosphere

22

00:00:59,709 --> 00:00:58,489

if you want to land on the surface of a

23

00:01:01,630 --> 00:00:59,719

planet would come back to earth and

24

00:01:03,790 --> 00:01:01,640

that's important what we provide the

25

00:01:05,469 --> 00:01:03,800

engineers is data that simulates the

26

00:01:07,150 --> 00:01:05,479

atmosphere variations they could see

27

00:01:09,040 --> 00:01:07,160

within the atmosphere you've designed

28

00:01:10,510 --> 00:01:09,050

actually a model for this right he

29

00:01:12,340 --> 00:01:10,520

actually we have a whole family models

30

00:01:14,499 --> 00:01:12,350

we call the global reference atmospheric

31

00:01:16,510 --> 00:01:14,509

models or Graham for short and what

32

00:01:18,460 --> 00:01:16,520

those dirts provide variations or

33

00:01:20,020 --> 00:01:18,470

simulate variations you could see the

34

00:01:22,749 --> 00:01:20,030

factors such as wind speed direction

35

00:01:24,190 --> 00:01:22,759

temperature humidity and pressure as a

36

00:01:26,320 --> 00:01:24,200

matter of fact well here we have a plot

37

00:01:28,240 --> 00:01:26,330

of a density perturbations you could see

38

00:01:29,740 --> 00:01:28,250

and Earth's atmosphere well I see your

39

00:01:30,880 --> 00:01:29,750

squiggly lines all right but I know it

40

00:01:33,010 --> 00:01:30,890

means something to you yeah it does look

41

00:01:34,870 --> 00:01:33,020

like a mess on there but that's very

42

00:01:36,550 --> 00:01:34,880

important to the shell engineers because

43

00:01:38,139 --> 00:01:36,560

when you're designing the vehicle or

44

00:01:40,029 --> 00:01:38,149

planning a mission to go from again

45

00:01:41,949 --> 00:01:40,039

launch or also for landing you want to

46

00:01:43,300 --> 00:01:41,959

consider variations you could see in the

47

00:01:45,040 --> 00:01:43,310

density of Earth's atmosphere that's

48

00:01:46,839 --> 00:01:45,050

very important again to get from point A

49

00:01:48,219 --> 00:01:46,849

which might be your launch place to

50

00:01:49,570 --> 00:01:48,229

point B a place you want to be in orbit

51
00:01:51,010 --> 00:01:49,580
so you have to account for the

52
00:01:52,660 --> 00:01:51,020
variations you can see in the density of

53
00:01:54,219 --> 00:01:52,670
Earth's atmospheres and that's just one

54
00:01:55,540 --> 00:01:54,229
of the applications of the grand model

55
00:01:57,100 --> 00:01:55,550
yeah you're also working with a very

56
00:01:58,540 --> 00:01:57,110
important Mars mission right now yeah

57
00:01:59,740 --> 00:01:58,550
that's true as a matter of fact we just

58
00:02:02,680 --> 00:01:59,750
recently began supporting the mars

59
00:02:05,290 --> 00:02:02,690
reconnaissance orbiter mission and that

60
00:02:06,969 --> 00:02:05,300
use or Mars Graham 2005 model as a

61
00:02:08,650 --> 00:02:06,979
matter of fact here we just in the team

62
00:02:11,020 --> 00:02:08,660
is supporting them all right let's go

63
00:02:13,300 --> 00:02:11,030

see what she has going on Hillary just

64

00:02:15,130 --> 00:02:13,310

has actually been very busy lately in

65

00:02:16,150 --> 00:02:15,140

support of the exploration of Mars with

66

00:02:17,680 --> 00:02:16,160

those atmospheric models who were

67

00:02:19,690 --> 00:02:17,690

talking about tell us a little bit about

68

00:02:20,619 --> 00:02:19,700

how that's working yes we're currently

69

00:02:23,050 --> 00:02:20,629

supporting the Mars Reconnaissance

70

00:02:24,940 --> 00:02:23,060

Orbiter and also known as mr oh and

71

00:02:26,920 --> 00:02:24,950

we're supporting that through the

72

00:02:28,720 --> 00:02:26,930

use of the Mars Graham 2005 model

73

00:02:31,089 --> 00:02:28,730

currently mro is in a process called

74

00:02:33,910 --> 00:02:31,099

aerobraking in which the orbiter starts

75

00:02:35,920 --> 00:02:33,920

in a highly elliptical orbit and through

76

00:02:38,949 --> 00:02:35,930

a process of dipping lower in the

77

00:02:43,509 --> 00:02:38,959

atmosphere of Mars in height above the

78

00:02:46,059 --> 00:02:43,519

surface we can cause it to slow down and

79

00:02:47,979 --> 00:02:46,069

also the orbit becomes more circular in

80

00:02:50,080 --> 00:02:47,989

nature the reason why aerobraking is so

81

00:02:52,570 --> 00:02:50,090

important is it conserves propulsion

82

00:02:55,240 --> 00:02:52,580

that's on the spacecraft we want to use

83

00:02:57,640 --> 00:02:55,250

is low amount of propulsion on the

84

00:02:59,770 --> 00:02:57,650

spacecraft during this whole process as

85

00:03:02,470 --> 00:02:59,780

we can so how does your atmospheric

86

00:03:05,319 --> 00:03:02,480

model help in that process right now we

87

00:03:09,150 --> 00:03:05,329

get data every periapsis of the orbiter

88

00:03:12,339 --> 00:03:09,160

we get data and we take that data and

89

00:03:14,380 --> 00:03:12,349

run Mars gram for that position in the

90

00:03:16,350 --> 00:03:14,390

atmosphere and we take them MRO data

91

00:03:19,569 --> 00:03:16,360

compare it to the Mars gram data and

92

00:03:21,759 --> 00:03:19,579

determine if we're on track where the

93

00:03:23,259 --> 00:03:21,769

navigational team wants to be or if

94

00:03:25,000 --> 00:03:23,269

we're too high or too low and then

95

00:03:26,559 --> 00:03:25,010

provide that information to them so that

96

00:03:27,789 --> 00:03:26,569

they can make a decision on whether or

97

00:03:29,740 --> 00:03:27,799

not they want to change where we're at

98

00:03:31,479 --> 00:03:29,750

in the atmosphere and this is a daily

99

00:03:33,550 --> 00:03:31,489

process weekends to your meeting with

100

00:03:35,199 --> 00:03:33,560

them every day yes seven days a week

101

00:03:38,020 --> 00:03:35,209

every day at one o'clock we're on the

102

00:03:39,879 --> 00:03:38,030

telephone now you've also done some

103

00:03:41,710 --> 00:03:39,889

atmospheric models of other bodies in

104

00:03:43,870 --> 00:03:41,720

the solar system right yes we've we've

105

00:03:46,509 --> 00:03:43,880

done models for Venus Titan and Neptune

106

00:03:48,220 --> 00:03:46,519

looking for 22 maybe exploring those