



**AB
GRAD
CON 23**

1
00:00:13,970 --> 00:00:10,810

[Music]

2
00:00:16,189 --> 00:00:13,980

hello everyone I'm Sadat from jet

3
00:00:17,810 --> 00:00:16,199

propulsion laboratory and I'm here to

4
00:00:21,170 --> 00:00:17,820

talk about the work that I started

5
00:00:23,029 --> 00:00:21,180

before joining JPL in India and for

6
00:00:26,150 --> 00:00:23,039

those of you in the audience who are

7
00:00:27,410 --> 00:00:26,160

currently involved or plan to do work in

8
00:00:29,450 --> 00:00:27,420

different parts of the world where

9
00:00:31,609 --> 00:00:29,460

astrobiology has huge potential and

10
00:00:34,190 --> 00:00:31,619

significance hopefully with some of my

11
00:00:35,090 --> 00:00:34,200

experience you'll be able to take things

12
00:00:37,190 --> 00:00:35,100

forward

13
00:00:39,650 --> 00:00:37,200

so first of all a little bit about

14

00:00:41,510 --> 00:00:39,660

myself so I'm originally from India and

15

00:00:43,610 --> 00:00:41,520

before joining JPL

16

00:00:46,069 --> 00:00:43,620

um I have an engineering background and

17

00:00:47,569 --> 00:00:46,079

my current work is actually on Enceladus

18

00:00:48,950 --> 00:00:47,579

on Sample collection Technologies but

19

00:00:50,750 --> 00:00:48,960

unfortunately today I'm not going to be

20

00:00:52,069 --> 00:00:50,760

talking about that this is primarily

21

00:00:53,569 --> 00:00:52,079

going to be focused on that but just

22

00:00:55,970 --> 00:00:53,579

giving a heads up people can find me

23

00:00:58,130 --> 00:00:55,980

after the talk and maybe we can chat

24

00:01:01,250 --> 00:00:58,140

um but here here is why we focused on

25

00:01:02,750 --> 00:01:01,260

India well first and foremost as a

26

00:01:04,670 --> 00:01:02,760

country India has one of the largest

27

00:01:06,830 --> 00:01:04,680

student populations as some of you might

28

00:01:08,630 --> 00:01:06,840

be aware every year we've got several

29

00:01:10,310 --> 00:01:08,640

thousands of students graduating in

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00:01:13,010 --> 00:01:10,320

science and engineering and on a daily

31

00:01:14,030 --> 00:01:13,020

basis we get inquiries about how do you

32

00:01:15,890 --> 00:01:14,040

study and how do you work in

33

00:01:17,750 --> 00:01:15,900

astrobiology so there's a huge supply

34

00:01:20,870 --> 00:01:17,760

and demand problem and there's little to

35

00:01:22,910 --> 00:01:20,880

no formal education or you know career

36

00:01:24,770 --> 00:01:22,920

prospects in the country so that was the

37

00:01:27,530 --> 00:01:24,780

first and foremost no-brainer reason

38

00:01:29,149 --> 00:01:27,540

secondly I would like to really promote

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00:01:32,330 --> 00:01:29,159

the fact that we have an amazing

40

00:01:33,890 --> 00:01:32,340

diversity of high value science analogs

41

00:01:35,569 --> 00:01:33,900

and these are places where some of you

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00:01:38,090 --> 00:01:35,579

might actually find some of your work to

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00:01:40,190 --> 00:01:38,100

be super relevant so with this in mind

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00:01:41,749 --> 00:01:40,200

these sites are not even on the atlas of

45

00:01:43,490 --> 00:01:41,759

astrobiology sites that the community

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00:01:46,310 --> 00:01:43,500

normally works in

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00:01:48,530 --> 00:01:46,320

and lastly our National Space Agency

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00:01:51,230 --> 00:01:48,540

Indian space research organization is

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00:01:53,870 --> 00:01:51,240

finally reaching a point to to involve

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00:01:56,149 --> 00:01:53,880

astrobiology as an important science

51
00:01:58,030 --> 00:01:56,159
priority for its future missions it had

52
00:02:00,289 --> 00:01:58,040
the Mars Orbiter mission in 2014

53
00:02:01,969 --> 00:02:00,299
currently there are it's under Works to

54
00:02:04,069 --> 00:02:01,979
work on a Surface mission that would

55
00:02:05,810 --> 00:02:04,079
work on the progress and the success of

56
00:02:07,969 --> 00:02:05,820
the lunar mission that will be launching

57
00:02:09,650 --> 00:02:07,979
in a month from now and finally there is

58
00:02:12,170 --> 00:02:09,660
the gaganyaan program which is the human

59
00:02:14,330 --> 00:02:12,180
space program which will have astronauts

60
00:02:16,729 --> 00:02:14,340
working in low earth orbit

61
00:02:18,530 --> 00:02:16,739
so that's with that as the basic

62
00:02:20,630 --> 00:02:18,540
motivation of why we decided to do this

63
00:02:22,850 --> 00:02:20,640

seven years ago let me talk quickly

64

00:02:24,890 --> 00:02:22,860

about the background in terms of what

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00:02:27,350 --> 00:02:24,900

astrobiology was happening before we

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00:02:29,930 --> 00:02:27,360

kind of stepped in so the earliest what

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00:02:31,850 --> 00:02:29,940

we could find is between 97 to 2005

68

00:02:33,770 --> 00:02:31,860

Israel was involved in scientific

69

00:02:36,290 --> 00:02:33,780

balloon experiments where they were

70

00:02:38,270 --> 00:02:36,300

basically working on collecting and

71

00:02:40,670 --> 00:02:38,280

understanding microbes in the

72

00:02:43,369 --> 00:02:40,680

stratosphere

73

00:02:44,869 --> 00:02:43,379

um cut to 2015 where as a grad student I

74

00:02:47,030 --> 00:02:44,879

got an opportunity to go on an

75

00:02:49,850 --> 00:02:47,040

astrobiology expedition to New Zealand

76
00:02:52,250 --> 00:02:49,860
and along with a few other Indian and

77
00:02:54,110 --> 00:02:52,260
Indian origin researchers we decided to

78
00:02:57,190 --> 00:02:54,120
bring the program to India

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00:02:59,630 --> 00:02:57,200
and that's what we did as part of the um

80
00:03:01,970 --> 00:02:59,640
NASA space shut down India Expedition

81
00:03:03,650 --> 00:03:01,980
that was the first time that a dedicated

82
00:03:05,030 --> 00:03:03,660
astrobiology expedition was taking place

83
00:03:07,610 --> 00:03:05,040
Gathering and bringing together

84
00:03:09,410 --> 00:03:07,620
researchers in the country and that's

85
00:03:11,449 --> 00:03:09,420
where ball just really started rolling

86
00:03:13,910 --> 00:03:11,459
the momentum started building up and let

87
00:03:15,770 --> 00:03:13,920
me tell you something that working and

88
00:03:18,229 --> 00:03:15,780

socializing with people in uncomfortable

89

00:03:19,970 --> 00:03:18,239

dry desert environments is way better

90

00:03:22,070 --> 00:03:19,980

than inside an air conditioned customer

91

00:03:24,350 --> 00:03:22,080

with experience

92

00:03:25,970 --> 00:03:24,360

so some of the things I led from that

93

00:03:27,530 --> 00:03:25,980

was the establishment of a standard of

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00:03:28,970 --> 00:03:27,540

Excellence in astrobiology at Amity

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00:03:31,130 --> 00:03:28,980

University Mumbai which was the first

96

00:03:33,470 --> 00:03:31,140

dedicated Center that I was a part of

97

00:03:34,970 --> 00:03:33,480

leading and also as part of Blue Marble

98

00:03:37,550 --> 00:03:34,980

space the organization that I had been

99

00:03:39,649 --> 00:03:37,560

affiliated with the astrobiology India

100

00:03:42,050 --> 00:03:39,659

group has been active since then

101
00:03:44,570 --> 00:03:42,060
working to promote coordination

102
00:03:45,949 --> 00:03:44,580
activities between domestic researchers

103
00:03:47,690 --> 00:03:45,959
in the country so we've been having

104
00:03:50,270 --> 00:03:47,700
National level meetings and discussions

105
00:03:52,070 --> 00:03:50,280
and what we want to do from here is move

106
00:03:54,229 --> 00:03:52,080
forward towards setting up a national

107
00:03:56,509 --> 00:03:54,239
astrobiology program closely in support

108
00:03:58,309 --> 00:03:56,519
with the Indian government

109
00:04:00,890 --> 00:03:58,319
I don't have enough time but I'll try to

110
00:04:02,509 --> 00:04:00,900
do justice to this slide um our efforts

111
00:04:05,809 --> 00:04:02,519
at the center focused on three main

112
00:04:07,789 --> 00:04:05,819
verticals the microgravity research we

113
00:04:10,130 --> 00:04:07,799

built plant-based plant growth

114

00:04:11,330 --> 00:04:10,140

observation experiments for ISRO we

115

00:04:13,309 --> 00:04:11,340

worked on characterizing some of the

116

00:04:15,890 --> 00:04:13,319

sites in Ladakh which is an early Mars

117

00:04:18,530 --> 00:04:15,900

analog and hardware testing for rovers

118

00:04:20,629 --> 00:04:18,540

and in collaboration with UC Berkeley

119

00:04:22,069 --> 00:04:20,639

the Berkeley City Research Center we had

120

00:04:23,749 --> 00:04:22,079

four research fellows who were working

121

00:04:26,390 --> 00:04:23,759

to use

122

00:04:28,730 --> 00:04:26,400

um radio telescope data from GMRT which

123

00:04:29,990 --> 00:04:28,740

is an array facility there to set up a

124

00:04:32,570 --> 00:04:30,000

city pipeline

125

00:04:34,370 --> 00:04:32,580

and our research work has culminated

126

00:04:36,170 --> 00:04:34,380

into the university finally agreeing to

127

00:04:37,550 --> 00:04:36,180

have a master's program that is

128

00:04:39,650 --> 00:04:37,560

dedicated for astrology and science

129

00:04:41,090 --> 00:04:39,660

students so hopefully this year onwards

130

00:04:44,030 --> 00:04:41,100

we'll have students in India who'll have

131

00:04:46,070 --> 00:04:44,040

that opportunity to study there

132

00:04:48,530 --> 00:04:46,080

um Blue Marble space has been a great

133

00:04:49,730 --> 00:04:48,540

source of information and help and

134

00:04:51,830 --> 00:04:49,740

network so those of you are not

135

00:04:54,110 --> 00:04:51,840

affiliated I would say strongly

136

00:04:56,090 --> 00:04:54,120

recommended do consider it

137

00:04:58,490 --> 00:04:56,100

quickly talking about some of the unique

138

00:04:59,990 --> 00:04:58,500

aspects of Astral biology in India I've

139

00:05:02,810 --> 00:05:00,000

just highlighted some of the main sites

140

00:05:04,670 --> 00:05:02,820

here in Ladakh up north which is a high

141

00:05:06,290 --> 00:05:04,680

altitude code dry desert environment

142

00:05:08,930 --> 00:05:06,300

Kutch which is one of the largest salt

143

00:05:11,450 --> 00:05:08,940

flats in the world the only accessible

144

00:05:12,950 --> 00:05:11,460

Basalt impact Crater in Lonar uh the

145

00:05:14,390 --> 00:05:12,960

basalt traps and Limestone caves and

146

00:05:16,249 --> 00:05:14,400

there are several others

147

00:05:18,950 --> 00:05:16,259

and because we don't have a National

148

00:05:19,909 --> 00:05:18,960

astrobiology Institute yet there have

149

00:05:22,189 --> 00:05:19,919

been institutions that have been

150

00:05:25,430 --> 00:05:22,199

mushrooming over the last few decades

151
00:05:28,850 --> 00:05:25,440
and I've been uh very successful and

152
00:05:31,070 --> 00:05:28,860
fortunate to be part of several senior

153
00:05:33,469 --> 00:05:31,080
earth scientists to work towards setting

154
00:05:35,090 --> 00:05:33,479
this up and it's only because of these

155
00:05:37,189 --> 00:05:35,100
people who you're seeing on the screen

156
00:05:38,510 --> 00:05:37,199
over here that we're able to do this and

157
00:05:40,370 --> 00:05:38,520
we've been working through the pandemic

158
00:05:42,050 --> 00:05:40,380
to make this happen they've been a

159
00:05:43,610 --> 00:05:42,060
working group uh several working groups

160
00:05:46,070 --> 00:05:43,620
that have been put in place uh we've

161
00:05:47,990 --> 00:05:46,080
been closely following uh work done in

162
00:05:49,790 --> 00:05:48,000
Europe and at uh in the United States

163
00:05:51,950 --> 00:05:49,800

through the NASA Astra Biology Institute

164

00:05:53,810 --> 00:05:51,960

to help form these working groups and

165

00:05:55,969 --> 00:05:53,820

these are some names in some areas where

166

00:05:58,730 --> 00:05:55,979

you know people have been working

167

00:06:00,290 --> 00:05:58,740

and too much information bad slide I

168

00:06:02,450 --> 00:06:00,300

know but I just wanted to tell you that

169

00:06:04,070 --> 00:06:02,460

there are these sites and we have been

170

00:06:06,590 --> 00:06:04,080

trying to map out the science objectives

171

00:06:08,029 --> 00:06:06,600

the different Technologies what worlds

172

00:06:09,710 --> 00:06:08,039

are they analog to and what kind of

173

00:06:11,749 --> 00:06:09,720

missions would they be able to support

174

00:06:13,070 --> 00:06:11,759

into the future

175

00:06:15,170 --> 00:06:13,080

um some other ways in which we have been

176

00:06:17,390 --> 00:06:15,180

contributing we published our first

177

00:06:18,350 --> 00:06:17,400

advocacy paper and new space Journal uh

178

00:06:20,930 --> 00:06:18,360

talking about the importance of

179

00:06:22,670 --> 00:06:20,940

astrobiology for India and internally we

180

00:06:25,010 --> 00:06:22,680

have been contributing to the science

181

00:06:27,770 --> 00:06:25,020

roadmap for uh ISRO as well

182

00:06:29,330 --> 00:06:27,780

now three main wins for us one is the

183

00:06:31,550 --> 00:06:29,340

fact that we've got several students who

184

00:06:32,749 --> 00:06:31,560

have gone through our uh system and

185

00:06:35,510 --> 00:06:32,759

these are the people who in the future

186

00:06:37,370 --> 00:06:35,520

will be taking light forward

187

00:06:39,830 --> 00:06:37,380

this year ISRO published its space

188

00:06:41,749 --> 00:06:39,840

policy document and we were very happy

189

00:06:43,969 --> 00:06:41,759

to see that they have acknowledged the

190

00:06:45,469 --> 00:06:43,979

importance of astrobiology because

191

00:06:46,490 --> 00:06:45,479

they've mentioned that they will be

192

00:06:48,890 --> 00:06:46,500

looking into extraterrestrial

193

00:06:50,809 --> 00:06:48,900

habitability so for us as a country this

194

00:06:52,010 --> 00:06:50,819

is a huge win that finally ISRO has

195

00:06:54,710 --> 00:06:52,020

acknowledged us

196

00:06:57,110 --> 00:06:54,720

and the fact that there is now

197

00:06:59,510 --> 00:06:57,120

comprehensive I would say not enough but

198

00:07:01,370 --> 00:06:59,520

still uh comprehensive diversification

199

00:07:03,050 --> 00:07:01,380

of funding for scientists in the country

200

00:07:04,550 --> 00:07:03,060

to do this but definitely more work

201
00:07:05,570 --> 00:07:04,560
needs to be done and more funding needs

202
00:07:08,510 --> 00:07:05,580
to be put together

203
00:07:09,950 --> 00:07:08,520
so my last slide um to summarize some of

204
00:07:11,390 --> 00:07:09,960
these things if you are in your region

205
00:07:13,309 --> 00:07:11,400
or country interested in setting things

206
00:07:14,629 --> 00:07:13,319
up the first and foremost step is to

207
00:07:16,850 --> 00:07:14,639
bring early and mid-career people

208
00:07:19,370 --> 00:07:16,860
together and encourage conversations to

209
00:07:21,110 --> 00:07:19,380
take place at a domestic level at the

210
00:07:23,390 --> 00:07:21,120
same time leveraging International work

211
00:07:25,909 --> 00:07:23,400
and like I said field workshops are

212
00:07:27,950 --> 00:07:25,919
amazing for team building

213
00:07:30,110 --> 00:07:27,960

finding an important University or a

214

00:07:31,790 --> 00:07:30,120

host institution is critical because if

215

00:07:33,290 --> 00:07:31,800

you're doing events logistically

216

00:07:35,450 --> 00:07:33,300

speaking it's important to find an

217

00:07:36,830 --> 00:07:35,460

organization that will support you and

218

00:07:38,570 --> 00:07:36,840

beware of non-scientific and

219

00:07:39,350 --> 00:07:38,580

exploitative groups in the in the in the

220

00:07:41,629 --> 00:07:39,360

region

221

00:07:43,790 --> 00:07:41,639

finally convene workshops identify

222

00:07:46,249 --> 00:07:43,800

research interests try to tailor them

223

00:07:47,809 --> 00:07:46,259

together into overarching themes and

224

00:07:49,129 --> 00:07:47,819

help the group formalize themselves in

225

00:07:51,290 --> 00:07:49,139

the form of a virtual Network a

226

00:07:52,550 --> 00:07:51,300

non-profit or a society and finally

227

00:07:53,870 --> 00:07:52,560

encourage the group members to work

228

00:07:56,150 --> 00:07:53,880

closely with their government for their

229

00:07:57,830 --> 00:07:56,160

astrology goals so that's my time and

230

00:07:59,510 --> 00:07:57,840

you hope you can find me and those of

231

00:08:02,930 --> 00:07:59,520

you are interested can talk more on this

232

00:08:21,220 --> 00:08:07,070

[Music]