
817
N817NA

1
00:00:03,520 --> 00:00:12,640
■

2
00:00:12,640 --> 00:00:14,480
>>For the first time in my life

3
00:00:14,480 --> 00:00:17,240
I saw the horizon
as a curved line.

4
00:00:17,920 --> 00:00:21,880
It was accentuated by a thin
seam of dark blue light...

5
00:00:22,120 --> 00:00:23,720
The atmosphere.

6
00:00:28,480 --> 00:00:31,800
This was not the ocean of air
I had been told it was...

7
00:00:32,560 --> 00:00:35,680
I was terrified by
its fragile appearance.

8
00:00:41,200 --> 00:00:44,640
>>In 1983, German
astronaut Ulf Merbold

9
00:00:44,640 --> 00:00:46,680
onboard NASA's Space Shuttle,

10
00:00:46,680 --> 00:00:48,680
was struck by how vulnerable

11
00:00:48,680 --> 00:00:52,000
the layer that protects us from
outer space really was...

12
00:00:53,200 --> 00:00:54,960
He was right!

13
00:00:56,360 --> 00:00:59,000
Industrialization and
economic growth

14
00:00:59,000 --> 00:01:02,000
have given us many
commodities and technologies.

15
00:01:02,440 --> 00:01:05,440
But they have also generated
a dangerous side effect...

16
00:01:05,840 --> 00:01:07,520
Pollution.

17
00:01:09,440 --> 00:01:12,720
>>Air pollution has a great
impact on human health

18
00:01:12,960 --> 00:01:14,640
>>More than 7 million people

19
00:01:14,640 --> 00:01:16,480
die per year due to the effects

20
00:01:16,480 --> 00:01:17,840
of air quality.

21
00:01:17,840 --> 00:01:19,960
>>It's a big problem!
Populations are growing

22
00:01:19,960 --> 00:01:22,360
and the impacts on health

23

00:01:22,360 --> 00:01:24,240
are an economic cost

24
00:01:24,240 --> 00:01:27,800
that I think governments
are very interested in.

25
00:01:29,240 --> 00:01:31,920
>>Understanding how we are
affecting our atmosphere

26
00:01:31,920 --> 00:01:34,640
and the quality of the air
we breathe is essential

27
00:01:34,640 --> 00:01:37,360
not just to continue
developing our societies,

28
00:01:37,360 --> 00:01:41,400
but also to our health
and, therefore, our survival.

29
00:01:44,240 --> 00:01:47,640
By combining measurements from
satellites, ground stations

30
00:01:47,640 --> 00:01:50,160
and aircraft over the
South Korean peninsula,

31
00:01:50,480 --> 00:01:53,720
KORUS-AQ will create
the most complete picture

32
00:01:53,720 --> 00:01:55,720
of air quality ever measured.

33
00:01:58,920 --> 00:02:00,360
>>As atmospheric chemists,

34
00:02:00,360 --> 00:02:02,600
we do know a lot about
the basics of air quality.

35
00:02:02,600 --> 00:02:05,160
But the specifics of
what happens in Korea

36
00:02:05,160 --> 00:02:06,920
are not something that
we know a lot about.

37
00:02:07,160 --> 00:02:09,520
>>It's not a mystery to us that

38
00:02:09,520 --> 00:02:11,560
there's a lot of air pollution.

39
00:02:11,560 --> 00:02:13,120
What we're really trying to do

40
00:02:13,120 --> 00:02:16,280
is learn how we can best
help the South Koreans

41
00:02:16,280 --> 00:02:18,080
improve their air quality.

42
00:02:18,320 --> 00:02:19,600
>>Government is trying to come up

43
00:02:19,600 --> 00:02:20,840
with a better strategy

44
00:02:20,840 --> 00:02:22,400
to fix this issue,

45

00:02:22,400 --> 00:02:24,040
but it's not that easy.

46
00:02:24,040 --> 00:02:26,520
it's a very complicated issue

47
00:02:26,520 --> 00:02:28,160
that we are facing.

48
00:02:28,160 --> 00:02:31,360
So I think this mission
really helps us to understand

49
00:02:31,360 --> 00:02:33,880
what is going on in our country.

50
00:02:35,000 --> 00:02:37,920
>>But air pollution is also
an environmental problem

51
00:02:37,920 --> 00:02:40,680
common to other cities
in many countries.

52
00:02:41,880 --> 00:02:44,920
>>It turns out that there are
many cities around the world

53
00:02:44,920 --> 00:02:48,640
that have similar problems
to Seoul. Even in the US.

54
00:02:48,640 --> 00:02:51,440
So this field study will help
improve the models

55
00:02:51,440 --> 00:02:53,040
and the processes in the models

56

00:02:53,040 --> 00:02:55,720
that will benefit many other
cities around the world.

57
00:02:57,360 --> 00:03:00,400
>>The information gathered
throughout the KORUS-AQ campaign

58
00:03:00,400 --> 00:03:02,840
will help us improve
our models of air quality

59
00:03:02,840 --> 00:03:04,720
and better understand the flow

60
00:03:04,720 --> 00:03:07,560
and interaction of pollutants
in our atmosphere.

61
00:03:19,040 --> 00:03:22,440
■

62
00:03:22,440 --> 00:03:25,320
>>Almost anyone who you tell
about the KORUS-AQ experiment

63
00:03:25,320 --> 00:03:28,680
will immediately ask about how
much of it is coming from China.

64
00:03:28,880 --> 00:03:31,200
Trans-boundary pollution
is always a concern

65
00:03:31,200 --> 00:03:33,400
and we came here
to look at that as well,

66
00:03:33,600 --> 00:03:34,960
but we had the good fortune

67
00:03:34,960 --> 00:03:37,200
of having a weather condition
that has created

68
00:03:37,200 --> 00:03:39,480
a lot of stagnation
in the Korean country

69
00:03:39,480 --> 00:03:41,800
and has prevented
Chinese emissions

70
00:03:41,800 --> 00:03:44,000
from having a large
impact on Korea.

71
00:03:44,280 --> 00:03:46,880
>>We expected that, frequently,

72
00:03:46,880 --> 00:03:48,680
there would be pollution

73
00:03:48,680 --> 00:03:52,320
from China blowing over Korea

74
00:03:52,840 --> 00:03:56,760
but, due to the meteorological
conditions this year,

75
00:03:56,760 --> 00:03:58,960
that didn't seem to
happen very much.

76
00:03:59,160 --> 00:04:00,720
>>It turns out, on some days,

77
00:04:00,720 --> 00:04:02,760
the emissions from China

78
00:04:02,760 --> 00:04:05,400
are impacting South Korea.

79
00:04:05,400 --> 00:04:07,280
But on many days
that we were here,

80
00:04:07,280 --> 00:04:10,320
it's entirely due to
the pollution emitted

81
00:04:10,320 --> 00:04:13,920
by the 51 million people
living in South Korea.

82
00:04:14,120 --> 00:04:17,040
>>And what we believe is that
this will motivate the Koreans

83
00:04:17,040 --> 00:04:19,520
to understand that they
can make a difference

84
00:04:19,520 --> 00:04:22,800
in their own air quality
by making local changes

85
00:04:22,800 --> 00:04:25,480
of things that they can control
rather than worrying

86
00:04:25,480 --> 00:04:27,960
only about what's
coming from outside.

87
00:04:30,160 --> 00:04:31,680
>>Having detailed information

88

00:04:31,680 --> 00:04:33,680
on the sources causing
air pollution

89
00:04:33,680 --> 00:04:35,600
is one of the most
important outcomes

90
00:04:35,600 --> 00:04:37,280
of an air quality study.

91
00:04:37,680 --> 00:04:40,200
Decisions can be made
in order to address

92
00:04:40,200 --> 00:04:42,360
environmental
issues on a region.

93
00:04:44,600 --> 00:04:47,040
>>We've also seen that
the position of some

94
00:04:47,040 --> 00:04:49,880
emission sources,
in particular with Seoul

95
00:04:49,880 --> 00:04:52,080
being in the northwest
corner of the country

96
00:04:52,080 --> 00:04:54,920
and also many of the power
plants and chemical facilities

97
00:04:54,920 --> 00:04:56,960
upwind of the city,

98
00:04:56,960 --> 00:04:59,040
that the location

of some sources

99
00:04:59,040 --> 00:05:03,520
is creating a bigger problem
in Seoul than is necessary.

100
00:05:03,520 --> 00:05:05,480
So, looking at the balance

101
00:05:05,480 --> 00:05:07,640
of where activities
are located in Korea,

102
00:05:07,640 --> 00:05:09,520
is likely going to be
a topic of interest

103
00:05:09,520 --> 00:05:11,520
for the outcomes from KORUS-AQ.

104
00:05:14,160 --> 00:05:15,840
>>Real time measurements
of emissions

105
00:05:15,840 --> 00:05:17,120
over the Korean peninsula

106
00:05:17,120 --> 00:05:20,240
has already proven the
importance of this field study.

107
00:05:21,600 --> 00:05:23,720
Further and more
detailed analysis

108
00:05:23,720 --> 00:05:25,680
of the data collected
during the campaign

109

00:05:25,680 --> 00:05:28,800
will help scientists improve
air quality models.

110
00:05:32,300 --> 00:05:35,700
>>So now we will have
the 6 weeks of data

111
00:05:35,720 --> 00:05:38,680
of hundreds of
different compounds

112
00:05:38,680 --> 00:05:40,800
to evaluate our models with...

113
00:05:40,800 --> 00:05:43,920
to see how they do
during these 6 weeks

114
00:05:43,920 --> 00:05:47,160
and then, if we can make our
models reproduce this period,

115
00:05:47,160 --> 00:05:50,040
reproduce all the
observations we've made,

116
00:05:50,320 --> 00:05:52,400
then we can have
confidence that

117
00:05:52,400 --> 00:05:56,720
it will work well next year...
or next fall...

118
00:05:56,920 --> 00:05:59,720
>>These models also help us test

119
00:05:59,720 --> 00:06:03,400
how we can best reduce

the air pollution by...

120
00:06:03,400 --> 00:06:06,480
What if we clean up the cars?
How much would that help?

121
00:06:06,480 --> 00:06:08,320
What if we clean up
the power plants?

122
00:06:08,320 --> 00:06:10,280
How much would that
lower air pollution?

123
00:06:10,280 --> 00:06:13,640
So these models are useful tools
to look at different scenarios.

124
00:06:13,920 --> 00:06:17,480
>>It's relatively simple to filter
out or scrub emissions.

125
00:06:17,640 --> 00:06:19,400
But it's not inexpensive...

126
00:06:19,400 --> 00:06:20,720
So if you know which ones

127
00:06:20,720 --> 00:06:22,040
will have the largest impact,

128
00:06:22,040 --> 00:06:23,360
then you can target those

129
00:06:23,360 --> 00:06:25,880
and still have good
economic productivity

130
00:06:25,880 --> 00:06:28,080

and protect your population.

131
00:06:29,960 --> 00:06:33,040
>>Computer models can help assess
air pollution problems

132
00:06:33,280 --> 00:06:36,360
and guide politicians in the
decision making process

133
00:06:36,560 --> 00:06:39,560
to lessen industrial impacts
on the environment.

134
00:06:42,240 --> 00:06:44,040
>>We definitely have technologies

135
00:06:44,040 --> 00:06:45,600
that will help us
with air quality,

136
00:06:45,600 --> 00:06:48,640
but the economic factors
always come into play.

137
00:06:48,920 --> 00:06:50,720
And so people are
always looking for ways

138
00:06:50,720 --> 00:06:52,360
to do things more economically.

139
00:06:52,360 --> 00:06:54,600
But that doesn't always
mean doing them cleanly.

140
00:06:54,600 --> 00:06:56,080
And so regulations are needed

141

00:06:56,080 --> 00:06:57,920
to make sure that we
don't take shortcuts

142
00:06:57,920 --> 00:07:00,120
and that we make the proper
investments in making sure

143
00:07:00,120 --> 00:07:02,280
that our activities
are not having

144
00:07:02,280 --> 00:07:05,040
an undue impact
on the environment.

145
00:07:11,800 --> 00:07:14,680
■

146
00:07:14,680 --> 00:07:17,680
>>After weeks of hard work
and intense data collection,

147
00:07:17,880 --> 00:07:19,640
the KORUS-AQ field study

148
00:07:19,640 --> 00:07:22,040
has enhanced our
knowledge of our planet...

149
00:07:23,880 --> 00:07:26,480
Our understanding of
the complex processes

150
00:07:26,480 --> 00:07:28,840
that take place
in our atmosphere.

151
00:07:30,920 --> 00:07:33,560
>>With KORUS-AQ we take another

step toward the future

152
00:07:33,560 --> 00:07:35,240
of an air quality
observing system

153
00:07:35,240 --> 00:07:37,440
that is going to make us
able to be more effective

154
00:07:37,440 --> 00:07:40,240
in identifying where poor
air quality is developing

155
00:07:40,240 --> 00:07:43,600
and how to better understand
what's driving it.

156
00:07:47,480 --> 00:07:48,600
>>What we've learned here

157
00:07:48,600 --> 00:07:51,600
can also be applied to
other cities and hopefully

158
00:07:51,600 --> 00:07:54,880
can help us improve the
air quality around the world.

159
00:07:55,120 --> 00:07:57,400
>>Because I think that
air pollution issues

160
00:07:57,400 --> 00:07:58,920
is not only for us

161
00:07:58,920 --> 00:08:01,000
but also for
some other countries.

162
00:08:02,920 --> 00:08:05,880
>>We are paving the way to
better understand pollution

163
00:08:06,080 --> 00:08:09,480
and our impact on air quality
in our atmosphere.

164
00:08:09,720 --> 00:08:12,080
But there's still much work
to do ahead of us.

165
00:08:14,840 --> 00:08:18,440
>>Think that, as we have reached
7 billion people on this planet,

166
00:08:18,440 --> 00:08:20,760
the consequences of what we do

167
00:08:20,760 --> 00:08:21,920
have a very significant

168
00:08:21,920 --> 00:08:23,760
impact on the environment.

169
00:08:23,760 --> 00:08:24,760
And we need to understand

170
00:08:24,760 --> 00:08:25,760
what we're doing very well.

171
00:08:29,560 --> 00:08:31,920
>>So this is the first step
of a long journey.

172
00:08:32,040 --> 00:08:34,840
We will still need additional
aircraft measurements

173
00:08:34,840 --> 00:08:37,640
and ground based measurements
going forward.

174
00:08:37,840 --> 00:08:39,880
>>We can't be everywhere
with the plane.

175
00:08:39,880 --> 00:08:42,880
But now that we demonstrated
here how the plane works

176
00:08:42,880 --> 00:08:45,440
in concert with satellite
observations and the ground,

177
00:08:45,720 --> 00:08:48,400
we can use satellite
observations to point

178
00:08:48,400 --> 00:08:50,880
the aircraft to the places
where we can learn the most

179
00:08:50,880 --> 00:08:52,280
or the places that
are in most need

180
00:08:52,280 --> 00:08:54,000
of understanding
what's going on.

181
00:08:59,760 --> 00:09:02,040
>>So we must continue
investigating...

182
00:09:02,240 --> 00:09:04,560
Exploring this world
to improve the lives