



1  
00:00:00,020 --> 00:00:04,030

[music] Narrator:

2  
00:00:04,050 --> 00:00:08,040

When seen from the ground holiday lights give us cheer and help us celebrate the season.

3  
00:00:08,060 --> 00:00:12,070

But from space, over time, they can tell us something about both culture

4  
00:00:12,090 --> 00:00:16,150

and energy usage. Three years ago

5  
00:00:16,170 --> 00:00:20,170

a new satellite called Suomi NPP began to give us brilliant new views of the Earth

6  
00:00:20,190 --> 00:00:24,190

by day and by night. But as stunning as it is

7  
00:00:24,210 --> 00:00:28,290

to see Earth all aglow, this is still just one composite image

8  
00:00:28,310 --> 00:00:32,310

averaging observations over a period of months. Getting the

9  
00:00:32,330 --> 00:00:36,370

big picture from space is always helpful, but we can learn even more

10  
00:00:36,390 --> 00:00:40,400

seeing that picture change over time.

11  
00:00:40,420 --> 00:00:44,470

A NASA-lead team of researchers has been pouring over the data from NPP

12  
00:00:44,490 --> 00:00:48,490

and compensating for factors like the reflection of the moon and the effect

13  
00:00:48,510 --> 00:00:52,510

terrain, clouds, aerosols, to produce a scientifically-valuable

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00:00:52,530 --> 00:00:56,530

measuring Earth's lights on a daily basis.

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00:00:56,550 --> 00:01:00,560

The first thing they noticed in the data was the effect of holidays.

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00:01:00,580 --> 00:01:04,580

Román:When we started looking at the data at night over the

17

00:01:04,600 --> 00:01:08,610

we were expecting to see a lot of stability in the night time lights.

18

00:01:08,630 --> 00:01:12,670

And we were really surprised to see this really vibrant increase

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00:01:12,690 --> 00:01:16,700

in activity during the holidays particularly around

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00:01:16,720 --> 00:01:20,730

areas in the suburbs.You have a lot of single-family homes

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00:01:20,750 --> 00:01:24,740

with a lot of yard space to put in lights.

22

00:01:24,760 --> 00:01:28,780

Narrator:Comparing the six weeks between Thanksgiving and New Years to the rest of the year,

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00:01:28,800 --> 00:01:32,870

the team noticed large areas where night lights were 20, 30, even 50 percent

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00:01:32,890 --> 00:01:36,880

brighter over the holidays, as shown here in shades of green.

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00:01:36,900 --> 00:01:40,900

Román:And so what we are seeing is this shift in location

26  
00:01:40,920 --> 00:01:44,920  
in activity where people are staying in their homes

27  
00:01:44,940 --> 00:01:48,970  
and they're celebrating, or they're traveling to the rural areas

28  
00:01:48,990 --> 00:01:53,080  
and they're celebrating ... and they're turning on the lights

29  
00:01:53,100 --> 00:01:57,110  
. Whereas in the urban centers people are turning off the lights because they're going off for the holidays.

30  
00:01:57,130 --> 00:02:01,140  
Narrator:

31  
00:02:01,160 --> 00:02:05,210  
Researchers actually first saw changes in holiday lighting patterns during Ramadan in the Middle East.

32  
00:02:05,230 --> 00:02:09,290  
Román: In contrast to the western holidays of Christmas and New Years, during Ramadan

33  
00:02:09,310 --> 00:02:13,300  
you don't see a shift in activity in location. What you're seeing is that communities

34  
00:02:13,320 --> 00:02:17,330  
are staying where they are, and they're shifting their activities

35  
00:02:17,350 --> 00:02:21,370  
to the nighttime.

36  
00:02:21,390 --> 00:02:25,390  
Another thing that the ... measurements are telling us is that it's capturing cultural differences even

37  
00:02:25,410 --> 00:02:29,410  
within a single community like the Muslim community

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00:02:29,430 --> 00:02:33,430

during the month of Ramadan. We're seeing patterns in behavior

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00:02:33,450 --> 00:02:37,510

that varies significantly from country to country,

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00:02:37,530 --> 00:02:41,550

a smaller increase in nighttime lights in Turkey, large increase of nighttime lights in

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00:02:41,570 --> 00:02:45,570

Saudi Arabia, no increase in nighttime lights in Israel

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00:02:45,590 --> 00:02:49,610

because it's not a predominantly Muslim country. So it's a lot of diversity seen within the data.

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00:02:49,630 --> 00:02:53,650

Narrator:Because the night light data has such good resolution,

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00:02:53,670 --> 00:02:57,660

researchers from Yale University have even been looking at

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00:02:57,680 --> 00:03:01,690

neighborhoods within cities, and correlating that data with known political and

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00:03:01,710 --> 00:03:05,720

socio-economic factors.

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00:03:05,740 --> 00:03:09,780

But from a NASA perspective, why is it important to concentrate on Earth's lights from space?

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00:03:09,800 --> 00:03:13,800

Román:A lot of our capability focuses on

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00:03:13,820 --> 00:03:17,820

using satellites to get a global picture of where we are

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00:03:17,840 --> 00:03:21,850

with respect to the environment and with respect to the day-to-day processes

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00:03:21,870 --> 00:03:25,900

processes that drives the earth system. A big component of that is

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00:03:25,920 --> 00:03:29,920

human activity and how they are driving the different processes

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00:03:29,940 --> 00:03:33,960

that impact the earth like carbon emissions and

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00:03:33,980 --> 00:03:38,010

like the heating patterns across cities.

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00:03:38,030 --> 00:03:42,040

So by looking at the lights we can see changes in human behavior

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00:03:42,060 --> 00:03:46,080

throughout the seasons, throughout the days, and we can use

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00:03:46,100 --> 00:03:50,120

that information to then understand what are the

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00:03:50,140 --> 00:03:54,150

norms that are driving the decisions behind

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00:03:54,170 --> 00:03:58,190

energy. If you look at climate change

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00:03:58,210 --> 00:04:02,240

research right now, we know that more than 70 percent of emissions

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00:04:02,260 --> 00:04:06,270

are happening in cities. So NASA is putting a lot of emphasis

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00:04:06,290 --> 00:04:10,310

on understanding cities and understanding the dynamics

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00:04:10,330 --> 00:04:14,360

dynamics of how cities are interacting with the climate and our system as a whole.