Evidencia de Nuestra Estancia en la Tierra: Imágenes del Resplandor Nocturno Captadas por el Satélite Suomi-NPP

Miguel O. Román
Centro de Vuelo Espacial Goddard de la NASA

Foto: @StationCDRKelly

¡Pero antes, un favorcito!

Twitter hashtag de hoy: #Foroluminica2015

@NASA_Roman @jcaeqb

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Foto: @StationCDRKelly

Esferas del Sistema Terrestre

Biósfera

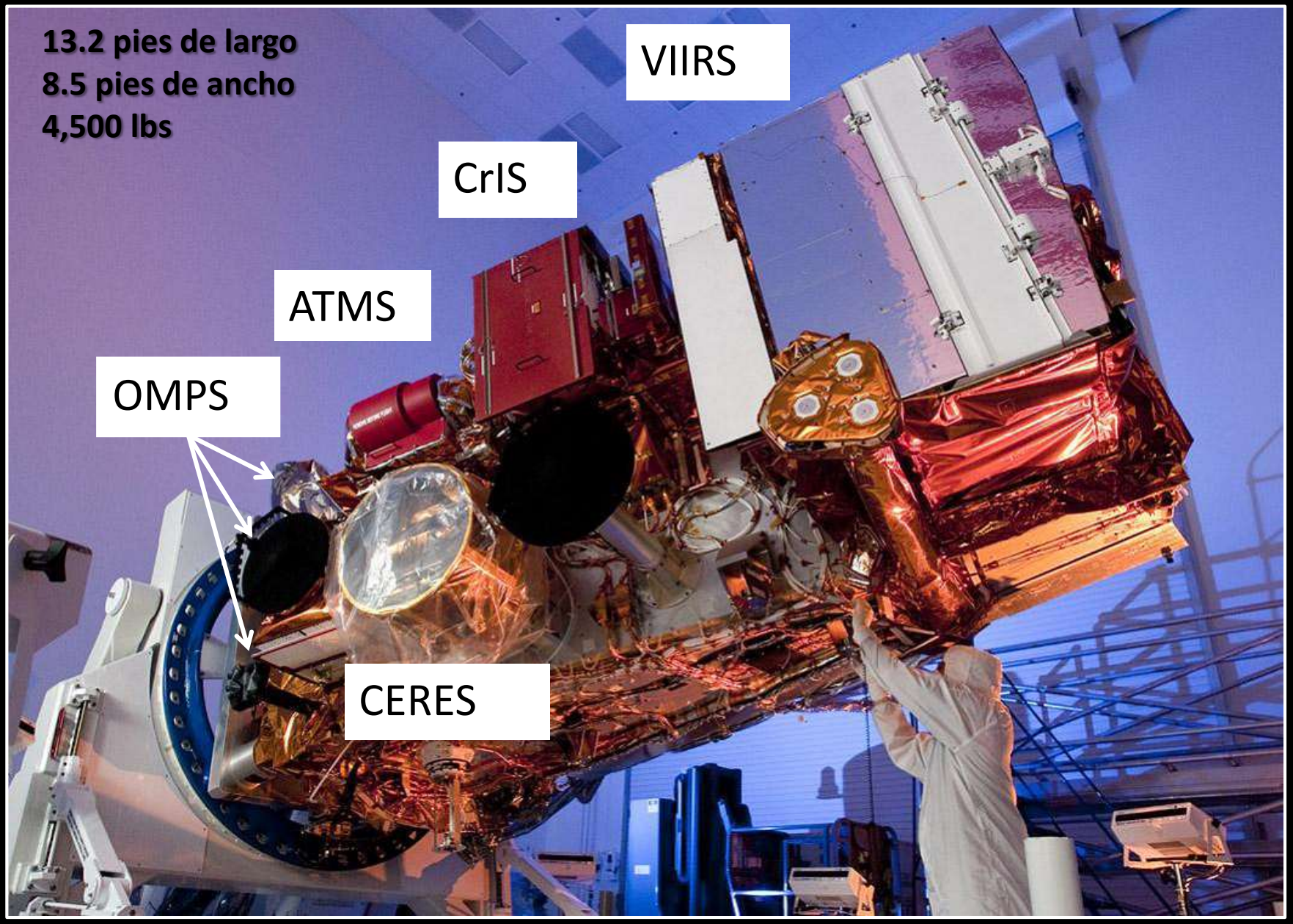
Océano

Atmósfera

Criósfera

Actividad Humana

Instrumentos del Satélite Suomi-NPP



¿Cómo uno se convierte en científico de la NASA?

c. 1987

The Washington Post

MIGUEL ROMÁN

An eye for tracking climate change

BY LISA REIN

The space ice currently propelling Miguel Román's career doesn't sound like a partner in cutting-edge research on how humans are interacting with Earth to cause global warming: the Visible Infrared Imager Radiometer Suite, a camera of sorts sitting on a satellite orbiting 824 miles above the planet.

But the sensor aboard NASA's Suomi NPP satellite is measuring forest fires, hurricanes, the size of leaves on trees and other changes that tell us Earth is warming, with dazzling imagery and equally dazzling precision.

And Román, a young earth-systems scientist with a knack for turning complex pixels into data, is leading the effort to make sure what's photographed in space is translated accurately for fire managers, weather forecasters, governments and researchers.

"We're studying where we live," he said, walking down a corridor in the Terrestrial Information Systems Laboratory, otherwise known as Code 619, in Building 33 at NASA Goddard Space Flight Center in Greenbelt.

"It's not just square pixels and signals," Román said. "It's our natural system and how humans are interacting with it."

He is one in a new generation of climate scientists who are using increasingly sophisticated satellites the size of yellow school buses to track not just weather but rising sea levels, melting ice and snow, fires and drought, and other evidence that greenhouse gas emissions are producing wide-ranging changes in global weather patterns.

Román is just 33. But the affable Puerto Rico-born researcher, whose specialty is remote sensing, is one of 33 individuals and teams of federal employees nominated for the 19th annual Samuel J. Heyman Service to

ROMÁN CONTINUED ON B6

Editor's note:

The profiles of Washington-area federal workers who are finalists for the 2014 Samuel J. Heyman Service to America Medals will run weekly through September.

Miguel Román at NASA leads the effort to ensure that satellite photographs are accurately translated into data.

Scientist studies climate, energy use

ROMÁN FROM B1

America Medals, among the highest honors in government.

He is one of five finalists for a "Call to Service" award, which recognizes the achievements of young public servants. The medals will be announced in September by the nonprofit Partnership for Public Service.

His colleagues at NASA, in nominating him, cited data on wildfires that was so timely and accurate it has helped emergency responders position equipment and people faster than ever. They also spotlighted his research interpreting images of nighttime lights in 1,000 cities to understand global energy use.

"At the end of the day, our Number One priority is to process the data and turn it into scientifically valid information in a useful format," Román said. "Our fire managers can't wait two or five hours to know what they're facing. We've got it down to about 20 minutes."

The fire monitoring system can map fires across the world

Miguel Román is one of five finalists for the Samuel J. Heyman Service to America Medals "Call to Service" award for his work on climate and energy data.

c. 2014

PUERTO RICO
LOW - HILLS - MTS.
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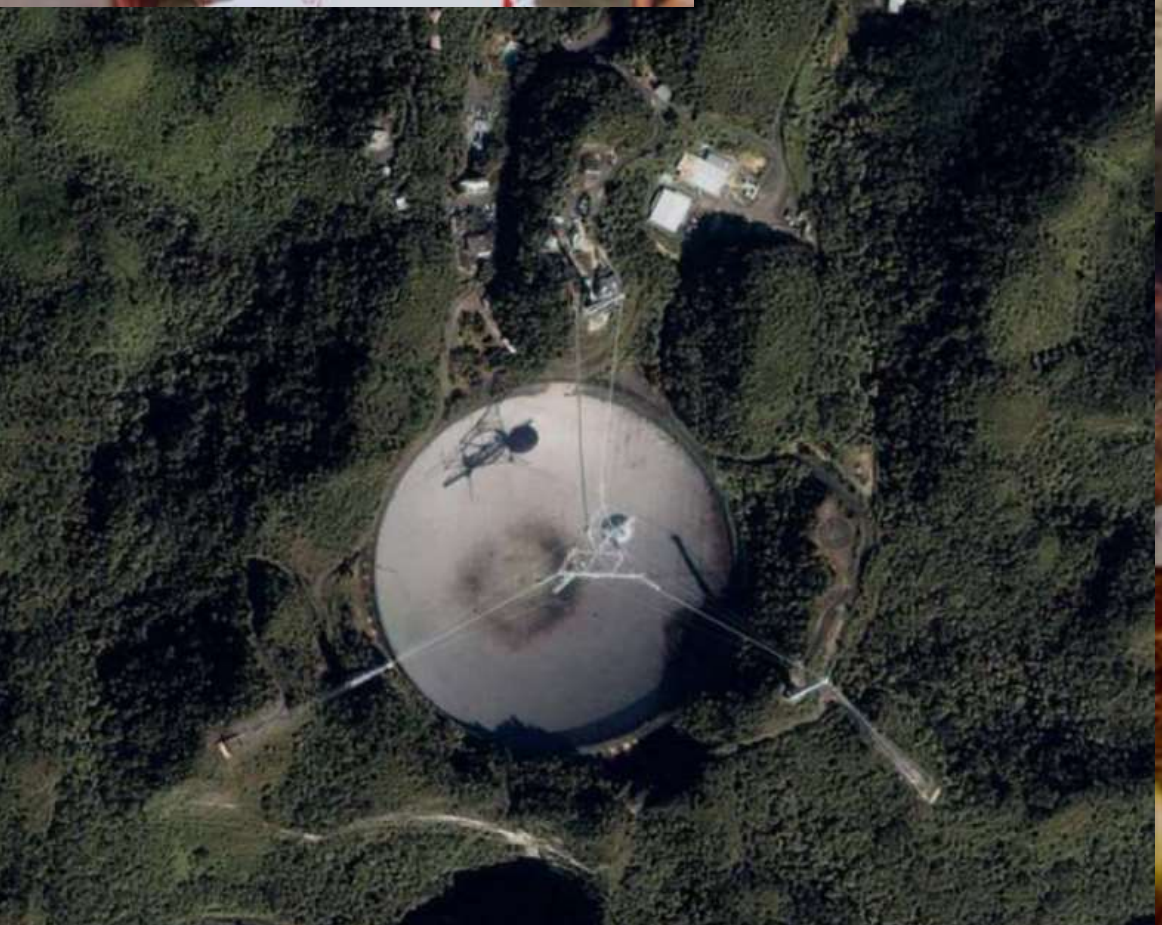
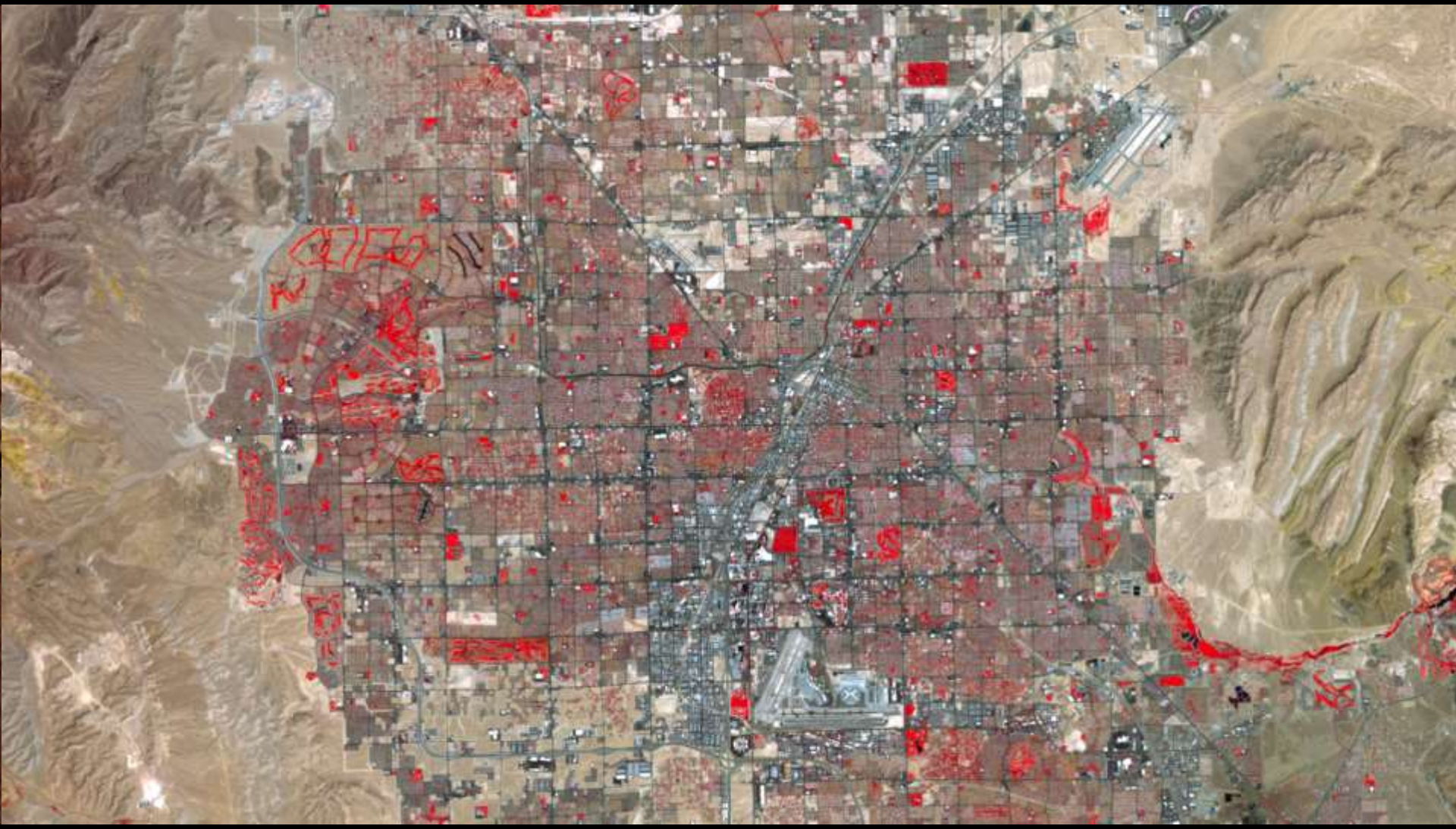
Atlantic Ocean
Puerto Rico
San Juan
Isabella
Arecibo
Bayamón
Carolina
Isla de Culebra
Aguadilla
Rincón
Utuado
Cerro de Punta
El Yunque
Fajardo
Mayagüez
Caguas
Cordillera Central
Humacao
San Germán
Esperanza
Isla de Vieques
Ponce
Guayama
Patillas
Las Mareas
Bosque Estatal de Guánica
Caribbean Sea
30 mi
30 km



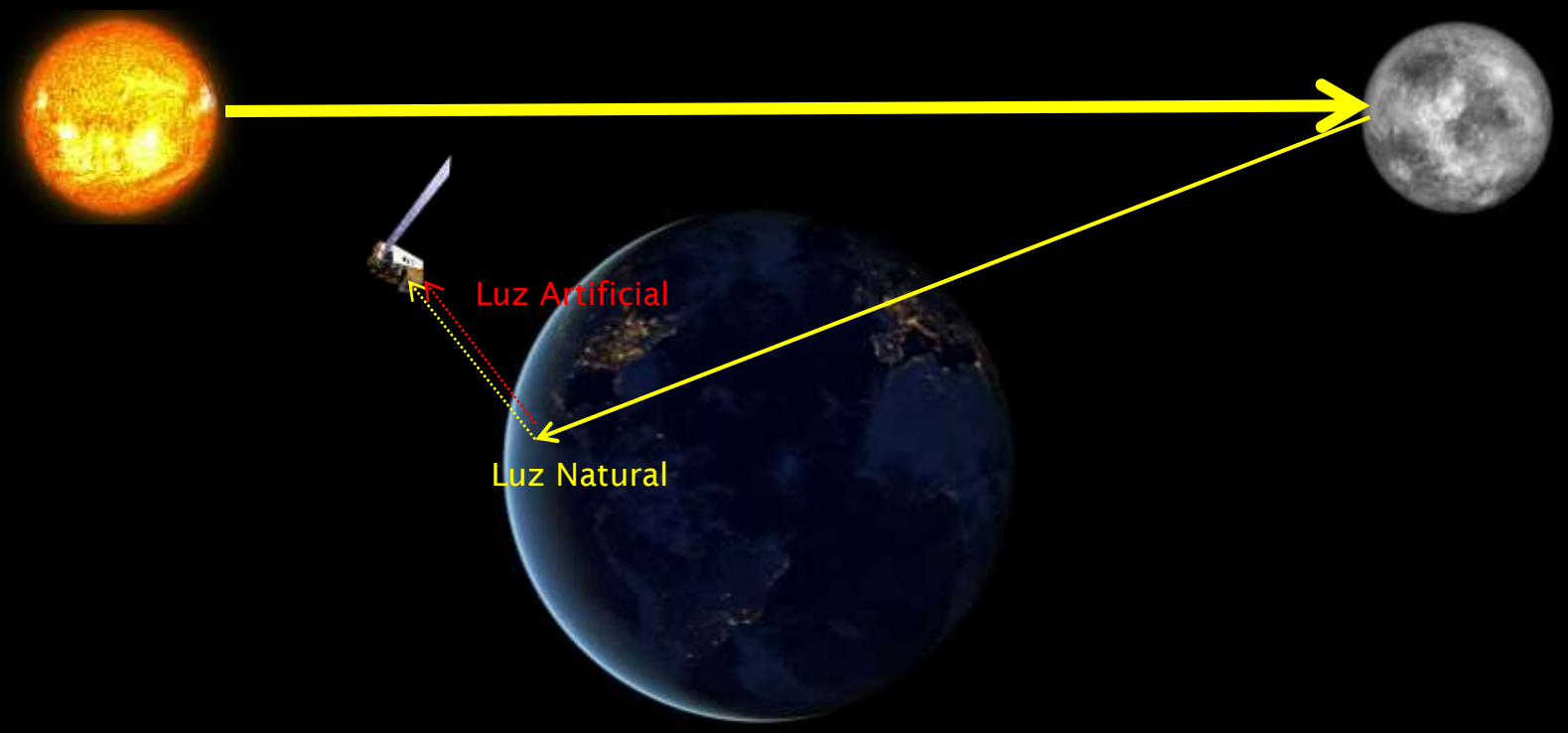
Nuestro patrimonio natural está íntimamente ligado a nuestra identidad como Pueblo.

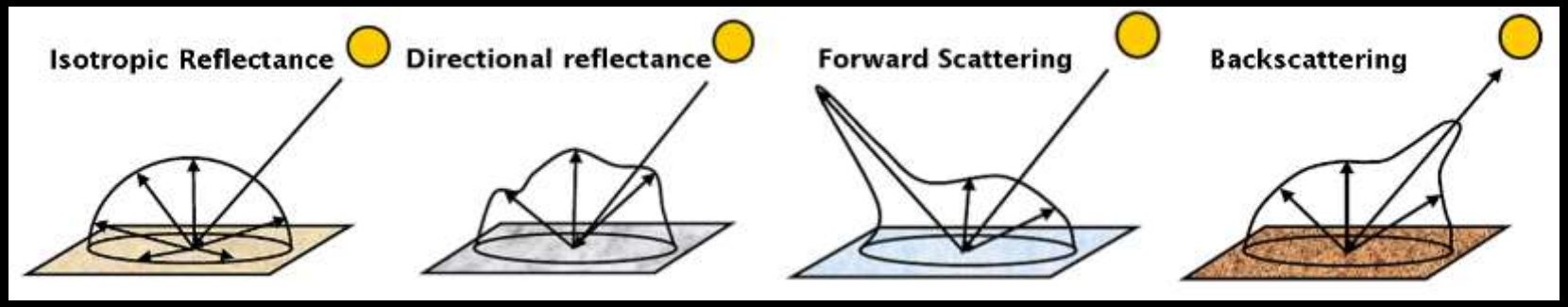
Borínquen: Mi tierra, mi sangre, mi bandera.
(*My land, my blood, my flag*)

Puerto Rico durante la Época Navideña

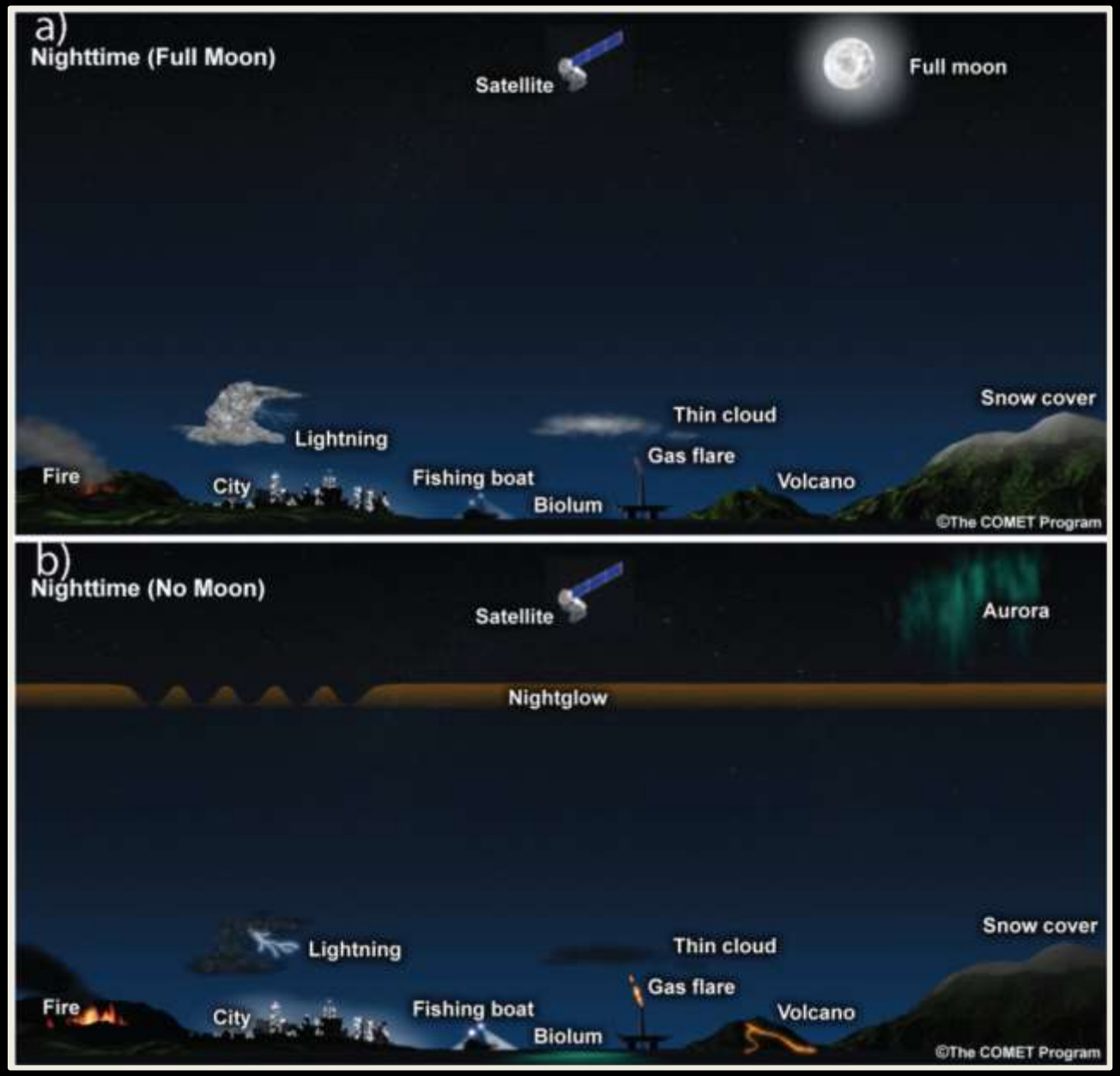


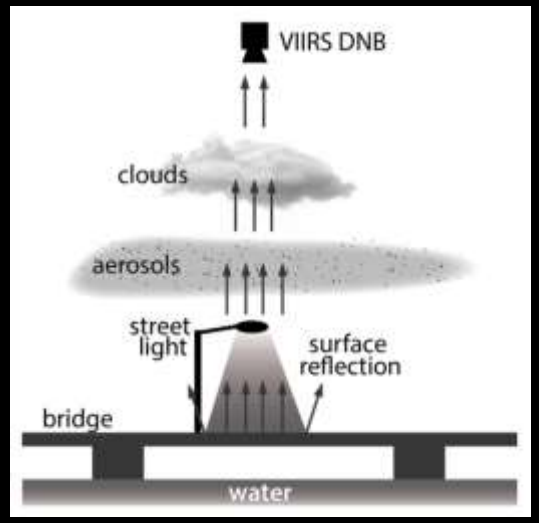
Principios de Teledetección (Sensores Pasivos)



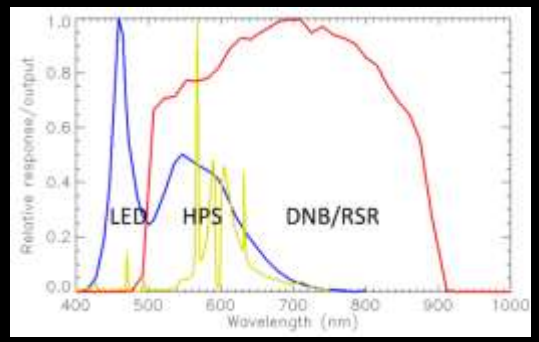


Suomi-NPP VIIRS: Capacidad de Teledetección (a) con y (b) sin iluminación Lunar





Propagación de luz artificial



- Respuesta Espectral de VIIRS
- Espectro de Lámpara LED
- Espectro de Lámpara de Sodio de Alta Presión

Miller et al., (2013) *Remote Sens. 2013, 5(12), 6717-6766; doi:10.3390/rs5126717*

Cambio en Energía Lumínica

menos **igual** **más**

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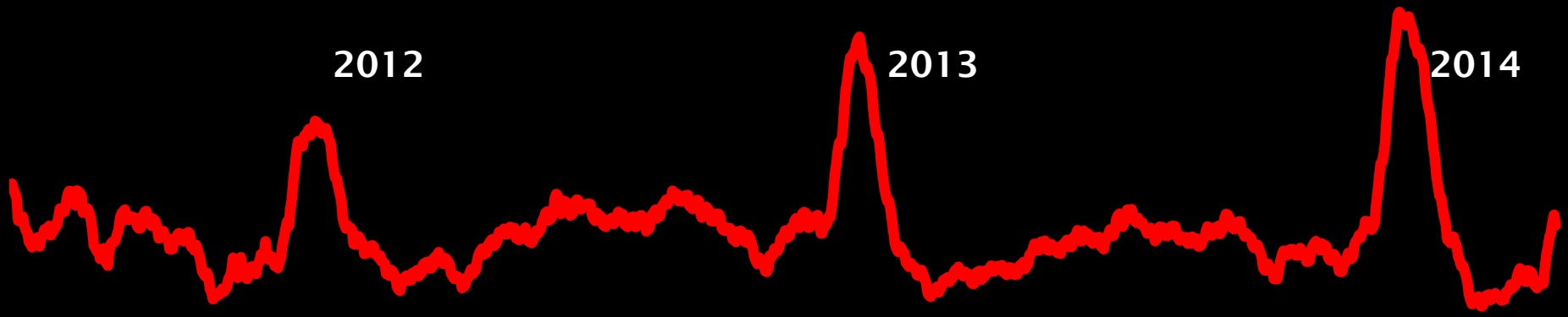
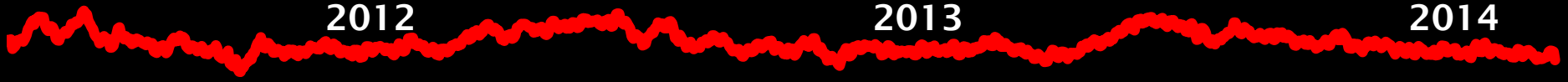
Puerto Rico durante la Época Navideña

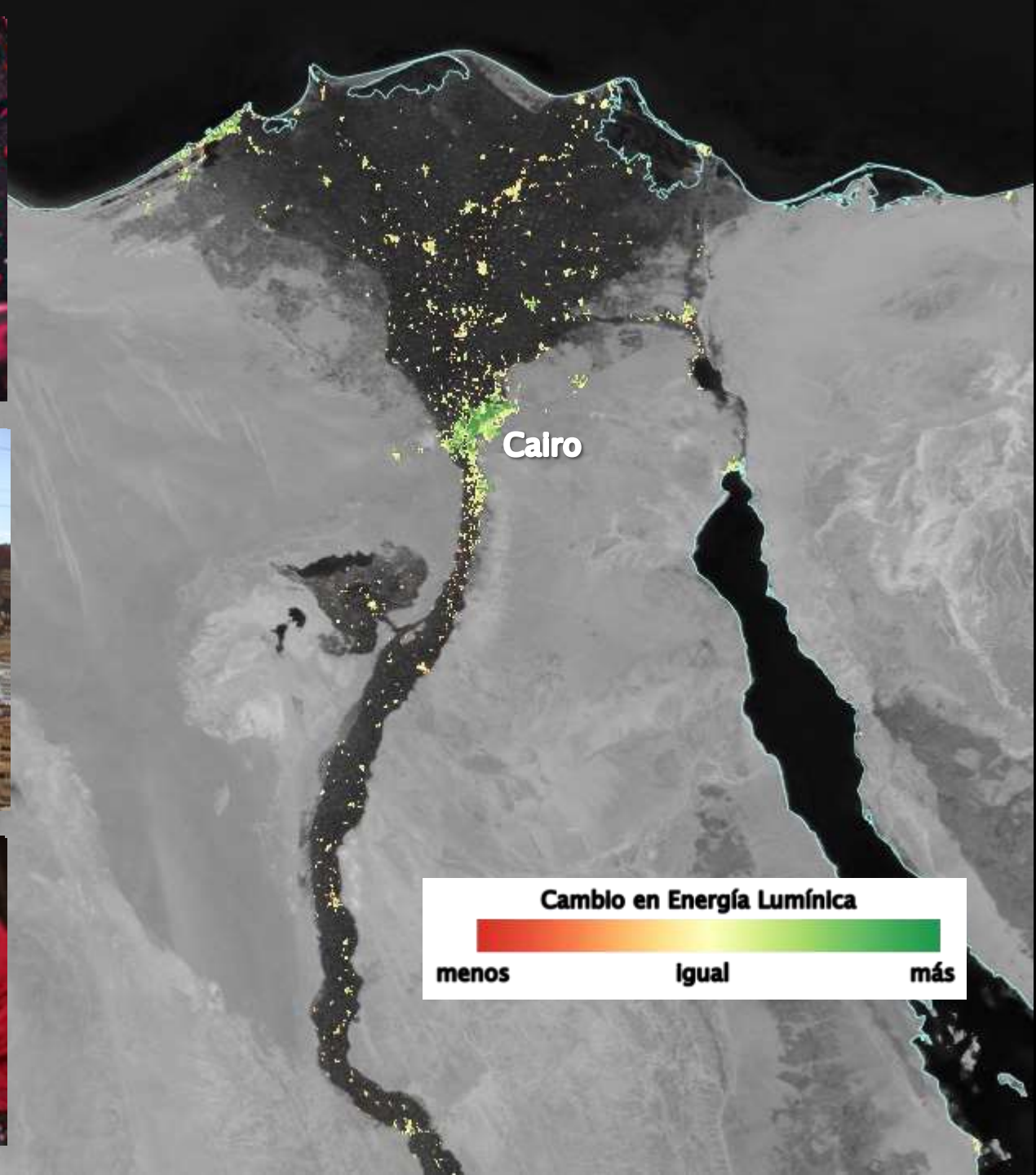
El Mes Sagrado del Ramadán

Yida, Arabia Saudita

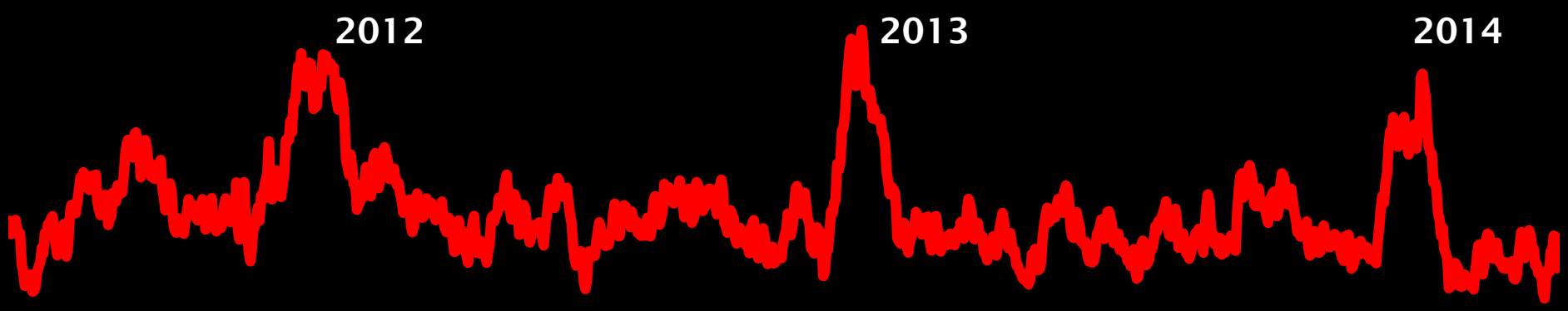


Tel Aviv, Israél

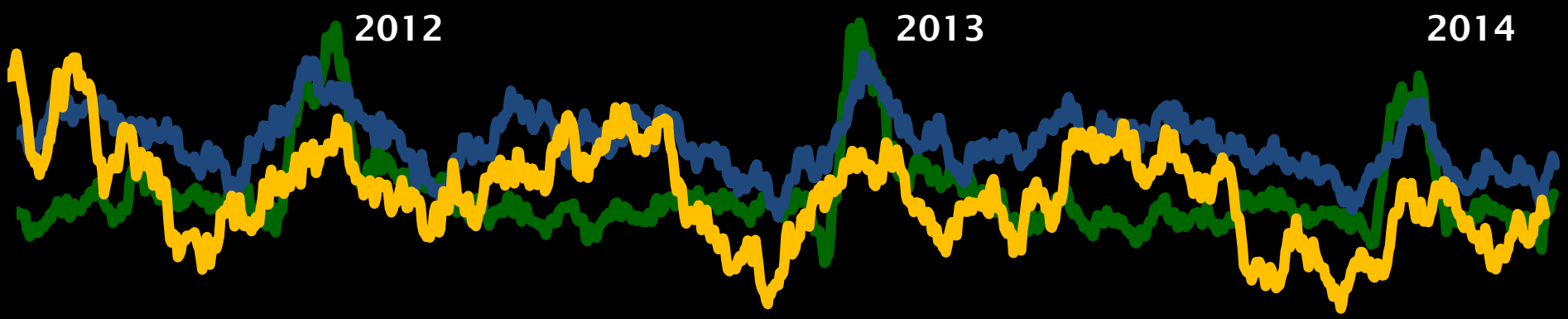



Cairo
Cambio en Energía Lumínica
menos
Igual
más

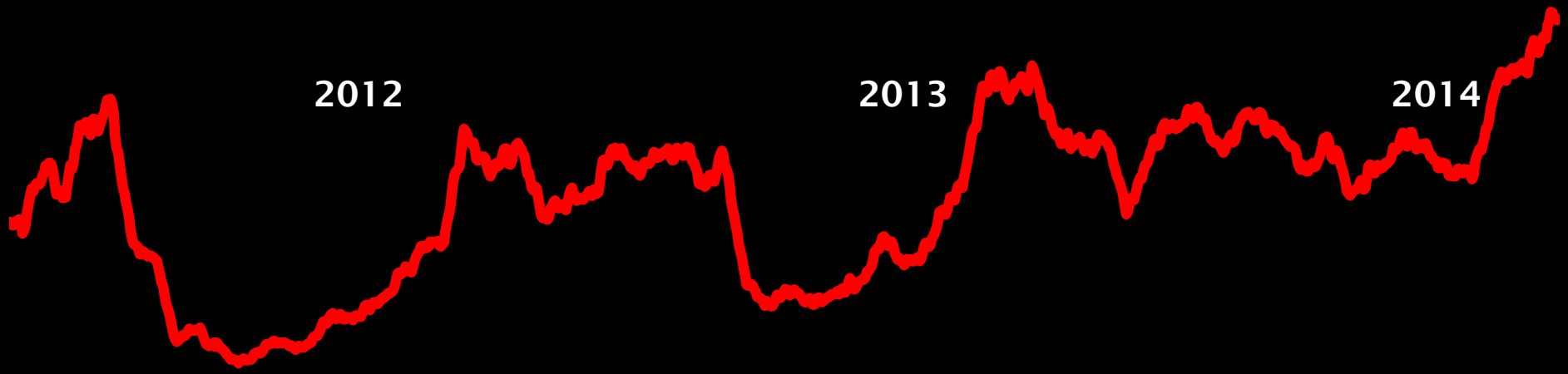
Cairo, Egipto



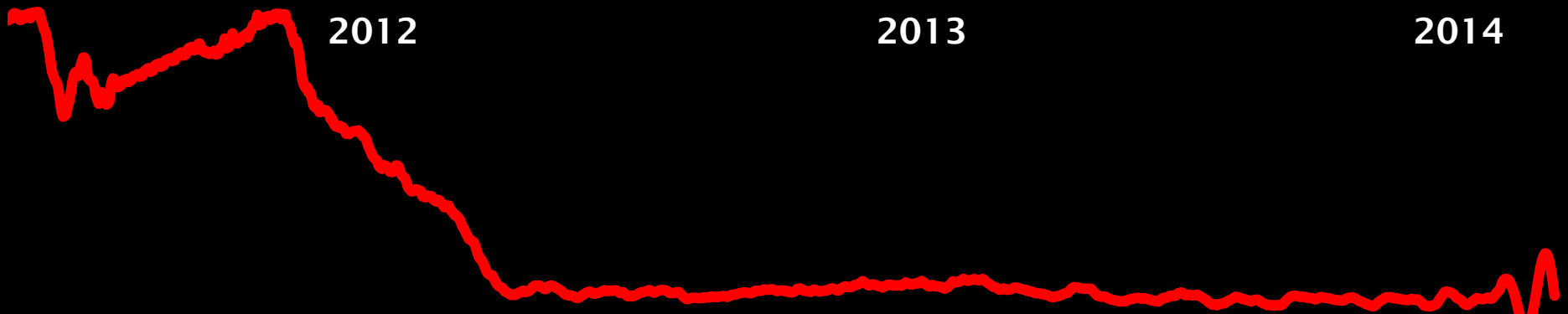
Distrito El Cairo, Distrito Oriental, and Distrito Asiut



Basora, Iraq



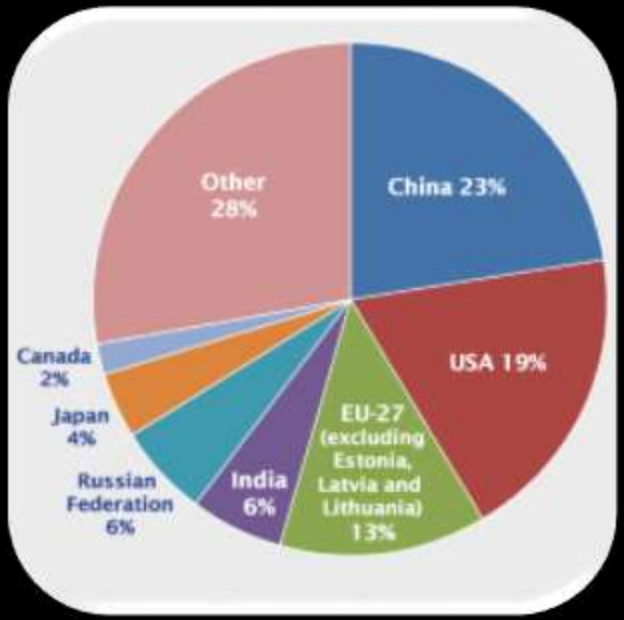
Alepo, Siria



Energía sustentable para todos.

Nivel Individual

Nivel Comunitario



Nivel Estatal y Global

Twitter: @NASA_Roman

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Foto: @StationCDRKelly

Documento de Base Teórica de Algoritmo (Román & Stokes, 2015)

AGU PUBLICATIONS

Earth's Future

RESEARCH ARTICLE
10.1002/2014EF000285

Holidays in lights: Tracking cultural patterns in demand for energy services

Miguel O. Román[1,†] and Eleanor C. Stokes[2,†]

B1. Correction of Surface Reflectance Anisotropy Effects

$$L_m\left(\lambda,\Omega_v,\Omega_m\right)=\frac{E_m(\lambda)}{\pi}\mathrm{BRF}\left(\lambda,\Omega_v,\Omega_m\right)\cos\left(\theta_m\right)$$

where θ_m is the lunar zenith angle, and $E_m(\lambda)$ (units of Watts m^{-2}) is the downwelling TOA sensor response function-weighted lunar irradiance derived from the MT2009 model:

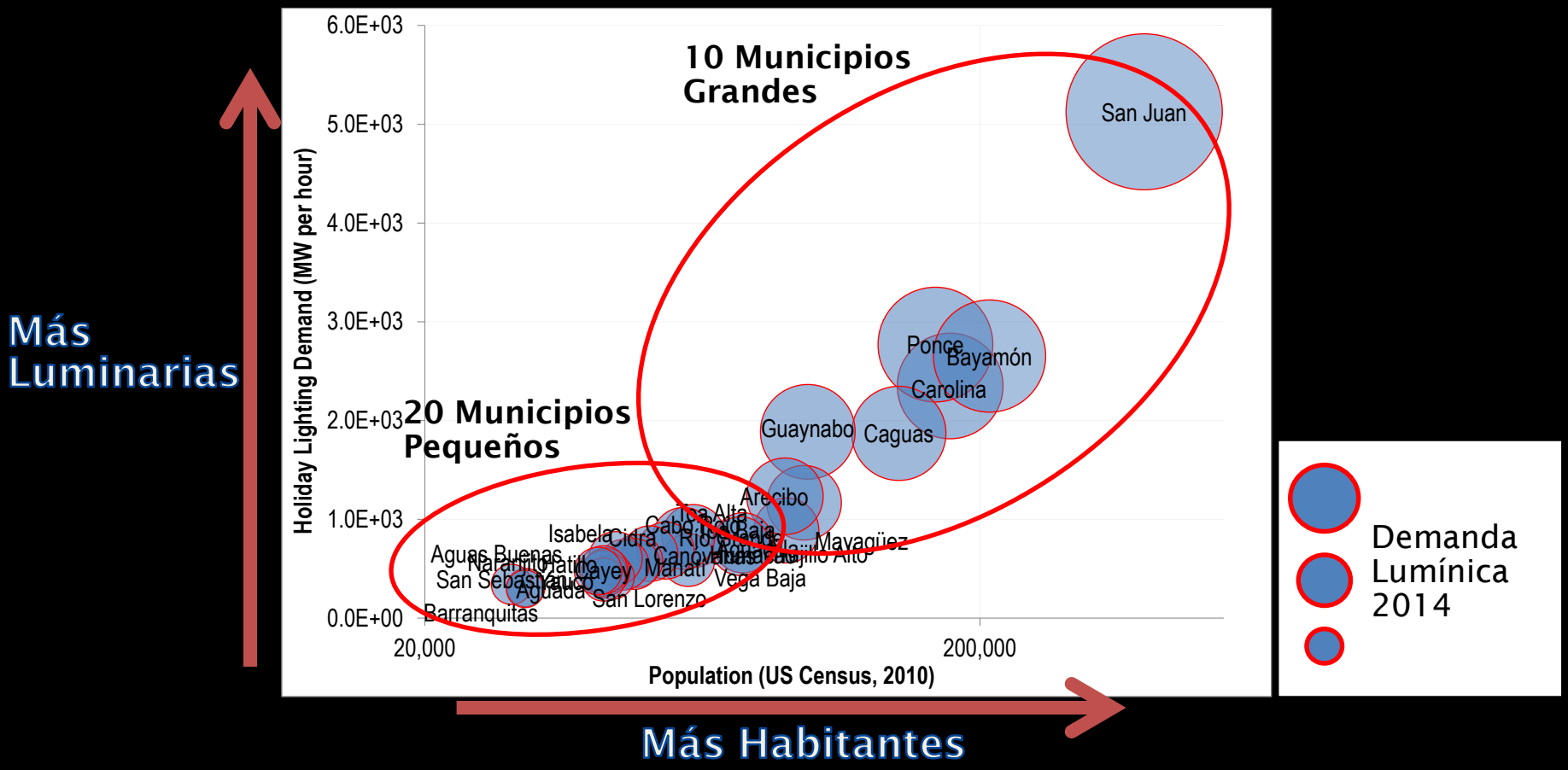
$$E_m(\lambda)=\int I_{MT}(\lambda)\,SRF(\lambda)\,d\lambda\Big/\int SRF(\lambda)\,d\lambda$$

B2. Estimation of Nighttime Lights

The surface upward radiance from artificial nighttime light sources, L_{NTL} (i.e., comprising nighttime lights from cities, suburban areas, rural villages, etc.) can be estimated using the following relationship [*Johnson et al.*, 2013]:

$$L_{\mathrm{NTL}}=\left[\frac{L_{\mathrm{DNB}}-L_{\mathrm{path}}}{T_{\uparrow}\left(\tau,\theta_{\mathrm{v}}\right)}\left(1-a\left(\theta_{\mathrm{m}}\right)\rho_{\mathrm{a}}\right)\right]-L_{\mathrm{m}}T_{\uparrow}\left(\tau,\theta_{\mathrm{m}}\right)$$

Demanda Lumínica en Puerto Rico



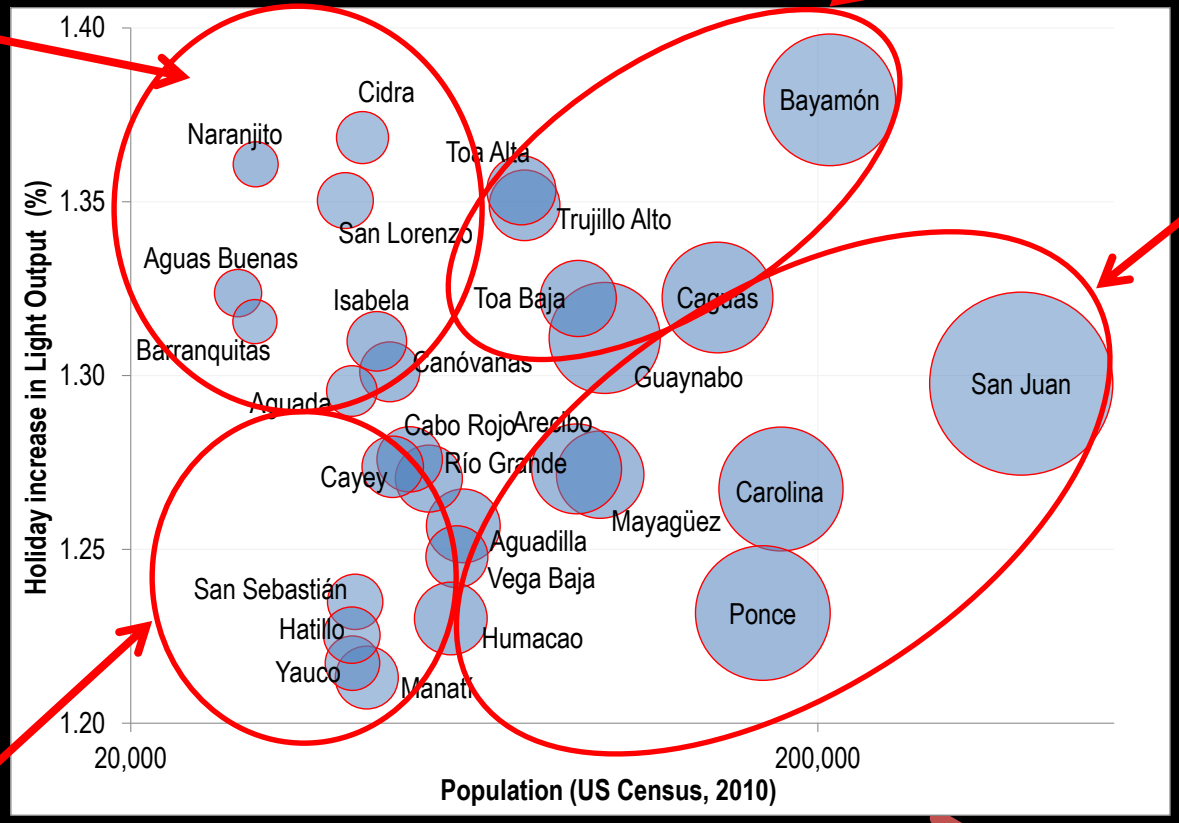
Puerto Rico durante la Navidad

Suburbios y Áreas Residenciales

Centros Culturales

Centros Urbanos

Más Luminarias Durante La Navidad



Demanda Lumínica 2014

Centros de Descanso

Más Habitantes

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