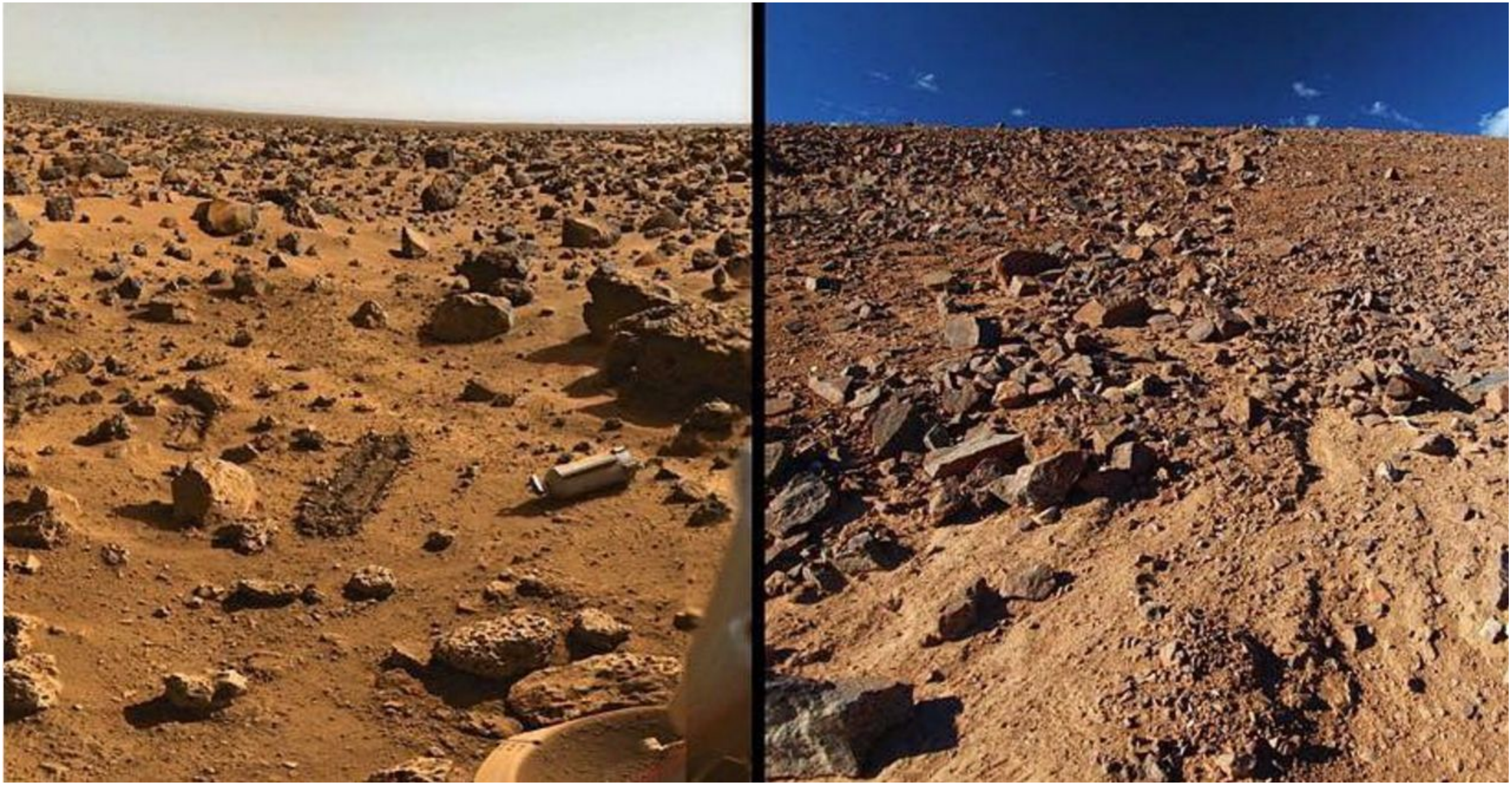
Universidad
de Antofagasta

Centro de Astronomía
Universidad de Antofagasta

Un panorama de la problemática de la contaminación lumínica hoy

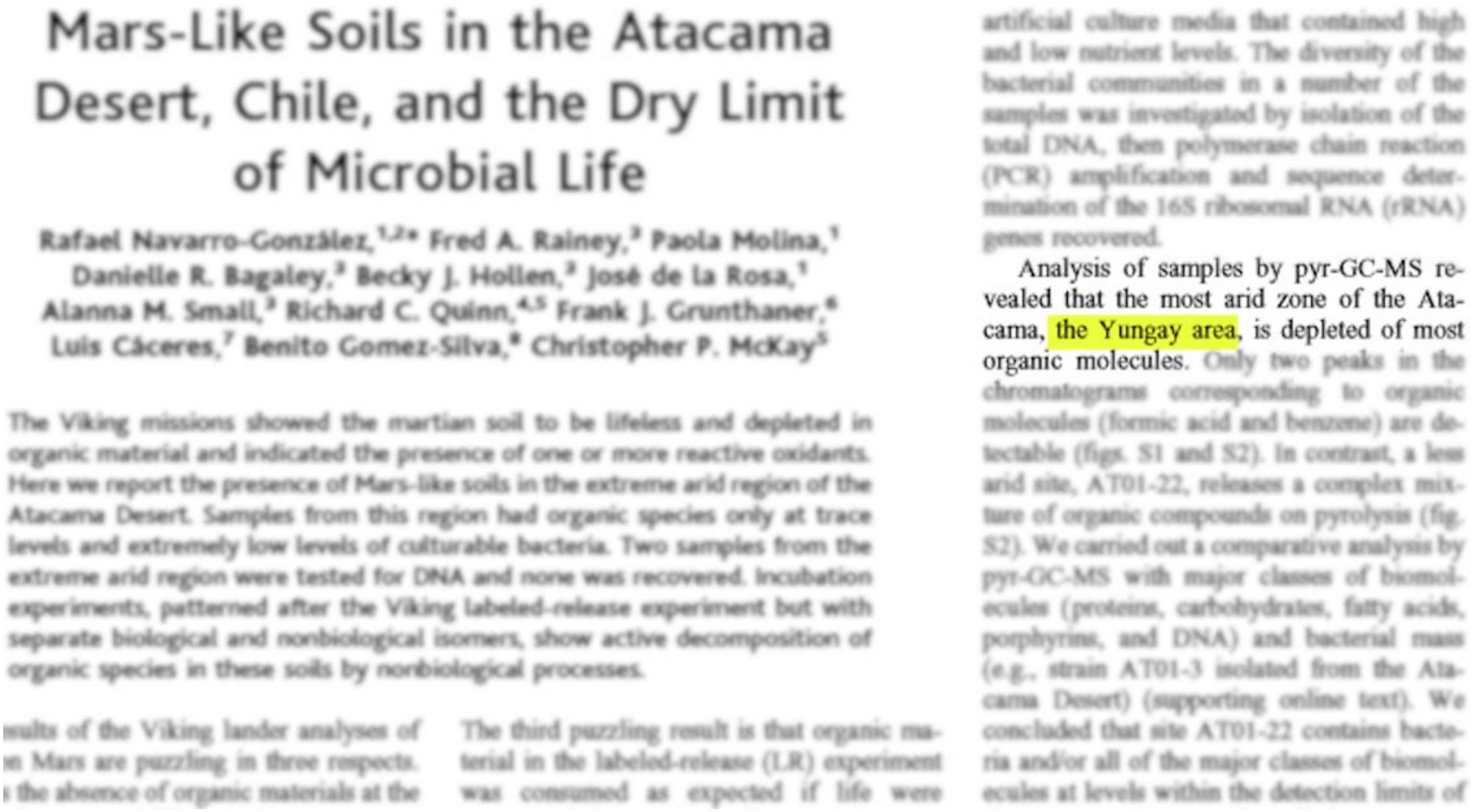
Eduardo Unda-Sanzana

Centro de Astronomía
Universidad de Antofagasta



Autores:: NASA / Vía Láctea Astrotour

El desierto más seco del mundo y más parecido a Marte



Mars-Like Soils in the Atacama Desert, Chile, and the Dry Limit of Microbial Life

Rafael Navarro-González,[1,2*] Fred A. Rainey,[3] Paola Molina,[1]
Danielle R. Bagaley,[3] Becky J. Hollen,[3] José de la Rosa,[1]
Alanna M. Small,[3] Richard C. Quinn,[4,5] Frank J. Grunthaner,[6]
Luis Cáceres,[7] Benito Gomez-Silva,[8] Christopher P. McKay[5]

The Viking missions showed the martian soil to be lifeless and depleted in organic material and indicated the presence of one or more reactive oxidants. Here we report the presence of Mars-like soils in the extreme arid region of the Atacama Desert. Samples from this region had organic species only at trace levels and extremely low levels of culturable bacteria. Two samples from the extreme arid region were tested for DNA and none was recovered. Incubation experiments, patterned after the Viking labeled-release experiment but with separate biological and nonbiological isomers, show active decomposition of organic species in these soils by nonbiological processes.

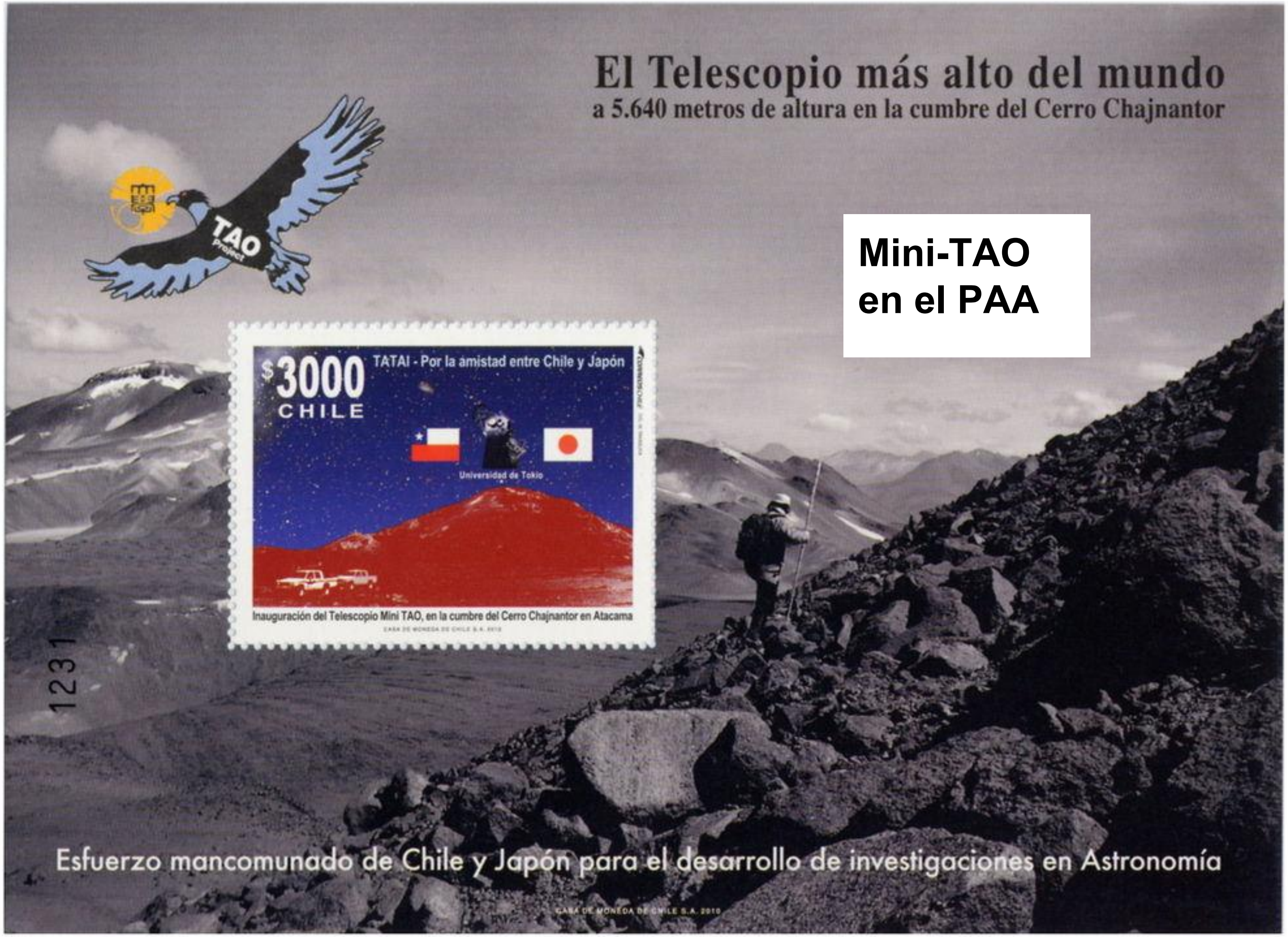
sults of the Viking lander analyses of
n Mars are puzzling in three respects.
the absence of organic materials at the

The third puzzling result is that organic material in the labeled-release (LR) experiment was consumed as expected if life were

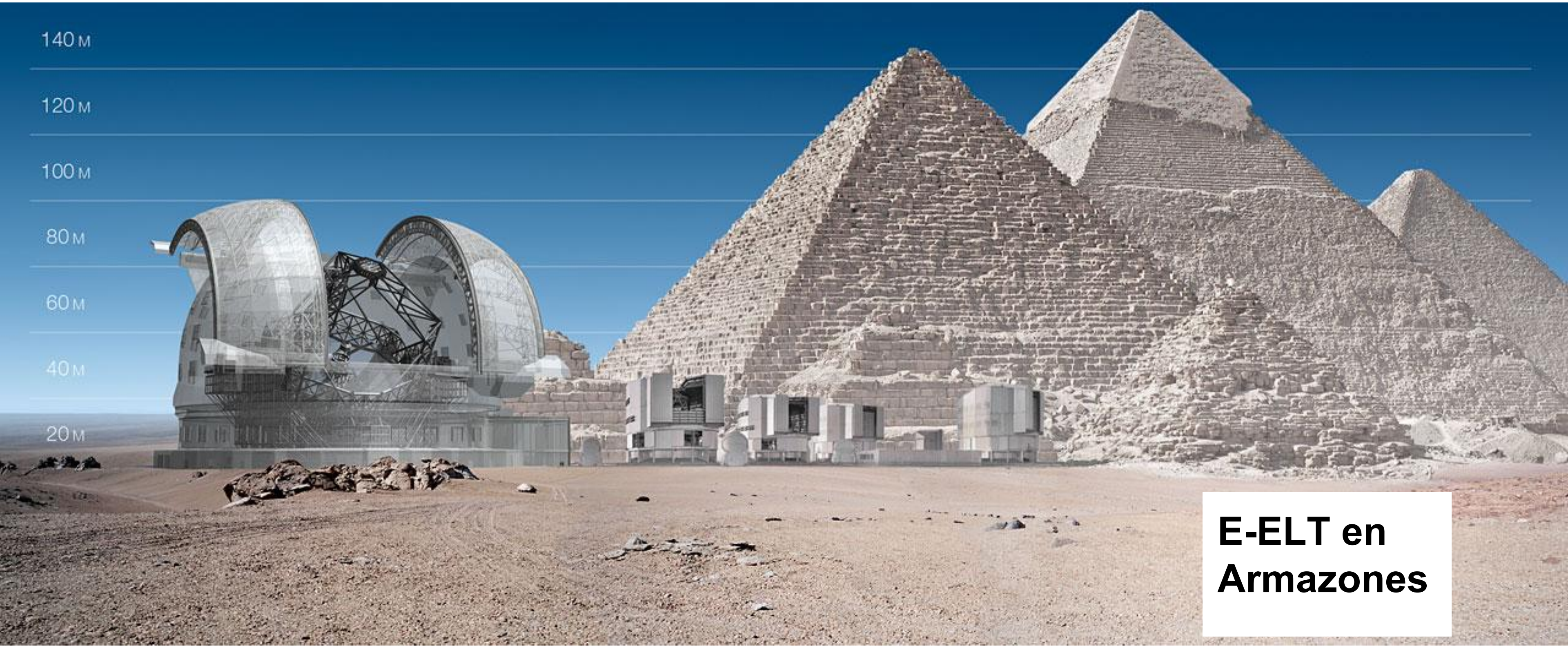
artificial culture media that contained high and low nutrient levels. The diversity of the bacterial communities in a number of the samples was investigated by isolation of the total DNA, then polymerase chain reaction (PCR) amplification and sequence determination of the 16S ribosomal RNA (rRNA) genes recovered.

Analysis of samples by pyr-GC-MS revealed that the most arid zone of the Atacama, the Yungay area, is depleted of most organic molecules. Only two peaks in the chromatograms corresponding to organic molecules (formic acid and benzene) are detectable (figs. S1 and S2). In contrast, a less arid site, AT01-22, releases a complex mixture of organic compounds on pyrolysis (fig. S2). We carried out a comparative analysis by pyr-GC-MS with major classes of biomolecules (proteins, carbohydrates, fatty acids, porphyrins, and DNA) and bacterial mass (e.g., strain AT01-3 isolated from the Atacama Desert) (supporting online text). We concluded that site AT01-22 contains bacteria and/or all of the major classes of biomolecules at levels within the detection limits of

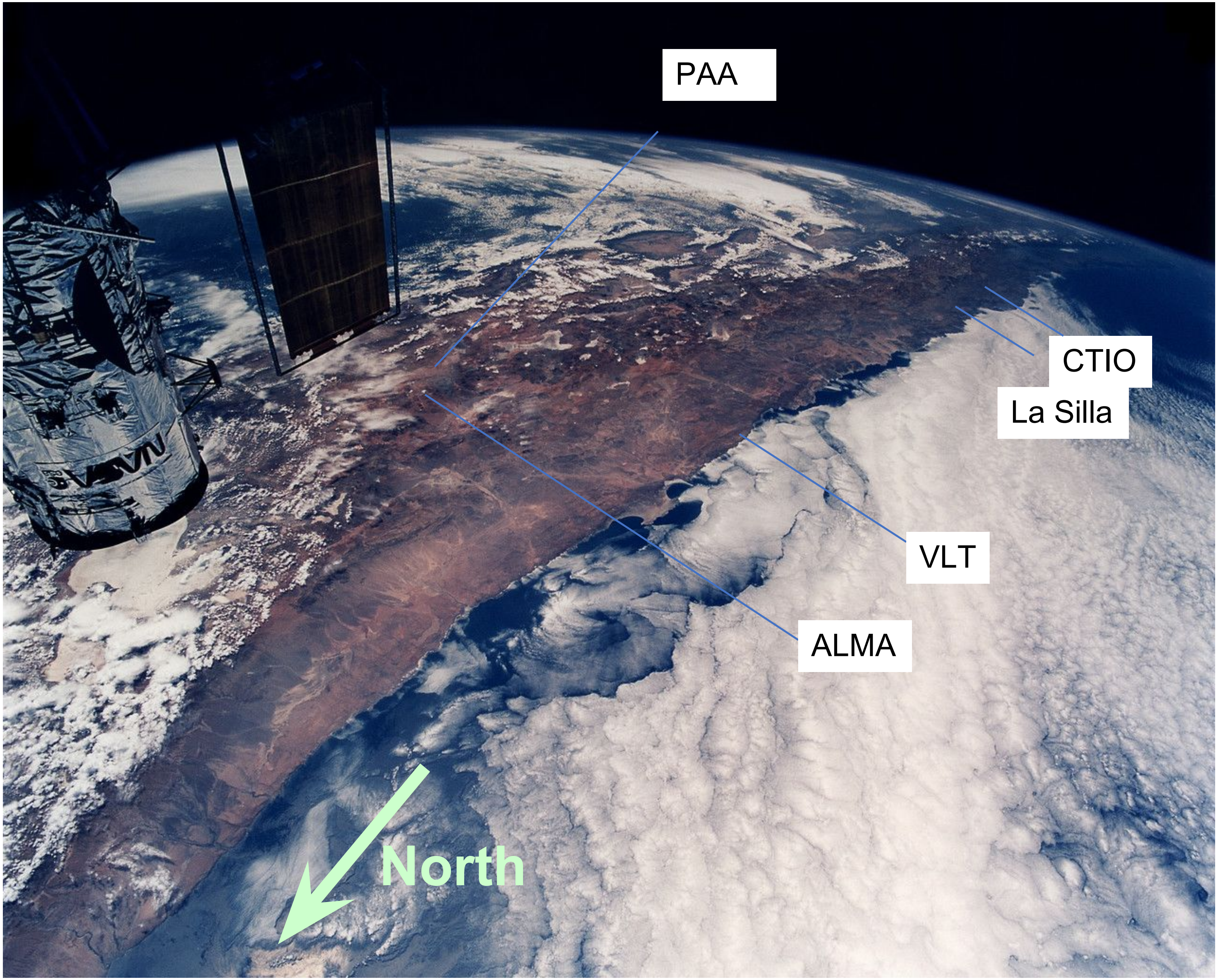
Mini-TAO en el PAA

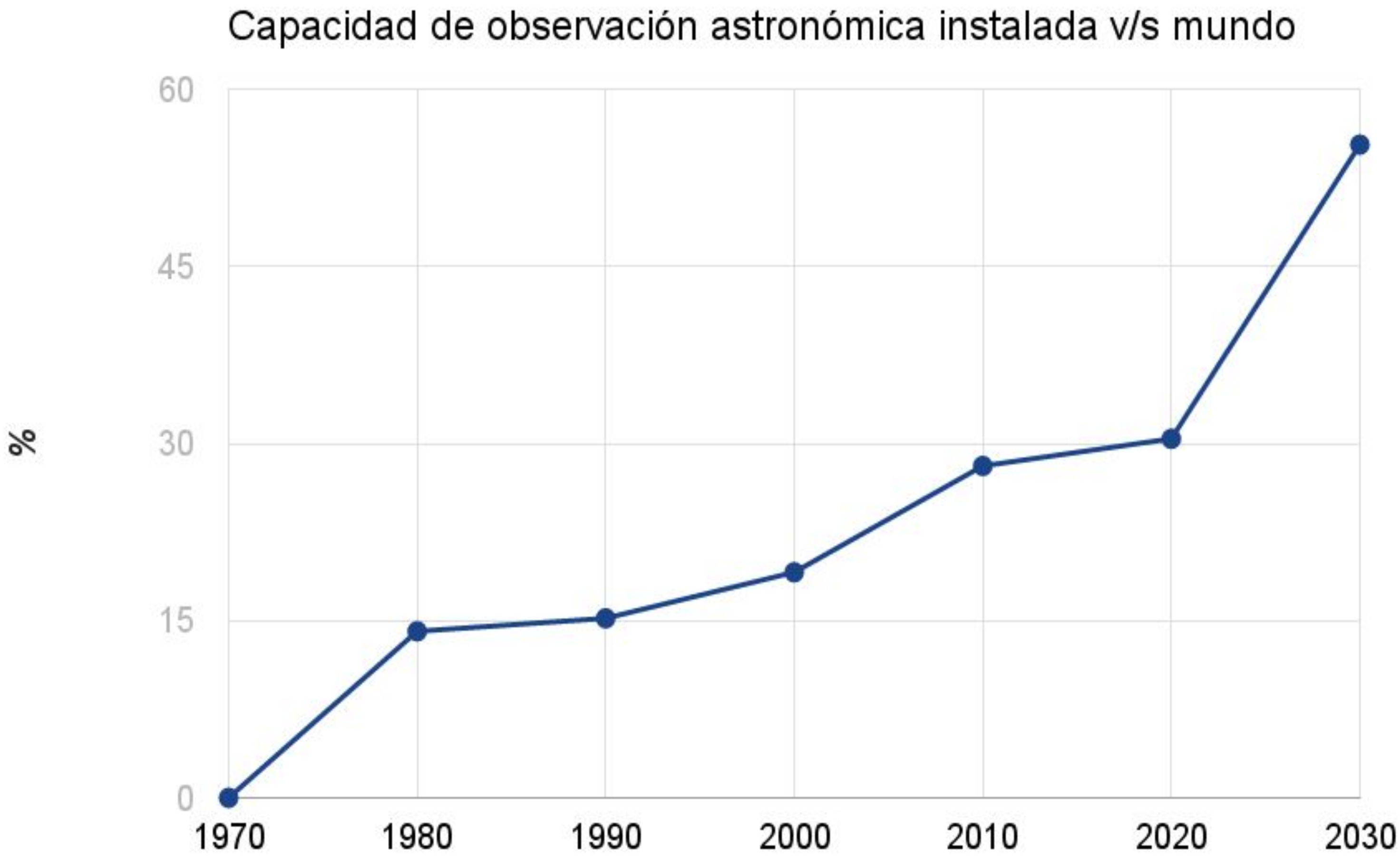

El Telescopio más alto del mundo
a 5.640 metros de altura en la cumbre del Cerro Chajnantor
TAO Project
$3000
CHILE
TATAI - Por la amistad entre Chile y Japón
Universidad de Tokio
CORREOS CHILE
Inauguración del Telescopio Mini TAO, en la cumbre del Cerro Chajnantor en Atacama
CASA DE MONEDA DE CHILE S.A. 2010
1231
Esfuerzo mancomunado de Chile y Japón para el desarrollo de investigaciones en Astronomía
CASA DE MONEDA DE CHILE S.A. 2010

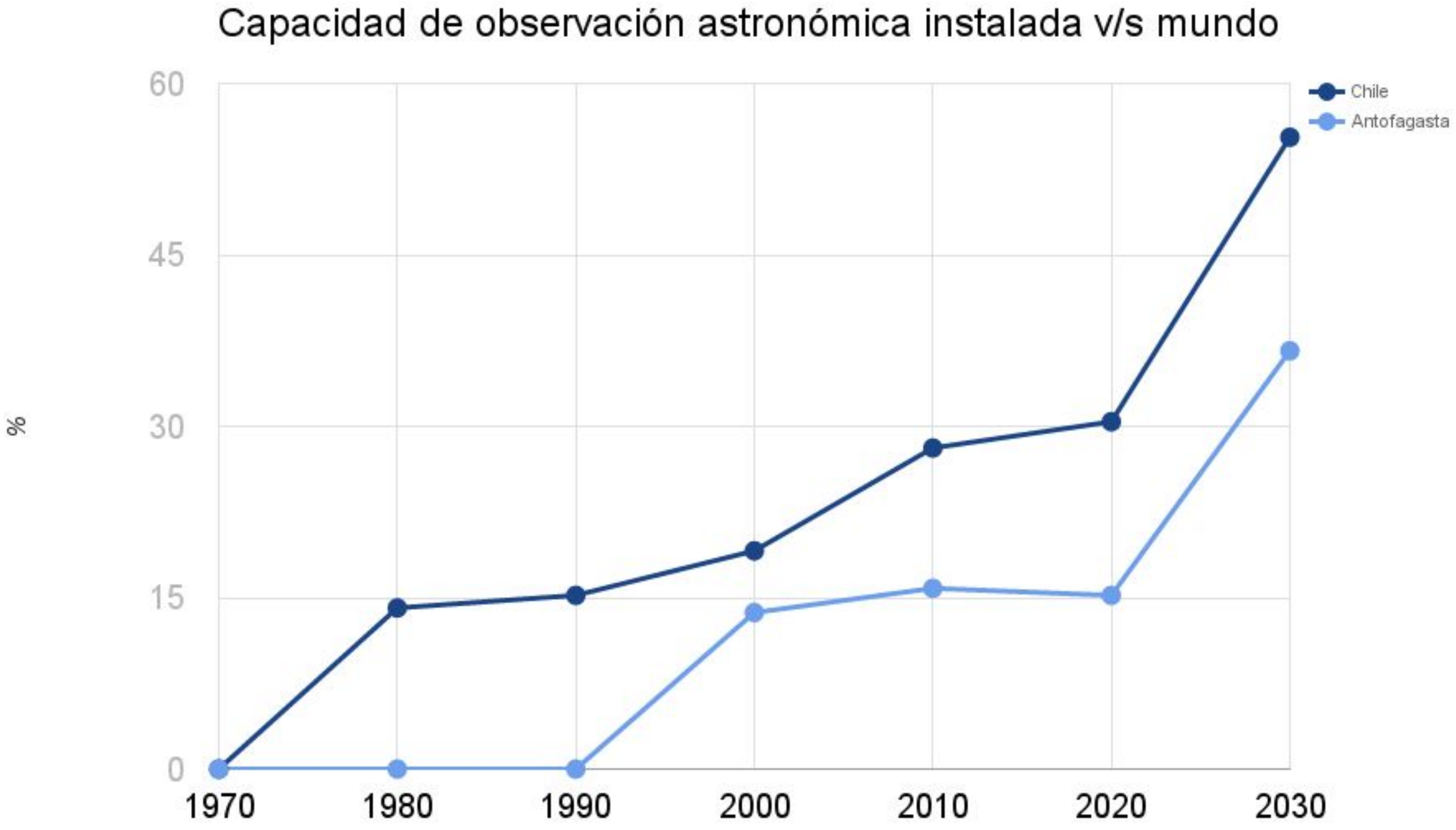
El telescopio más grande del mundo


140 M
120 M
100 M
80 M
60 M
40 M
20 M

E-ELT en Armazones


PAA
CTIO
La Silla
VLT
ALMA
North


Capacidad de observación astronómica instalada v/s mundo
%
60
45
30
15
0
1970
1980
1990
2000
2010
2020
2030


Capacidad de observación astronómica instalada v/s mundo
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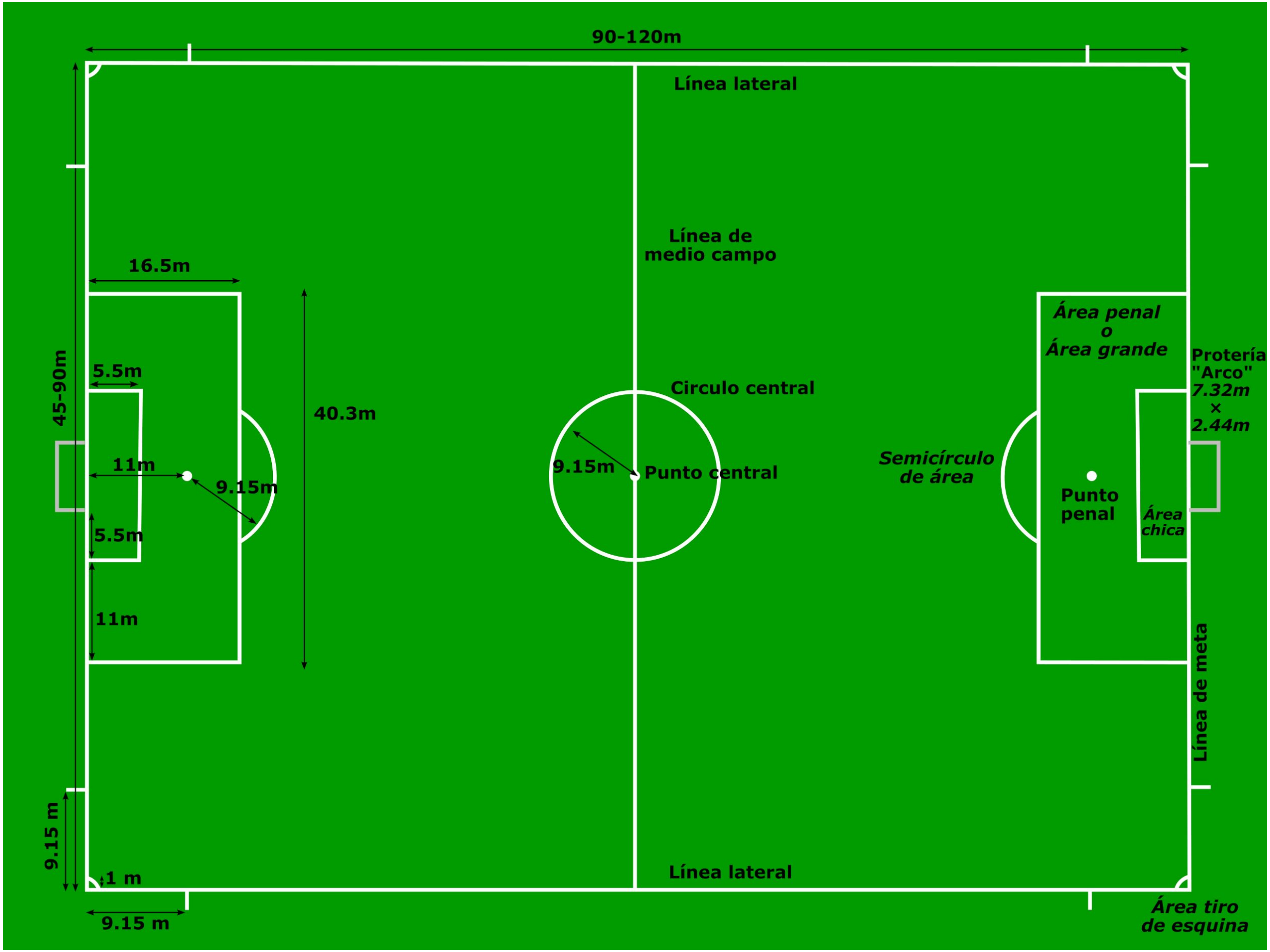
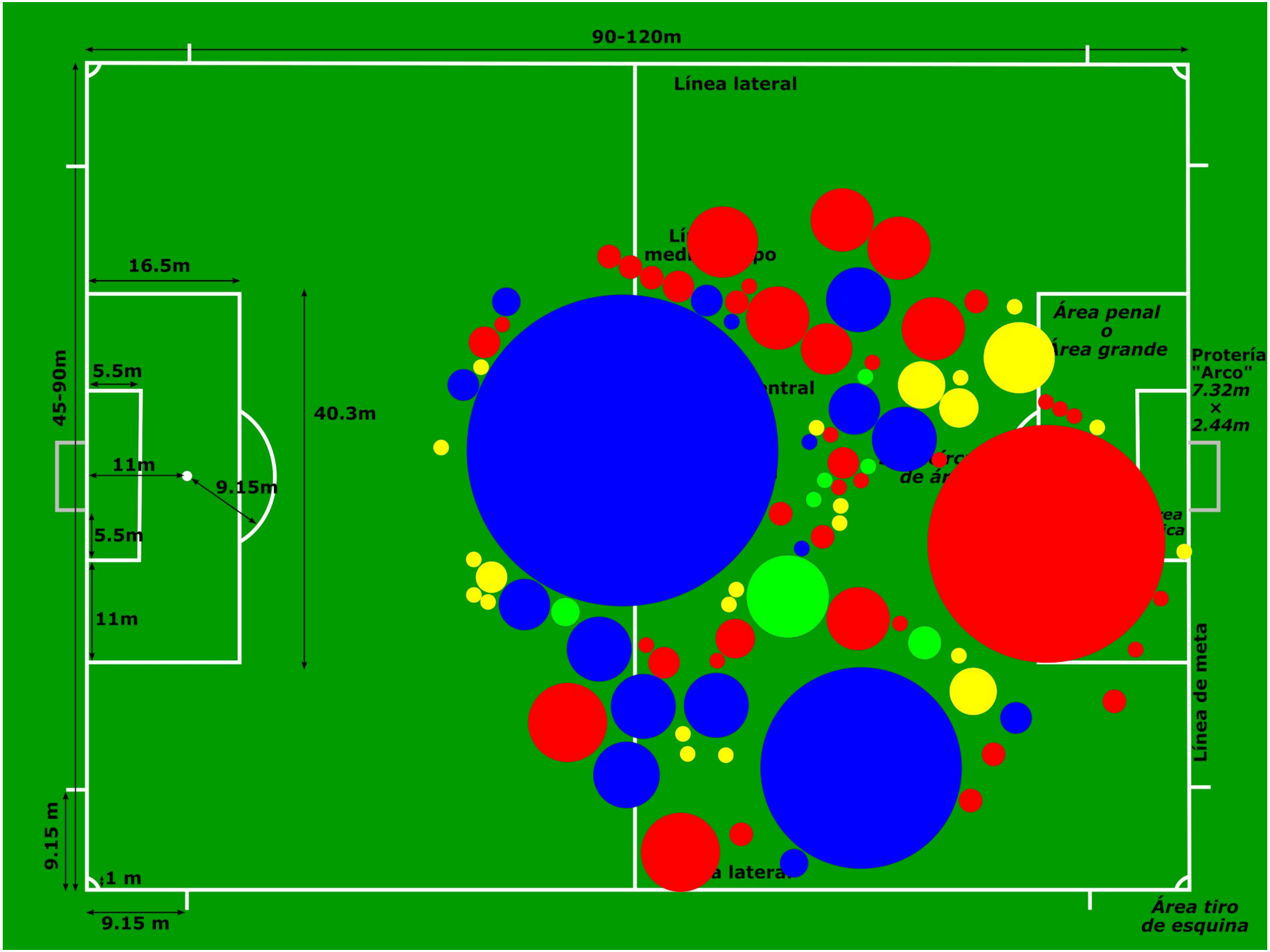

90-120m
Línea lateral
Línea de medio campo
16.5m
45-90m
5.5m
40.3m
Circulo central
Área penal o Área grande
Protería "Arco" 7.32m × 2.44m
11m
9.15m
9.15m
Punto central
Semicírculo de área
Punto penal
Área chica
5.5m
11m
Línea de meta
9.15 m
1 m
Línea lateral
9.15 m
Área tiro de esquina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Área grande
Protería
"Arco"
7.32m
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ica
Línea de meta
9.15 m
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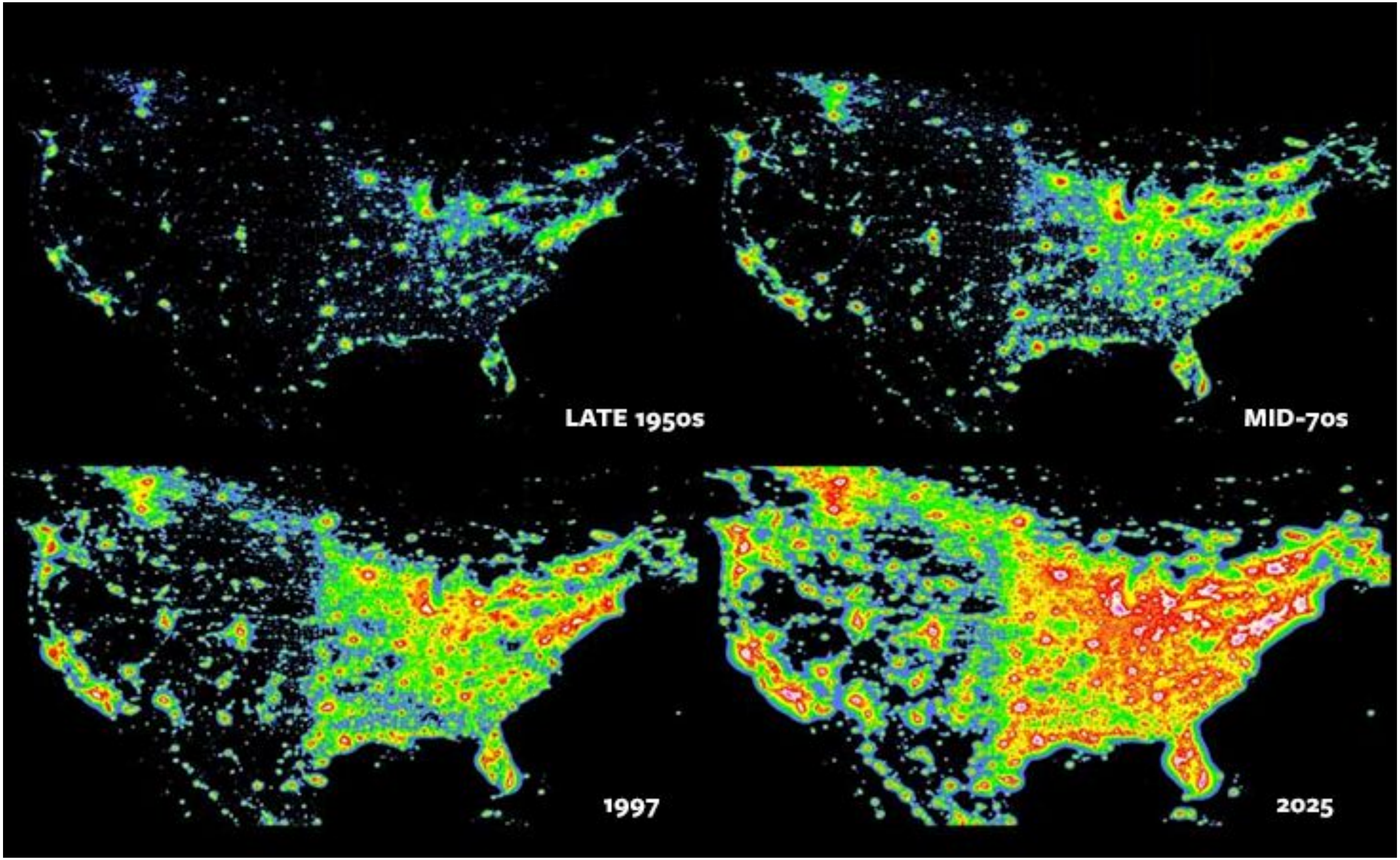
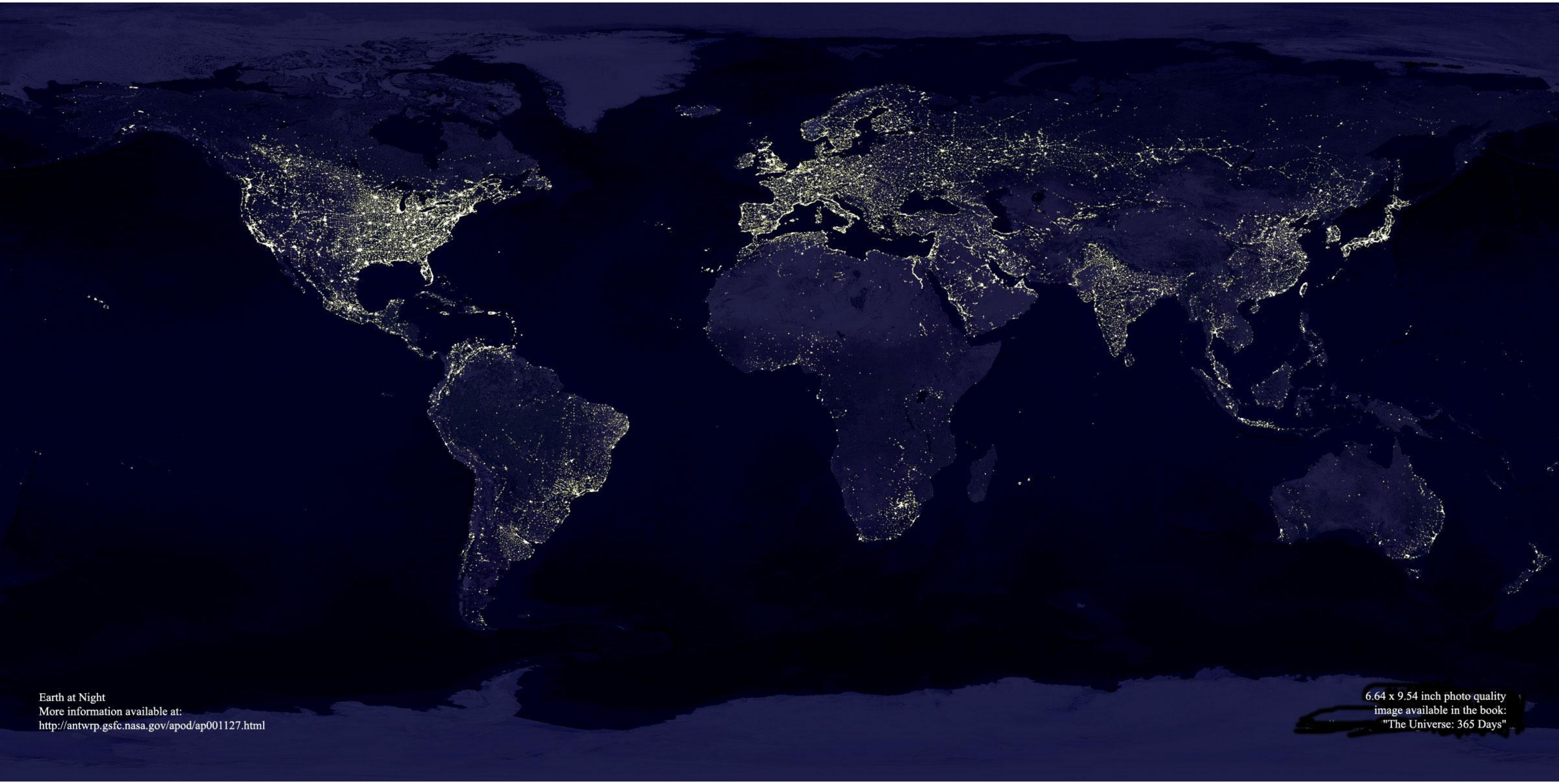
9.15 m
a lateral
Área tiro
de esquina

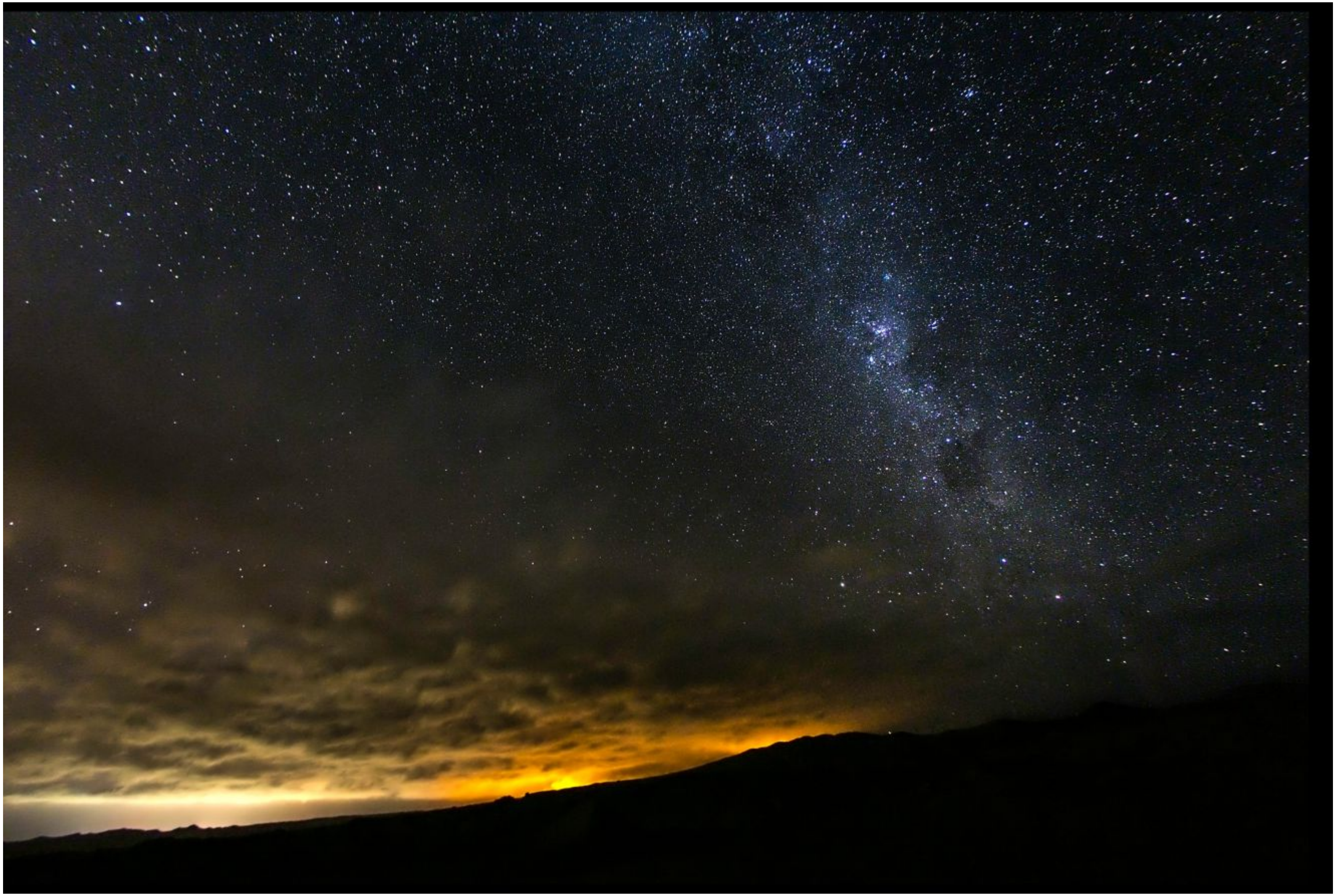

LATE 1950s
MID-70s
1997
2025



Earth at Night
More information available at:
http://antwrp.gsfc.nasa.gov/apod/ap001127.html

6.64 x 9.54 inch photo quality
image available in the book:
"The Universe: 365 Days"

[redacted]



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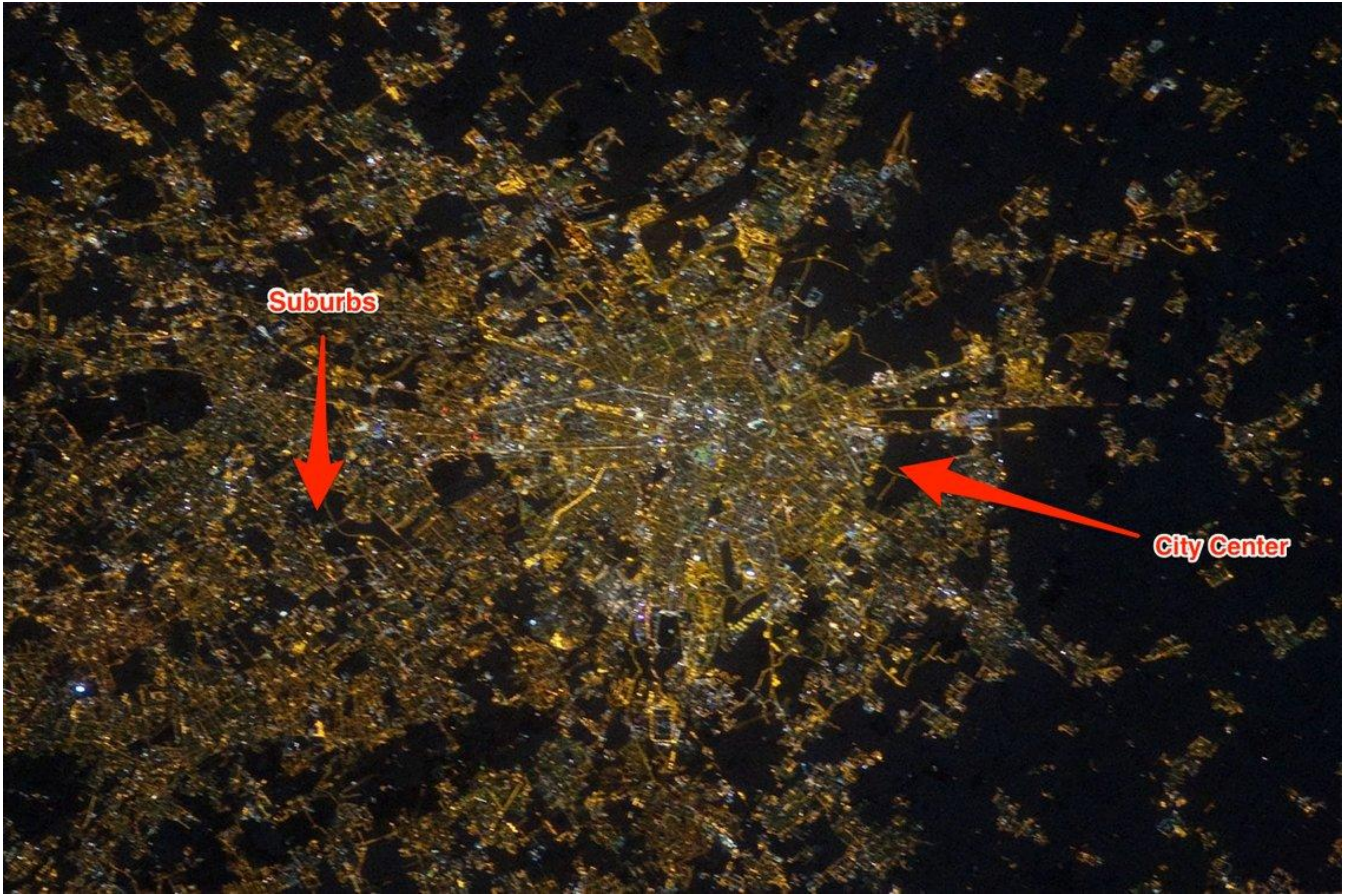
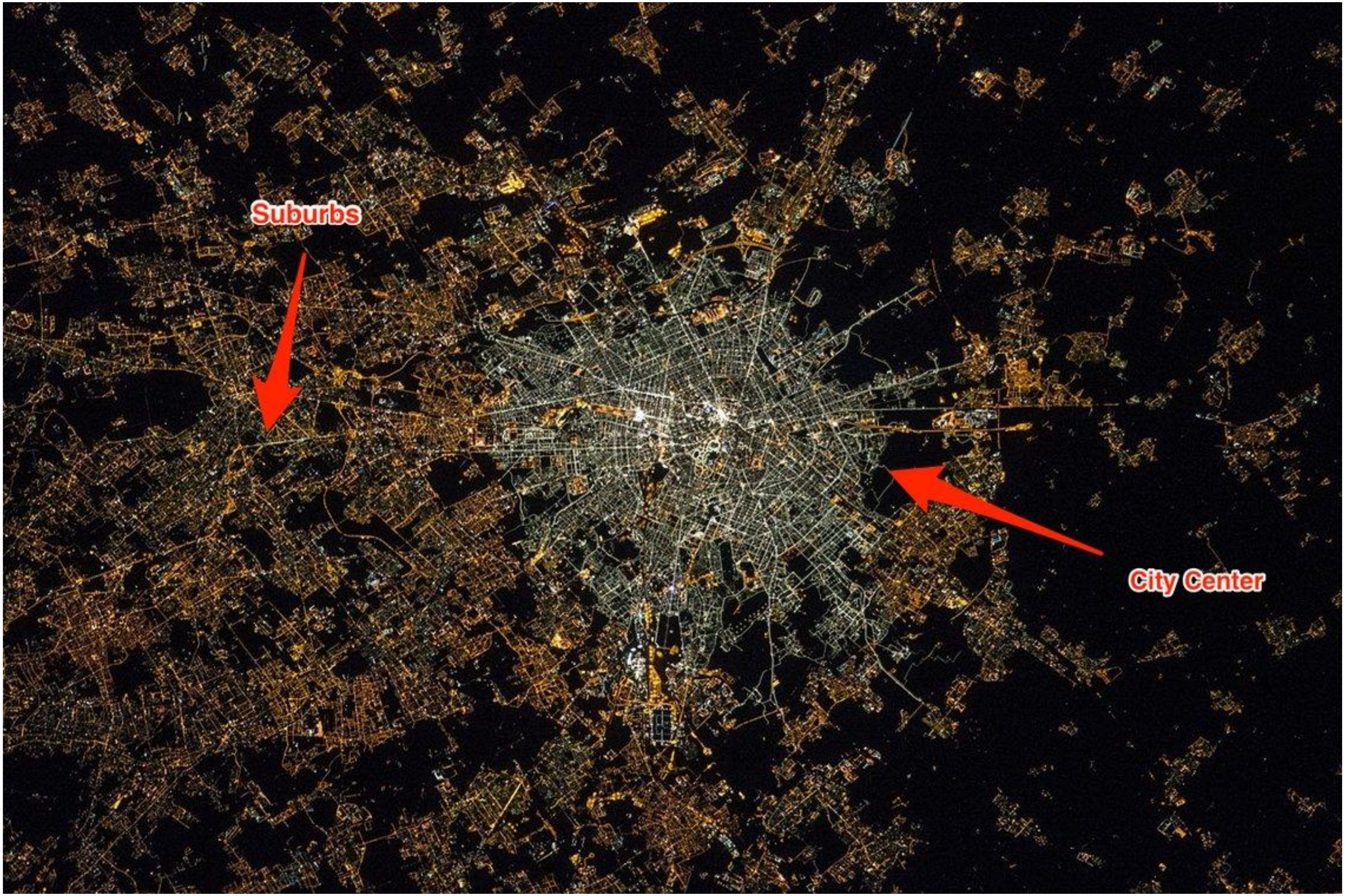
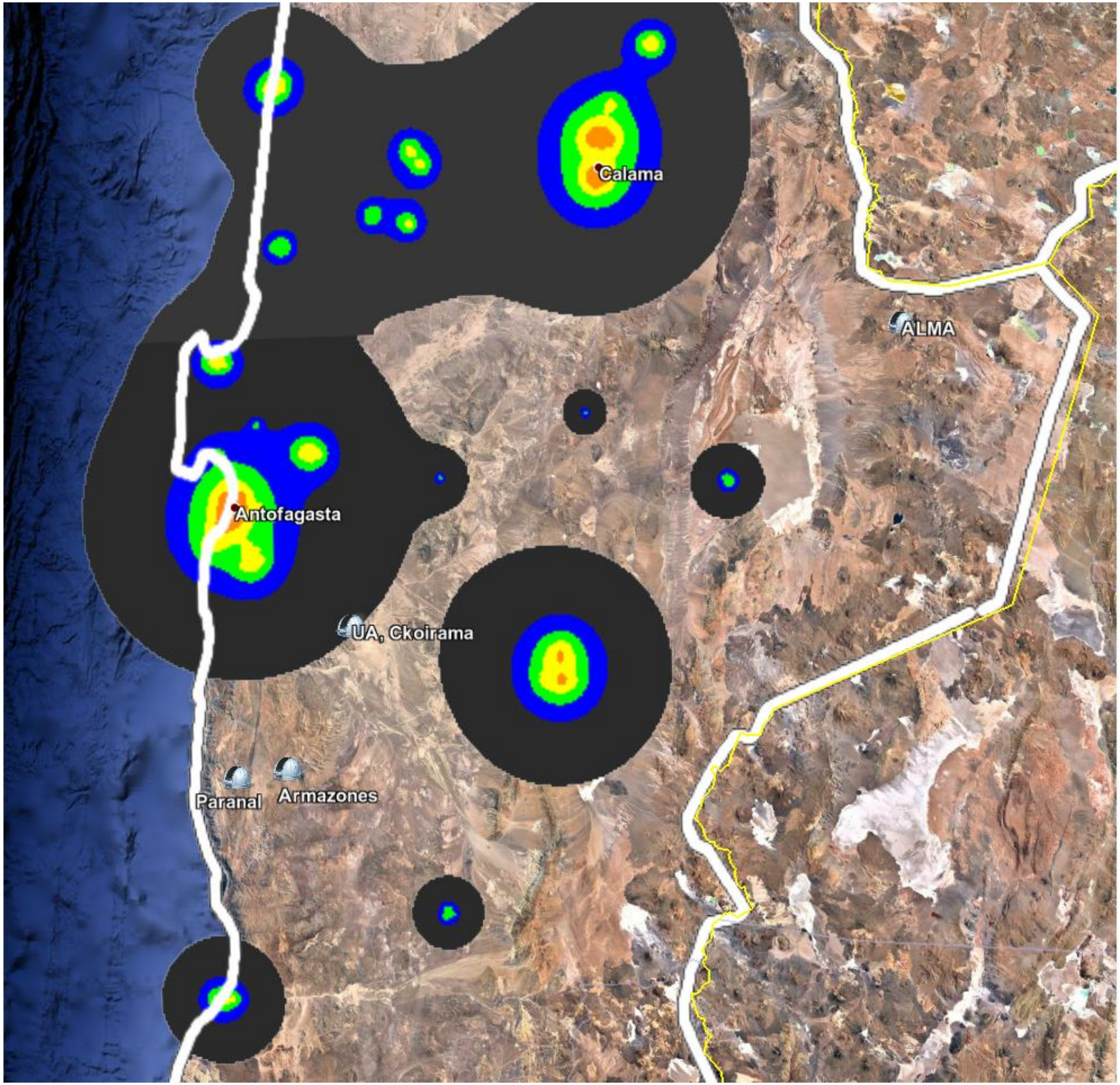
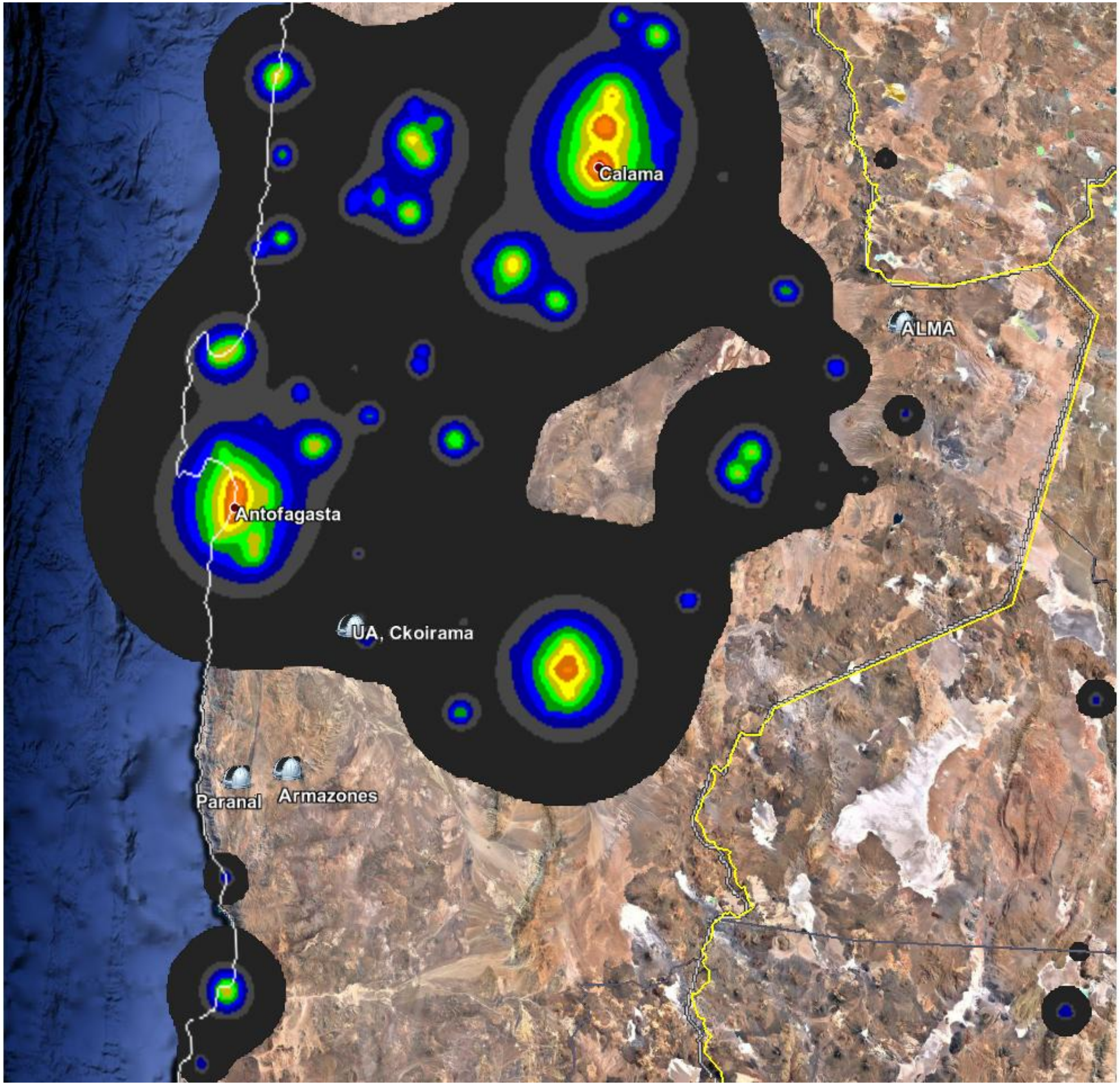
102


Suburbs
City Center


Suburbs
City Center


Calama
ALMA
Antofagasta
UA, Ckoirama
Paranal
Armazones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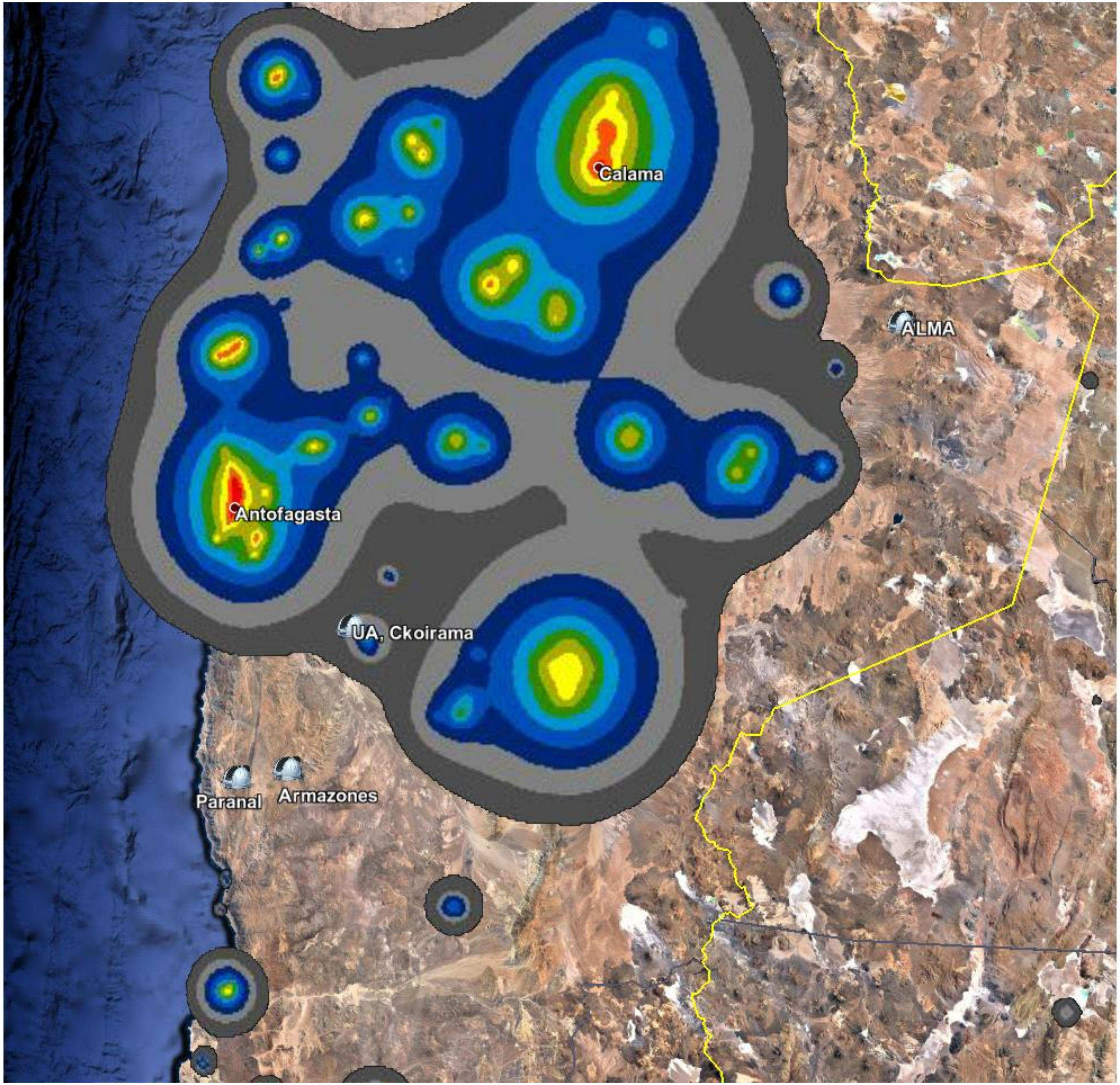
Calama
ALMA
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UA, Ckoirama
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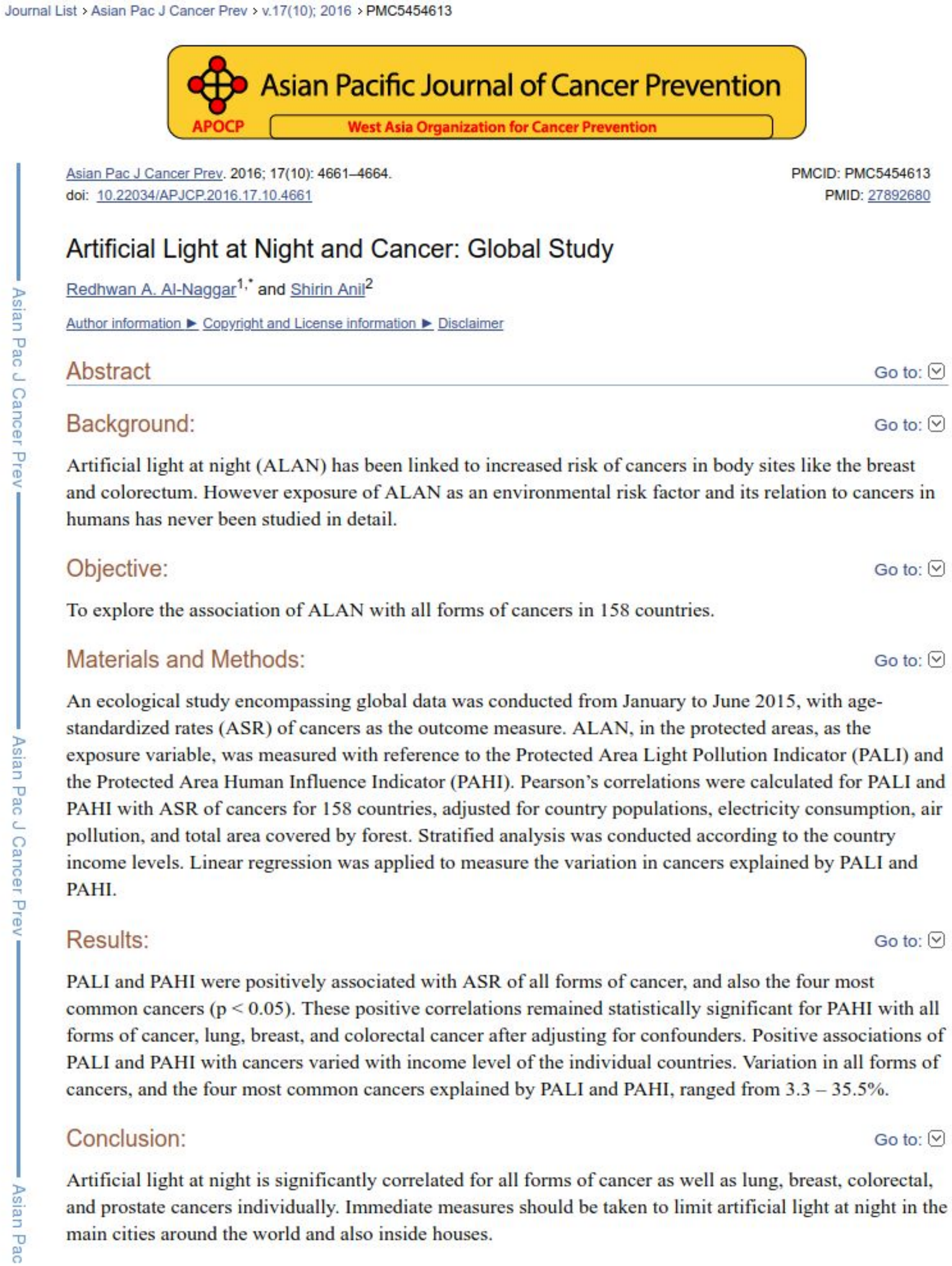
Armazones



Asian Pacific Journal of Cancer Prevention
APOCP
West Asia Organization for Cancer Prevention

Asian Pac J Cancer Prev. 2016; 17(10): 4661–4664.
doi: 10.22034/APJCP.2016.17.10.4661

PMCID: PMC5454613
PMID: 27892680

Asian Pac J Cancer Prev
Asian Pac J Cancer Prev
Asian Pac

Artificial Light at Night and Cancer: Global Study

Redhwan A. Al-Naggar[1,*] and Shirin Anil[2]

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Abstract

Go to:

Background:

Go to:

Artificial light at night (ALAN) has been linked to increased risk of cancers in body sites like the breast and colorectum. However exposure of ALAN as an environmental risk factor and its relation to cancers in humans has never been studied in detail.

Objective:

Go to:

To explore the association of ALAN with all forms of cancers in 158 countries.

Materials and Methods:

Go to:

An ecological study encompassing global data was conducted from January to June 2015, with age-standardized rates (ASR) of cancers as the outcome measure. ALAN, in the protected areas, as the exposure variable, was measured with reference to the Protected Area Light Pollution Indicator (PALI) and the Protected Area Human Influence Indicator (PAHI). Pearson's correlations were calculated for PALI and PAHI with ASR of cancers for 158 countries, adjusted for country populations, electricity consumption, air pollution, and total area covered by forest. Stratified analysis was conducted according to the country income levels. Linear regression was applied to measure the variation in cancers explained by PALI and PAHI.

Results:

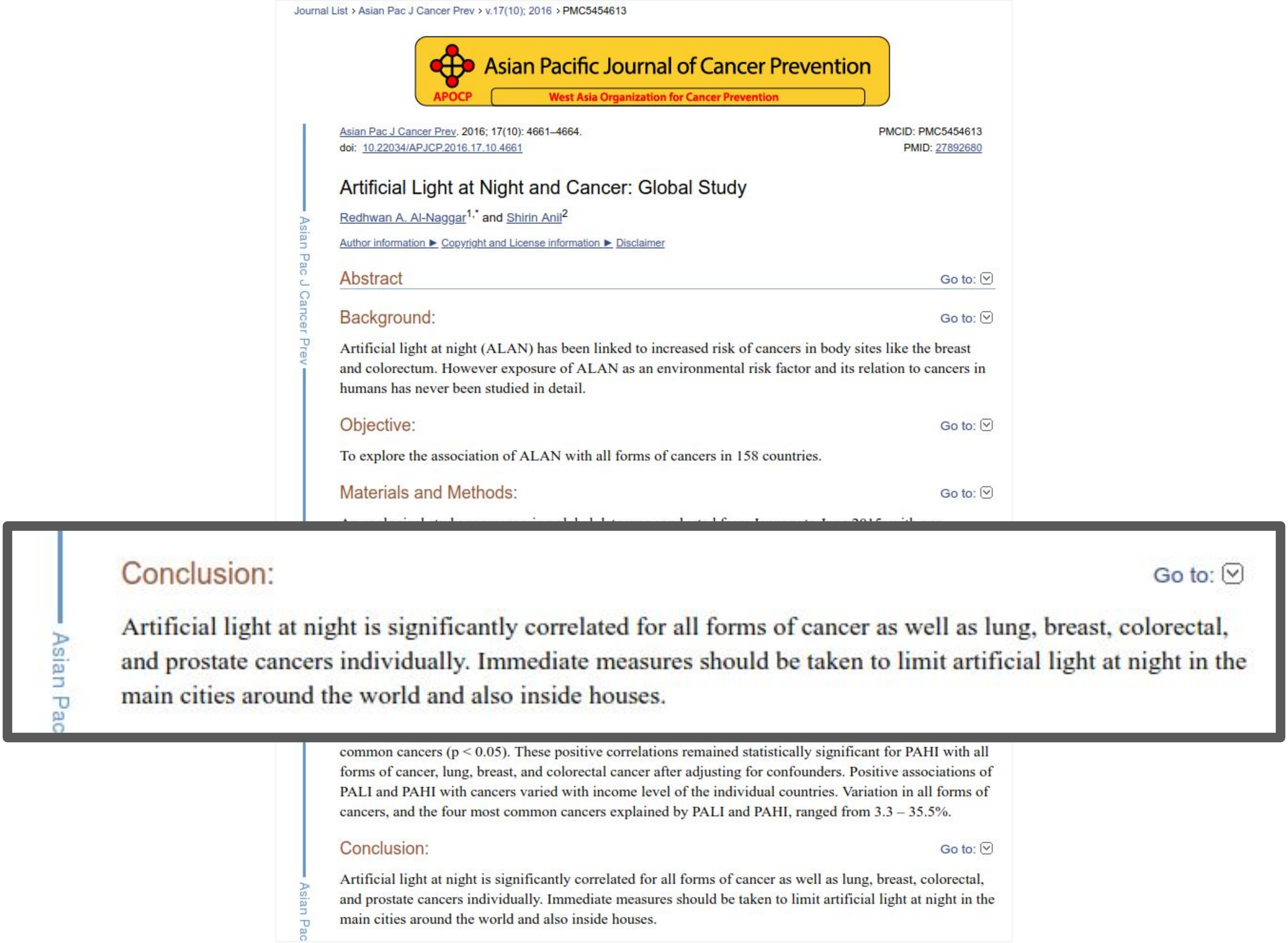
Go to:

PALI and PAHI were positively associated with ASR of all forms of cancer, and also the four most common cancers ($p < 0.05$). These positive correlations remained statistically significant for PAHI with all forms of cancer, lung, breast, and colorectal cancer after adjusting for confounders. Positive associations of PALI and PAHI with cancers varied with income level of the individual countries. Variation in all forms of cancers, and the four most common cancers explained by PALI and PAHI, ranged from 3.3 – 35.5%.

Conclusion:

Go to:

Artificial light at night is significantly correlated for all forms of cancer as well as lung, breast, colorectal, and prostate cancers individually. Immediate measures should be taken to limit artificial light at night in the main cities around the world and also inside houses.



Journal List › Asian Pac J Cancer Prev › v.17(10); 2016 › PMC5454613
APOCP
Asian Pacific Journal of Cancer Prevention
West Asia Organization for Cancer Prevention

Asian Pac J Cancer Prev. 2016; 17(10): 4661–4664.
doi: 10.22034/APJCP.2016.17.10.4661
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Artificial Light at Night and Cancer: Global Study

Redhwan A. Al-Naggar[1,*] and Shirin Anil[2]

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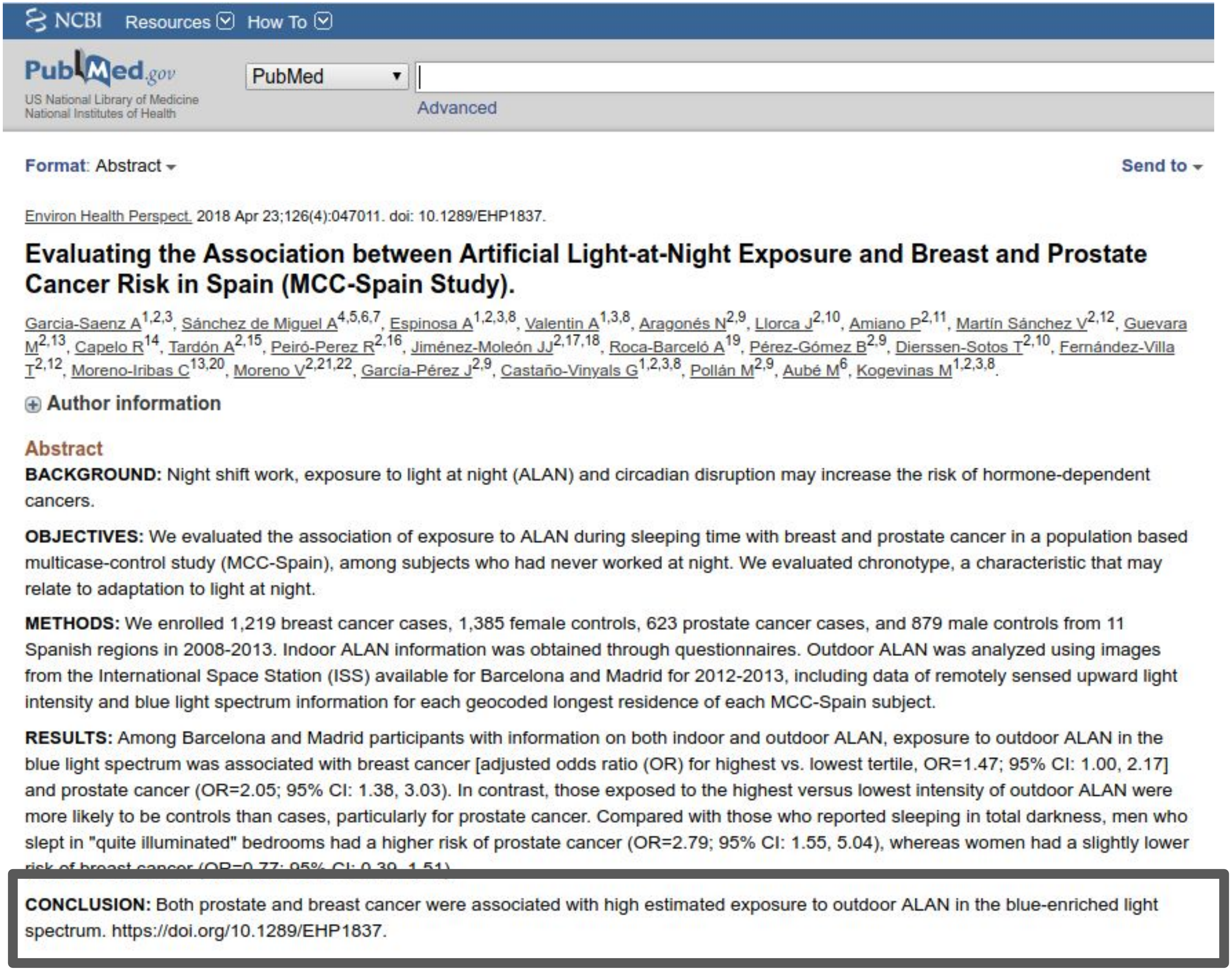


Environ Health Perspect. 2018 Apr 23;126(4):047011. doi: 10.1289/EHP1837.

Evaluating the Association between Artificial Light-at-Night Exposure and Breast and Prostate Cancer Risk in Spain (MCC-Spain Study).

Garcia-Saenz A[1,2,3], Sánchez de Miguel A[4,5,6,7], Espinosa A[1,2,3,8], Valentin A[1,3,8], Aragonés N[2,9], Llorca J[2,10], Amiano P[2,11], Martín Sánchez V[2,12], Guevara M[2,13], Capelo R[14], Tardón A[2,15], Peiró-Perez R[2,16], Jiménez-Moleón JJ[2,17,18], Roca-Barceló A[19], Pérez-Gómez B[2,9], Dierssen-Sotos T[2,10], Fernández-Villa T[2,12], Moreno-Iribas C[13,20], Moreno V[2,21,22], García-Pérez J[2,9], Castaño-Vinyals G[1,2,3,8], Pollán M[2,9], Aubé M[6], Kogevinas M[1,2,3,8].

Author information

Abstract

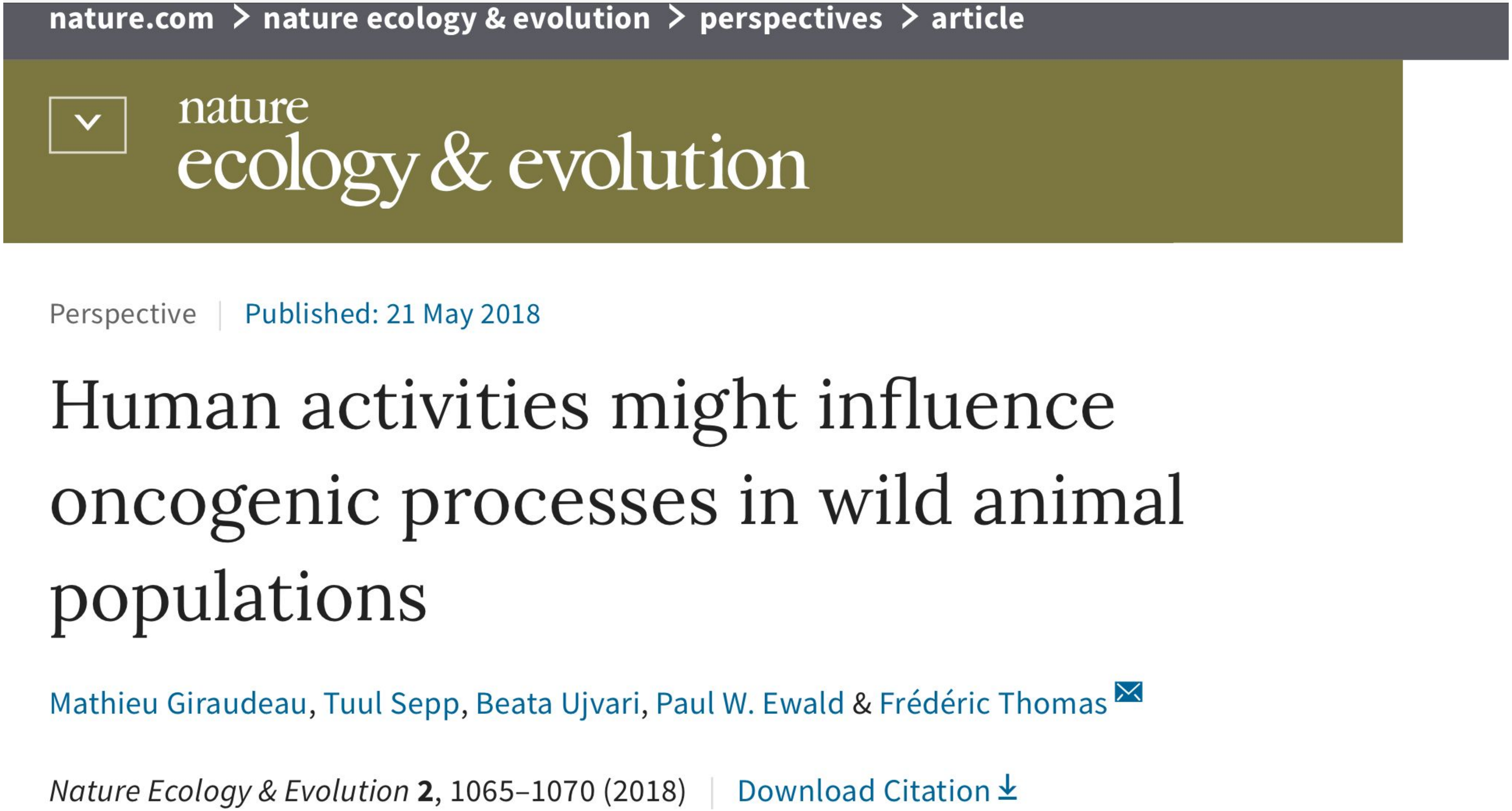
BACKGROUND: Night shift work, exposure to light at night (ALAN) and circadian disruption may increase the risk of hormone-dependent cancers.

OBJECTIVES: We evaluated the association of exposure to ALAN during sleeping time with breast and prostate cancer in a population based multicase-control study (MCC-Spain), among subjects who had never worked at night. We evaluated chronotype, a characteristic that may relate to adaptation to light at night.

METHODS: We enrolled 1,219 breast cancer cases, 1,385 female controls, 623 prostate cancer cases, and 879 male controls from 11 Spanish regions in 2008-2013. Indoor ALAN information was obtained through questionnaires. Outdoor ALAN was analyzed using images from the International Space Station (ISS) available for Barcelona and Madrid for 2012-2013, including data of remotely sensed upward light intensity and blue light spectrum information for each geocoded longest residence of each MCC-Spain subject.

RESULTS: Among Barcelona and Madrid participants with information on both indoor and outdoor ALAN, exposure to outdoor ALAN in the blue light spectrum was associated with breast cancer [adjusted odds ratio (OR) for highest vs. lowest tertile, OR=1.47; 95% CI: 1.00, 2.17] and prostate cancer (OR=2.05; 95% CI: 1.38, 3.03). In contrast, those exposed to the highest versus lowest intensity of outdoor ALAN were more likely to be controls than cases, particularly for prostate cancer. Compared with those who reported sleeping in total darkness, men who slept in "quite illuminated" bedrooms had a higher risk of prostate cancer (OR=2.79; 95% CI: 1.55, 5.04), whereas women had a slightly lower risk of breast cancer (OR=0.77; 95% CI: 0.39, 1.51).

CONCLUSION: Both prostate and breast cancer were associated with high estimated exposure to outdoor ALAN in the blue-enriched light spectrum. https://doi.org/10.1289/EHP1837.


nature.com > nature ecology & evolution > perspectives > article

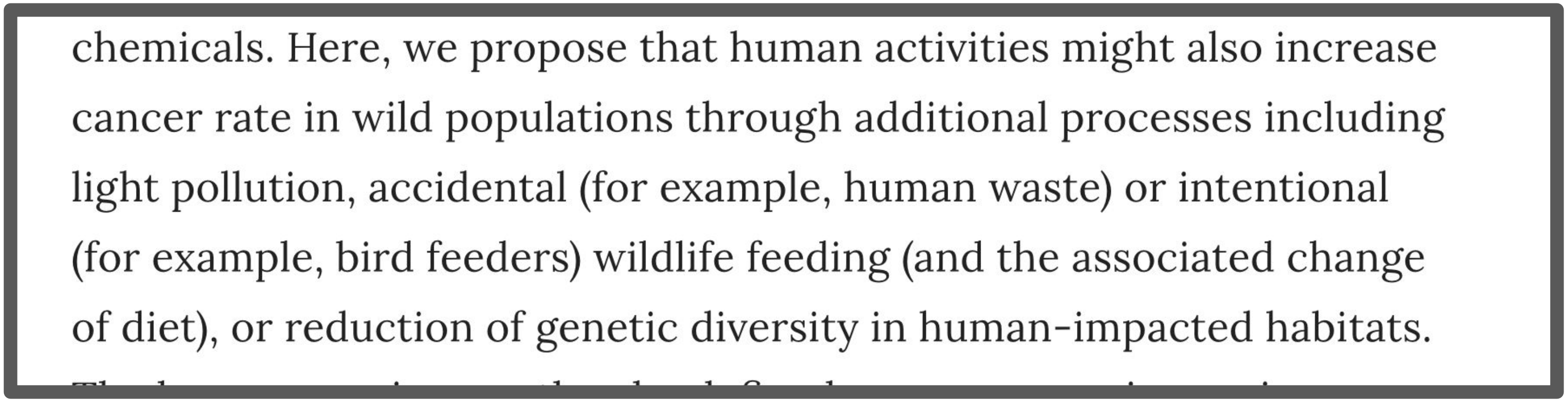
nature
ecology & evolution

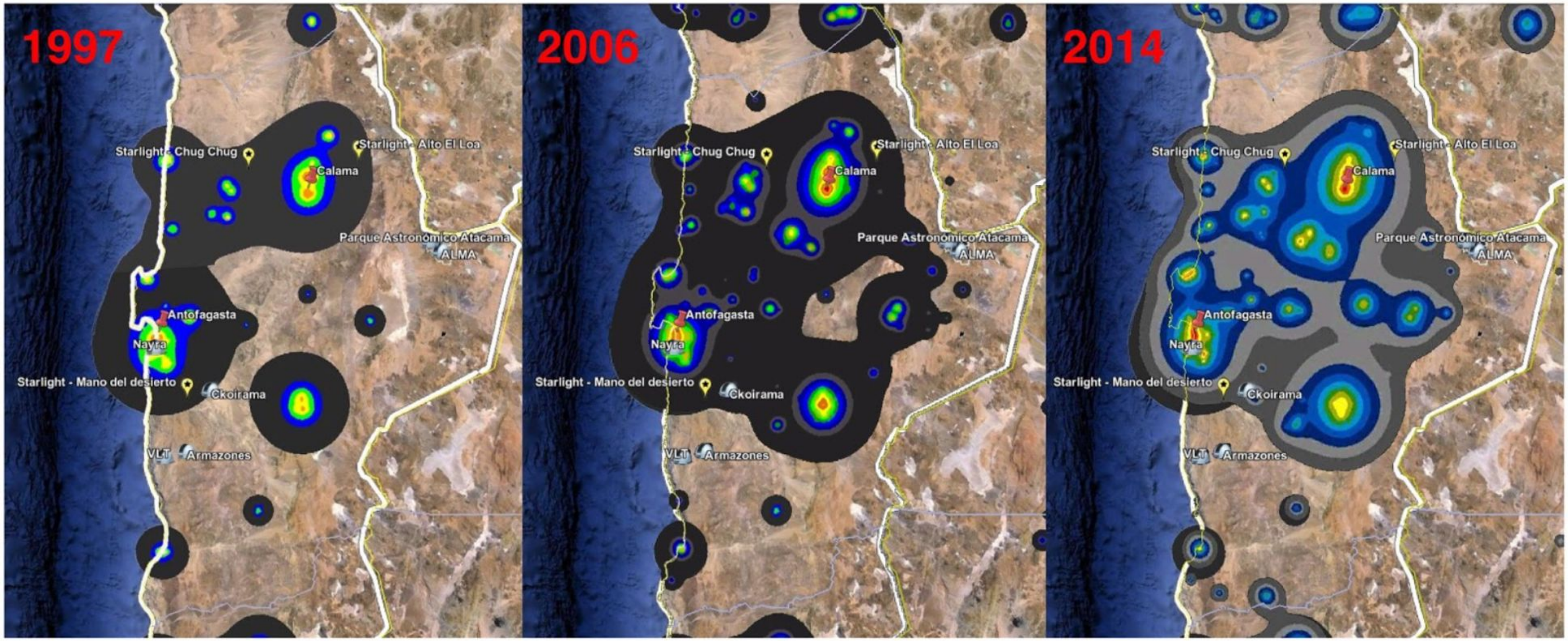
Perspective | Published: 21 May 2018

Human activities might influence oncogenic processes in wild animal populations

Mathieu Giraudeau, Tuul Sepp, Beata Ujvari, Paul W. Ewald & Frédéric Thomas

Nature Ecology & Evolution **2**, 1065–1070 (2018) | Download Citation


chemicals. Here, we propose that human activities might also increase cancer rate in wild populations through additional processes including light pollution, accidental (for example, human waste) or intentional (for example, bird feeders) wildlife feeding (and the associated change of diet), or reduction of genetic diversity in human-impacted habitats.


1997
Starlight - Chug Chug
Starlight - Alto El Loa
Calama
Parque Astronómico Atacama
ALMA
Antofagasta
Nayra
Starlight - Mano del desierto
Ckoirama
VLT
Armazones
2006
Starlight - Chug Chug
Starlight - Alto El Loa
Calama
Parque Astronómico Atacama
ALMA
Antofagasta
Nayra
Starlight - Mano del desierto
Ckoirama
VLT
Armazones
2014
Starlight - Chug Chug
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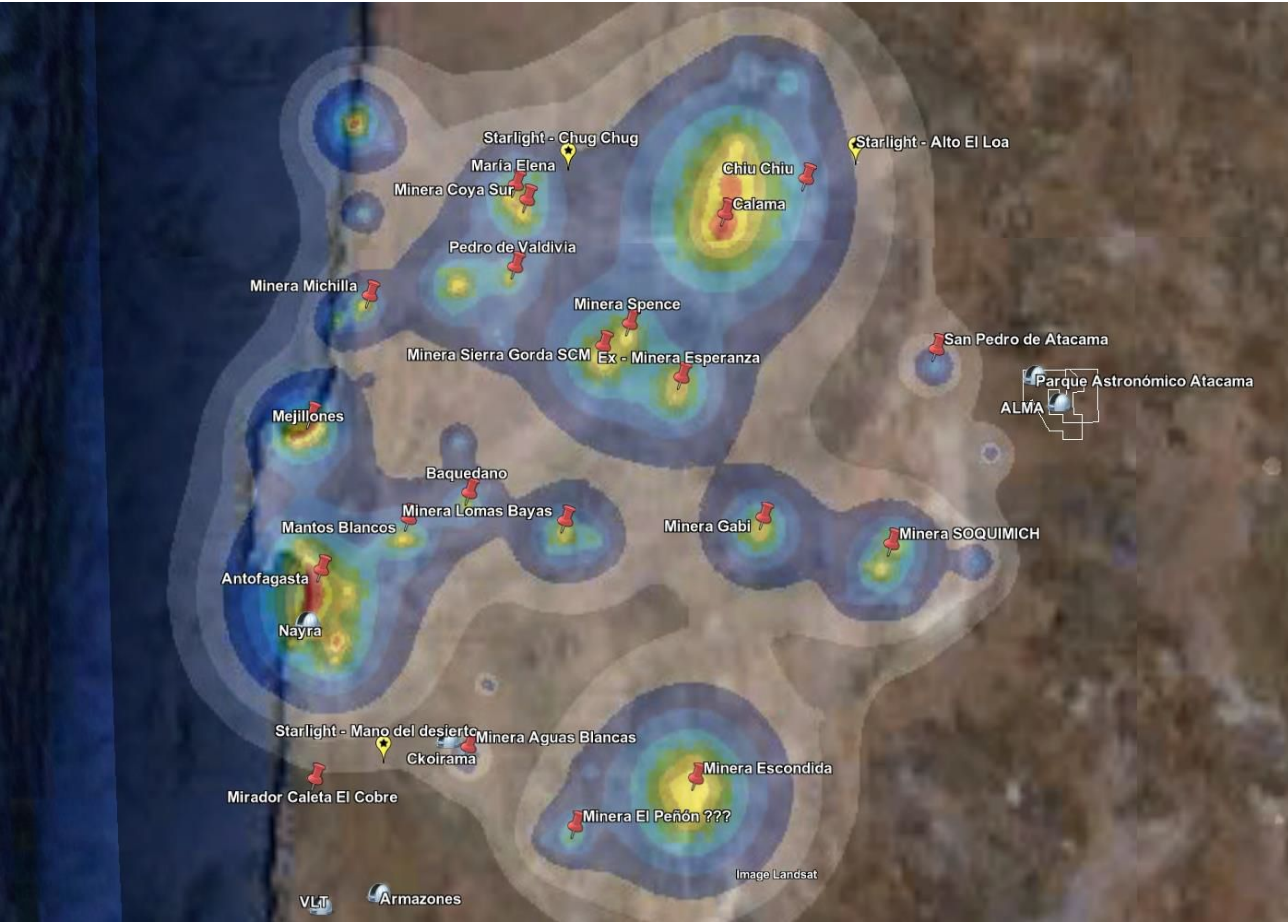
Calama
Parque Astronómico Atacama
ALMA
Antofagasta
Nayra
Starlight - Mano del desierto
Ckoirama
VLT
Armazones

Comparación de E. Unda-Sanzana en base a estudios mundiales de contaminación lumínica de Cinzano (1997), Lorenz (2006) y Falchi (2014). La escala de color sube en el orden negro, gris, azul, verde, amarillo, rojo como fuentes de mayor efecto contaminante. Los niveles de base son diferentes, de modo que la mejor comparación entre los tres paneles se tiene al observar los límites azules en cada panel.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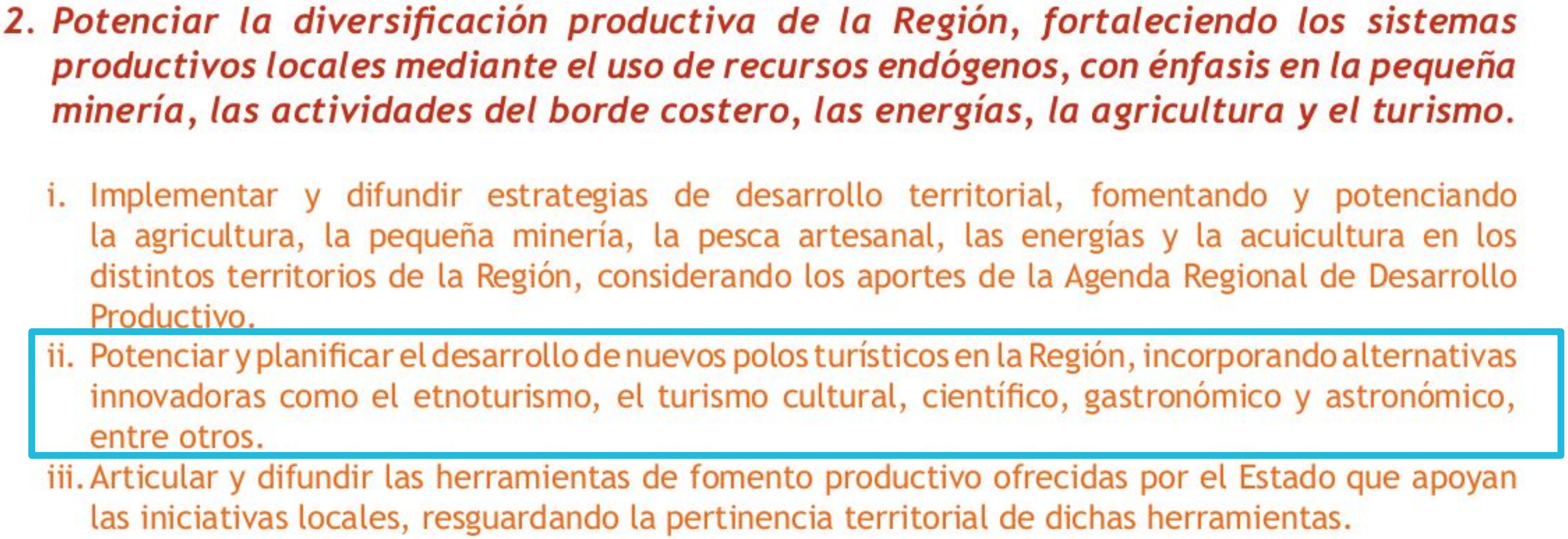
Starlight - Alto El Loa
María Elena
Minera Coya Sur
Chiu Chiu
Calama
Pedro de Valdivia
Minera Michilla
Minera Spence
San Pedro de Atacama
Minera Sierra Gorda SCM
Ex - Minera Esperanza
Parque Astronómico Atacama
ALMA
Mejillones
Baquedano
Minera Lomas Bayas
Mantos Blancos
Minera Gabi
Minera SOQUIMICH
Antofagasta
Nayra
Starlight - Mano del desierto
Minera Aguas Blancas
Ckoirama
Minera Escondida
Mirador Caleta El Cobre
Minera El Peñón ???
Image Landsat
VLT
Armazones

Programa espacial chileno

Programa espacial chileno

2018-10-26 Proyecto focal: Monitoreo satelital de contaminación lumínica

Astronomía en la Estrategia Regional de Desarrollo 2009-2020



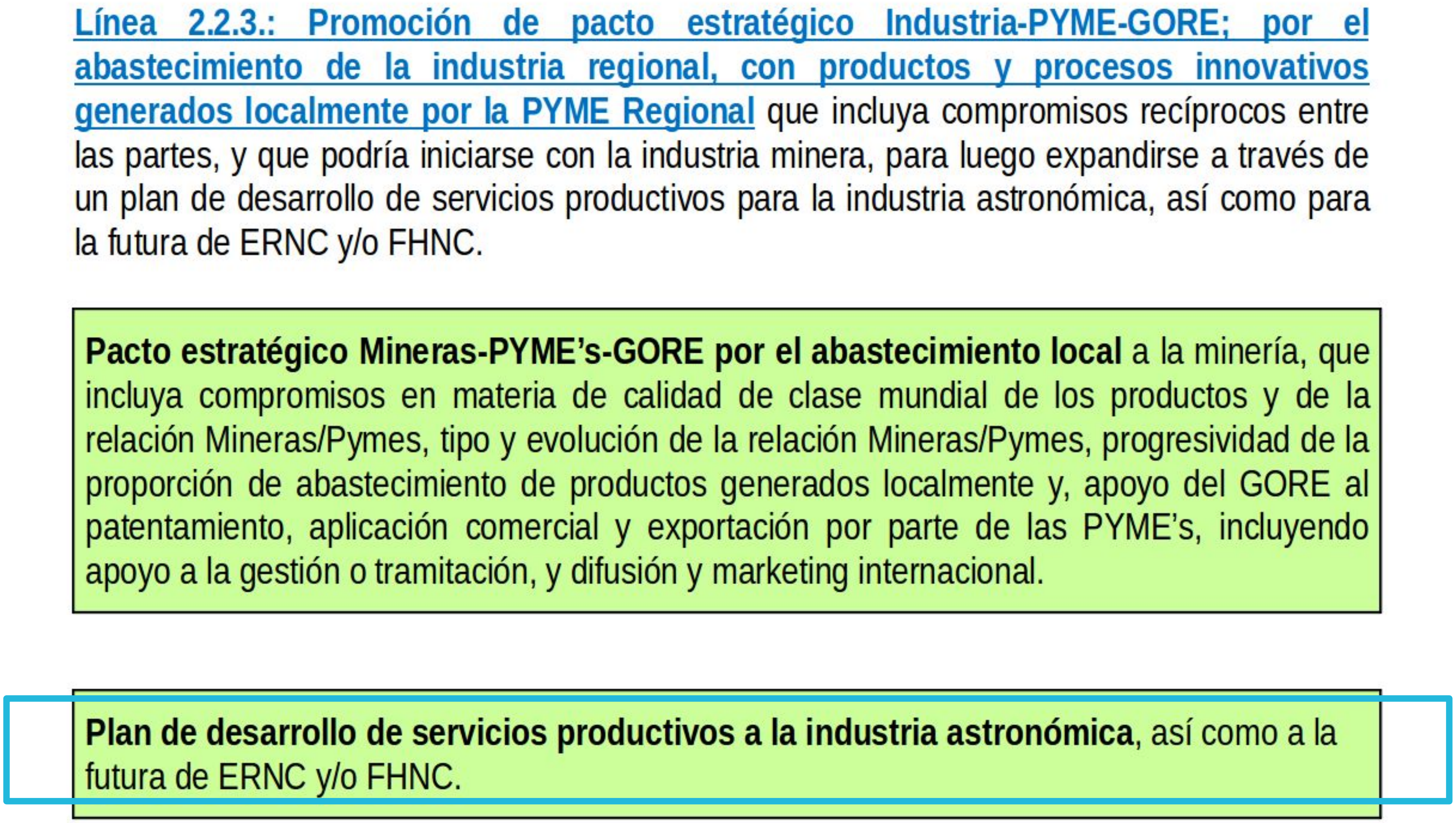
2. *Potenciar la diversificación productiva de la Región, fortaleciendo los sistemas productivos locales mediante el uso de recursos endógenos, con énfasis en la pequeña minería, las actividades del borde costero, las energías, la agricultura y el turismo.*

i. Implementar y difundir estrategias de desarrollo territorial, fomentando y potenciando la agricultura, la pequeña minería, la pesca artesanal, las energías y la acuicultura en los distintos territorios de la Región, considerando los aportes de la Agenda Regional de Desarrollo Productivo.

ii. Potenciar y planificar el desarrollo de nuevos polos turísticos en la Región, incorporando alternativas innovadoras como el etnoturismo, el turismo cultural, científico, gastronómico y astronómico, entre otros.

iii. Articular y difundir las herramientas de fomento productivo ofrecidas por el Estado que apoyan las iniciativas locales, resguardando la pertinencia territorial de dichas herramientas.

Astronomía en la Estrategia Regional de Innovación (validada en julio de 2012)



Línea 2.2.3.: Promoción de pacto estratégico Industria-PYME-GORE; por el abastecimiento de la industria regional, con productos y procesos innovativos generados localmente por la PYME Regional que incluya compromisos recíprocos entre las partes, y que podría iniciarse con la industria minera, para luego expandirse a través de un plan de desarrollo de servicios productivos para la industria astronómica, así como para la futura de ERNC y/o FHNC.

Pacto estratégico Mineras-PYME's-GORE por el abastecimiento local a la minería, que incluya compromisos en materia de calidad de clase mundial de los productos y de la relación Mineras/Pymes, tipo y evolución de la relación Mineras/Pymes, progresividad de la proporción de abastecimiento de productos generados localmente y, apoyo del GORE al patentamiento, aplicación comercial y exportación por parte de las PYME's, incluyendo apoyo a la gestión o tramitación, y difusión y marketing internacional.

Plan de desarrollo de servicios productivos a la industria astronómica, así como a la futura de ERNC y/o FHNC.

Ahorrar energía
Cuidar la salud de la población
Cuidar los ecosistemas desérticos y costeros.ner
Diversificar la economía regional.
Mantener ventajas en educación científica.

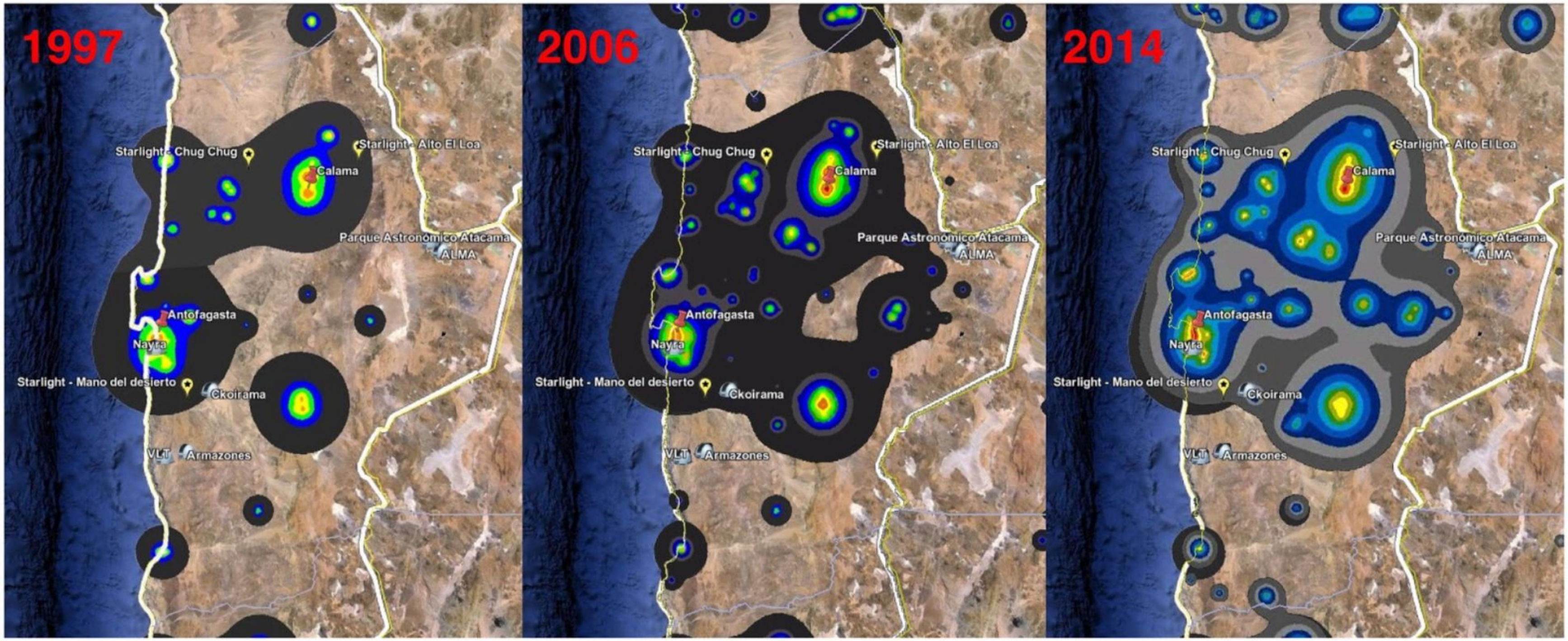
...y también para hacer ciencia de primer nivel mundial...

Norma 1997

2005

Norma 2013

¿Ley 2018?


1997
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eduardo.unda@uantof.cl

¡Gracias!

Eduardo Unda-Sanzana
Centro de Astronomía
Universidad de Antofagasta
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