

**COLOMBIA - SWEDEN**  
**Bilateral cooperation on PM2.5 y BC**

**Workshop 9 - 11 October 2019**

**Status of the emission inventory to be used  
for air quality modeling**



Res. No. 16740, 2017-2021.

Vigilada MinEduación.



# Which are the emission sources we want to describe?

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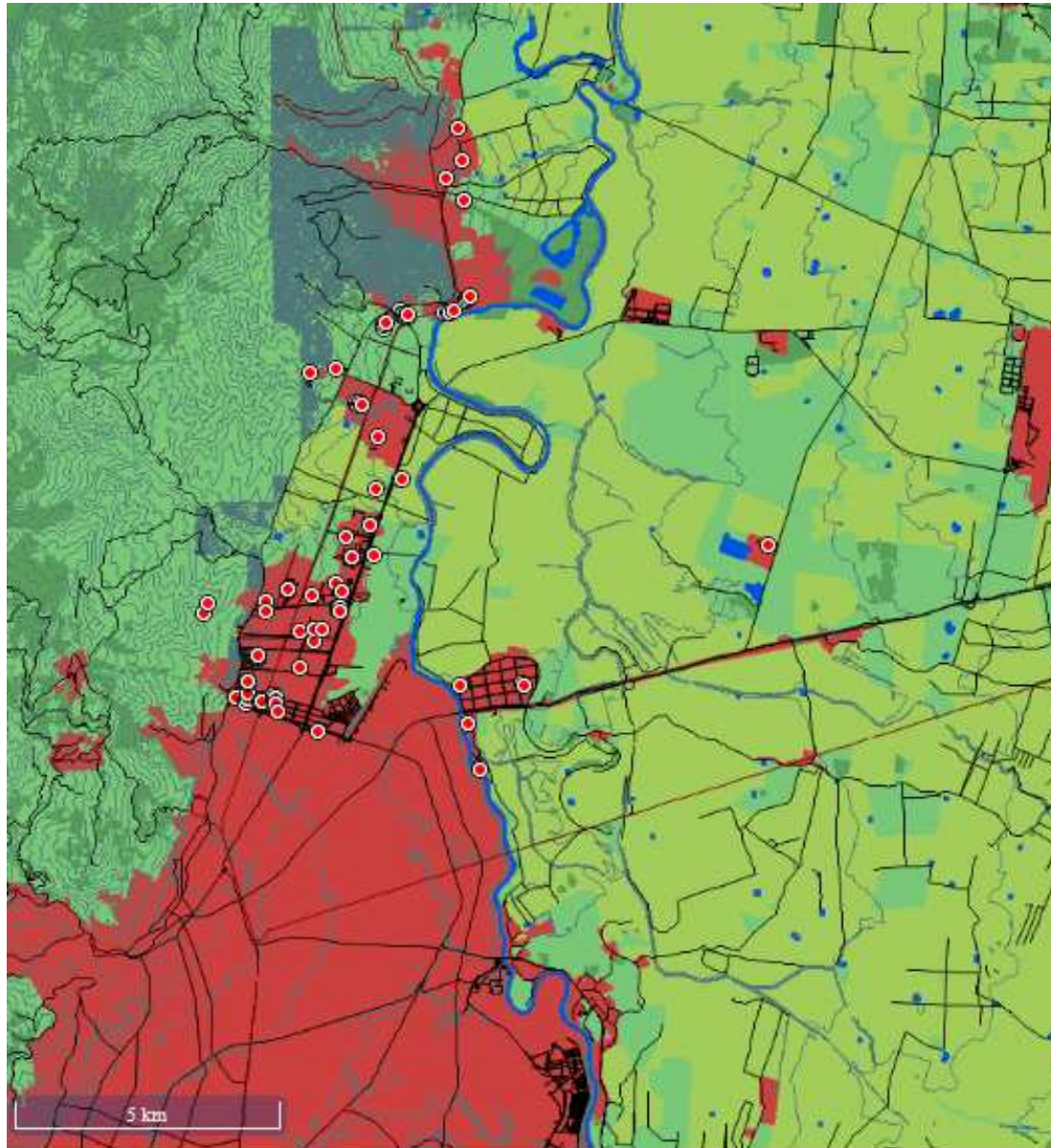


**Pollutants:** PM, NO<sub>x</sub>, SO<sub>x</sub>, NH<sub>3</sub>, CO, VOC

**Sources:**

- Industrial point sources
  - Mobile sources (public transport and private vehicles)
  - *Working machines (constructions etc)*
  - *Residential*
  - Forest fires
  - Agriculture combustion (e.g. sugar cane burning)
  - Biogenic
- } *if possible....*

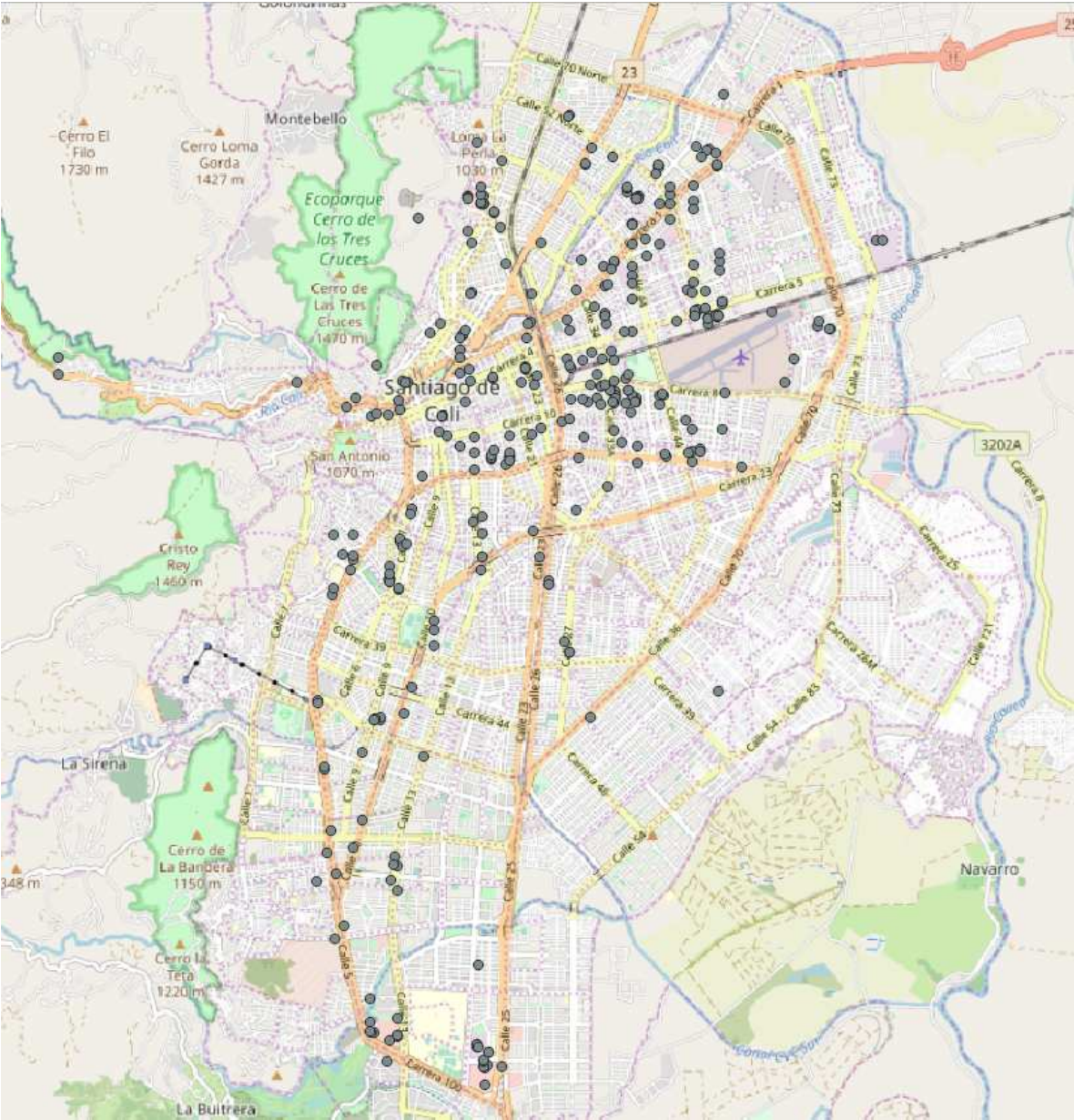
# Industrial Yumbo & Palmira (from CVC)



## Emissions tons/year:

PM:	2754
NOx:	4793
SOx:	15228
NH3:	-
CO:	-
VOC:	11

# Industrial Cali (from DAGMA)



## Emissions tons/year<sup>1)</sup>:

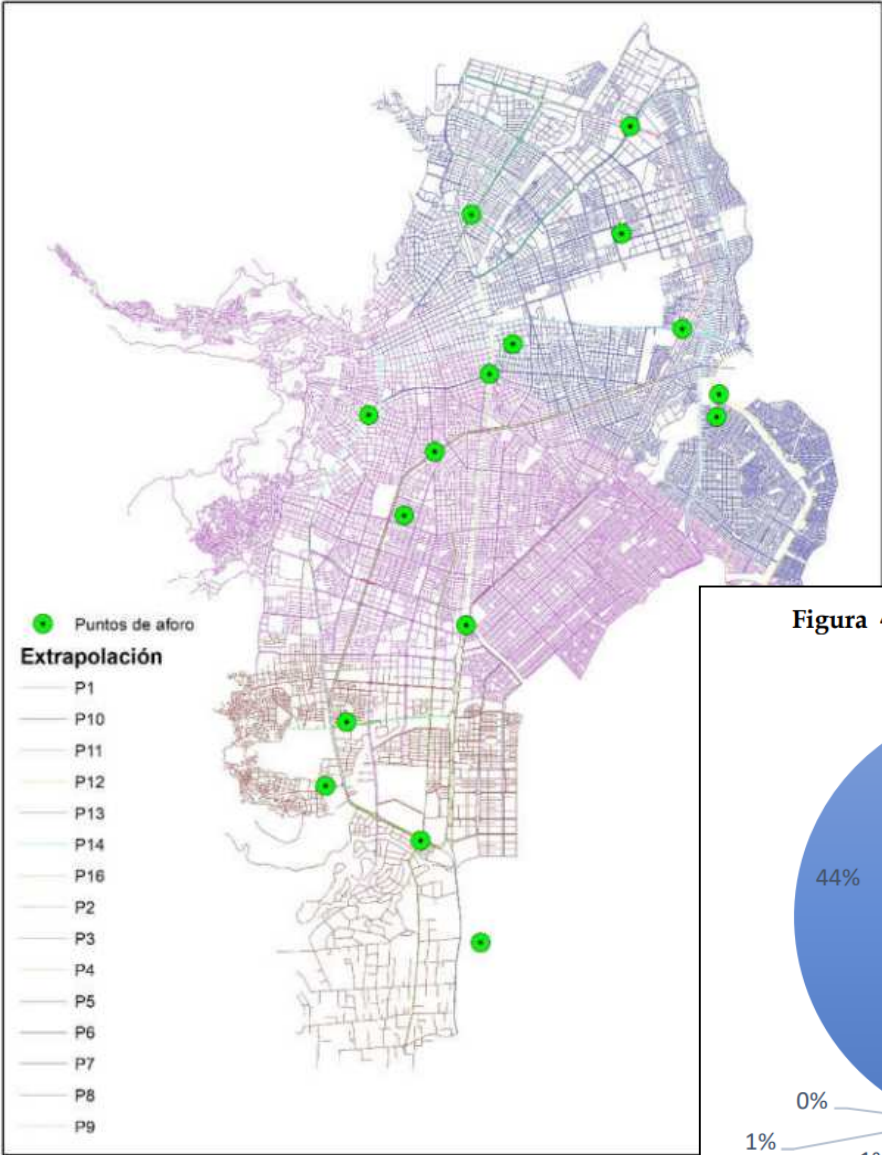
PM:	224
NOx:	691
SOx:	98
NH3:	-
CO:	552
VOC:	113

1) From:  
"Informe final actualización del inventario de emisiones de Santiago de Cali"  
(Febrero de 2018)

# Mobile sources (from DAGMA)



Figura 48 Punto de aforo fuente móviles y extrapolación vial

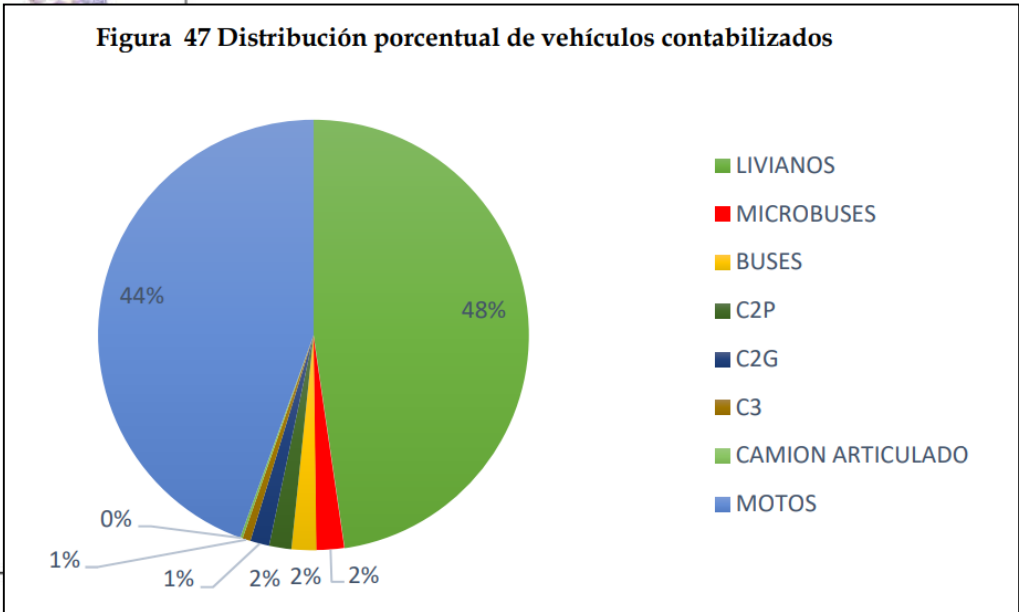


## Emissions tons/year<sup>1)</sup>:

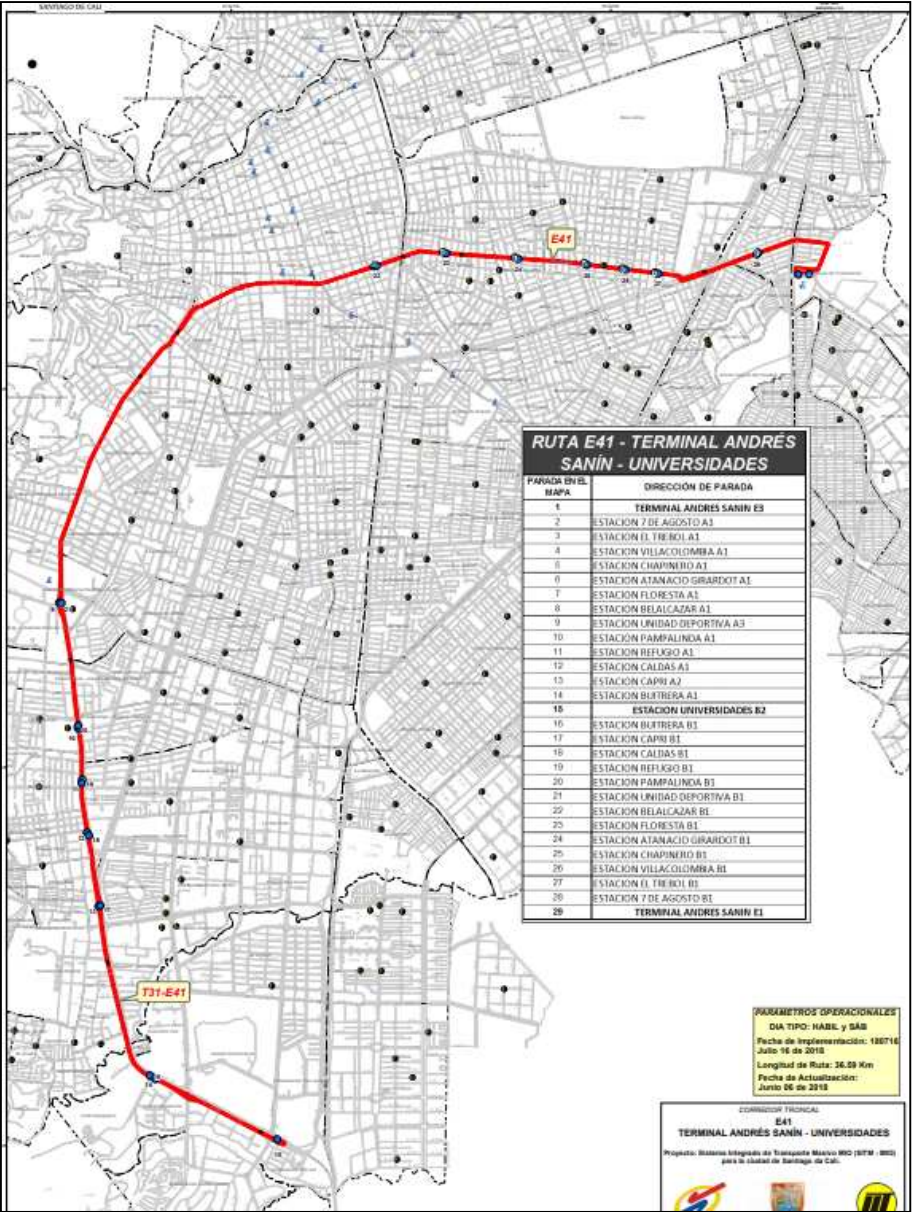
PM: 2751  
 NOx: 33267  
 SOx: 1354  
 NH3: -  
 CO: 378389  
 VOC: 60810

1) From:  
 "Informe final actualización del inventario de emisiones de Santiago de Cali" (Febrero de 2018)

Figura 47 Distribución porcentual de vehículos contabilizados

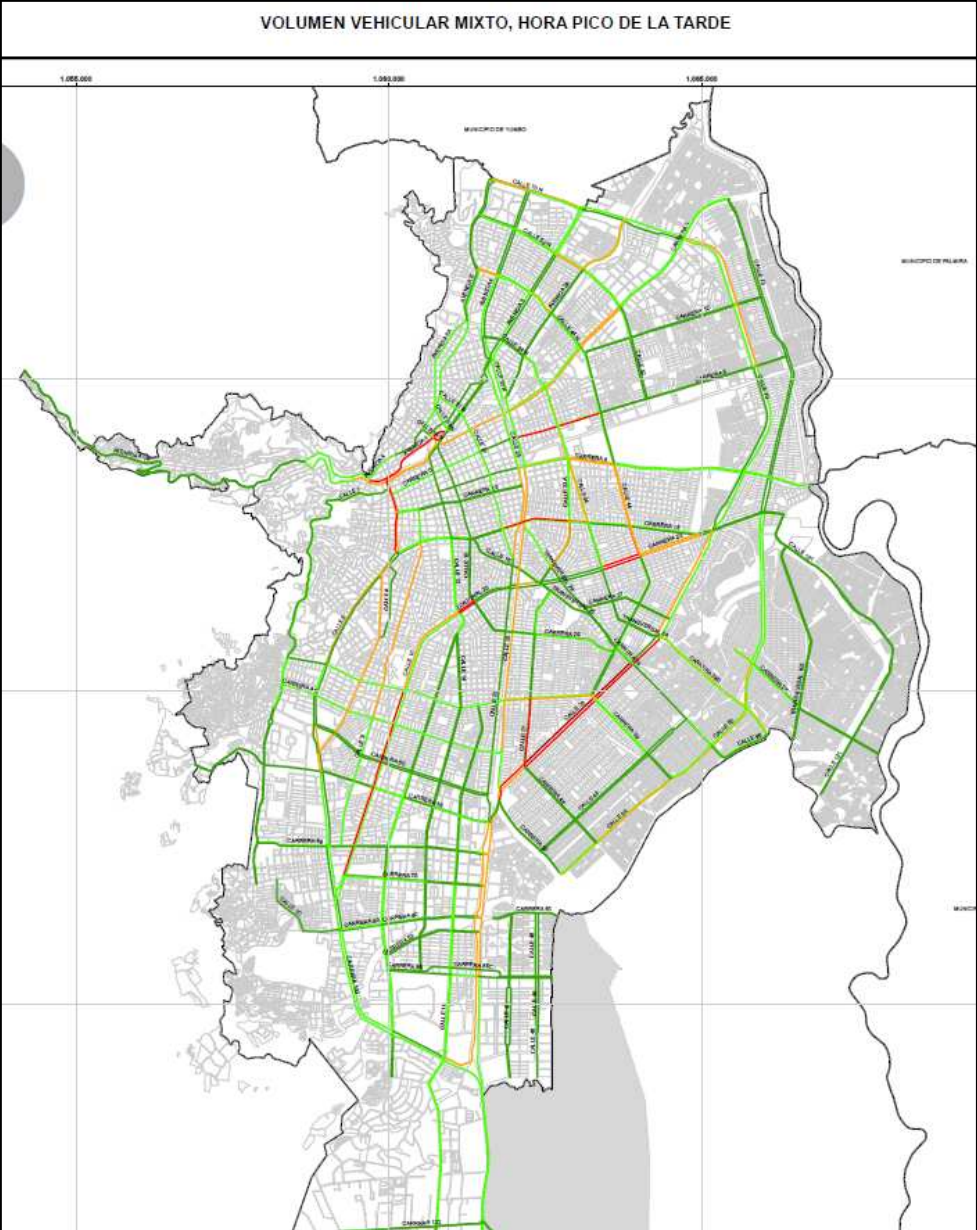


# Mobile sources (public transport)



- For every bus route:
- describe bus technology
  - bus time table

# Mobile sources (private transport)



Describe:

- Fleet composition
- Vehicle technology
- Traffic flows (peak/average)

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## **CAMS Global Fire Assimilation System - GFAS**

- GFAS assimilates fire radiative power (FRP) observations from satellite-based sensors to produce daily estimates of biomass burning emissions.
- Information about injection heights derived from fire observations and meteorological information from the operational weather forecasts of ECMWF.
- FRP observations currently assimilated in GFAS are the NASA Terra MODIS and Aqua MODIS active fire products (<http://modis-fire.umd.edu/>).
- GFAS data includes: Fire Radiative Power (FRP), dry matter burnt and biomass burning emissions.
- Data are available globally on a regular lat-lon grid with horizontal resolution of 0.1 degrees from 2003 to present.

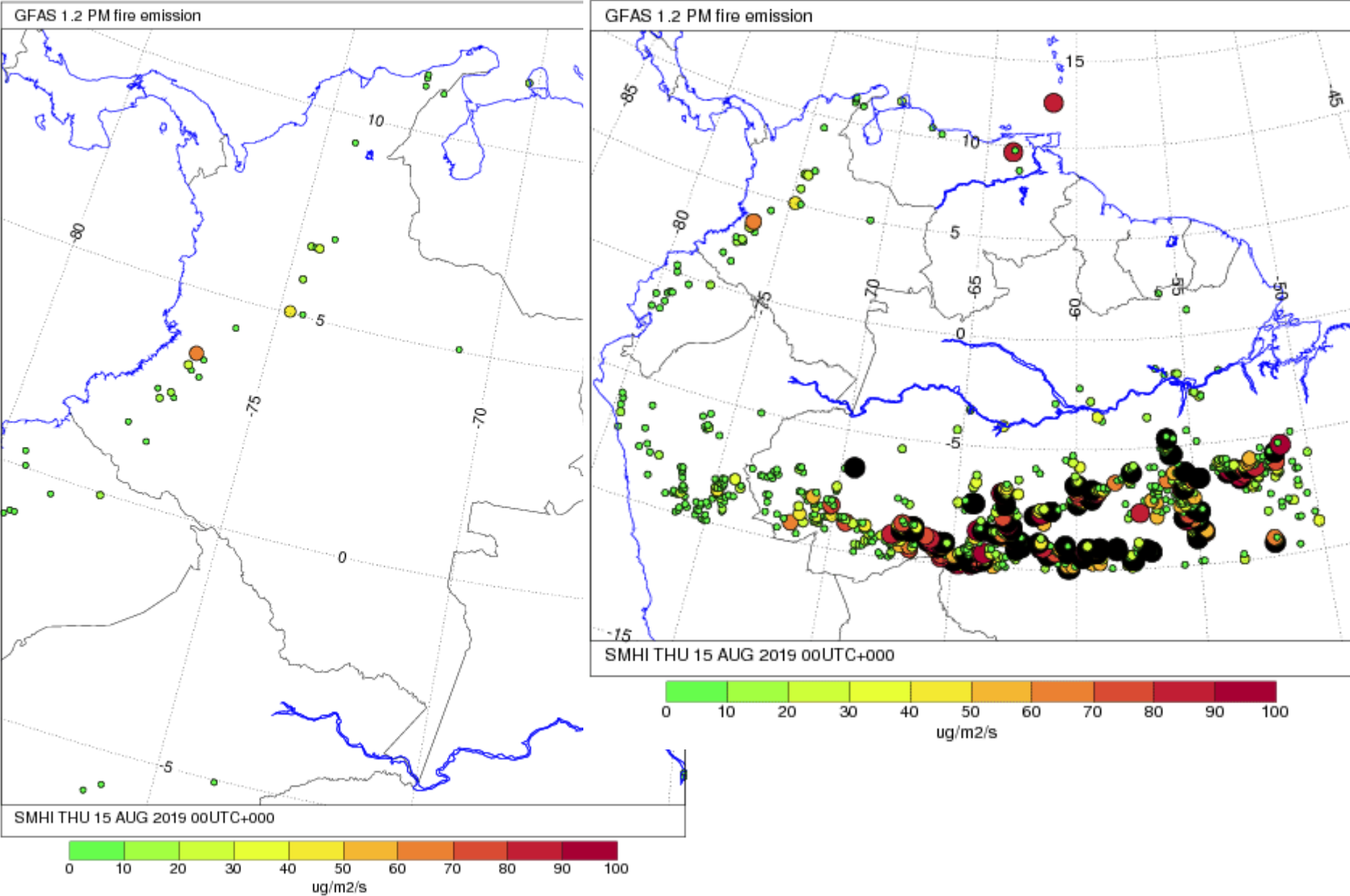
Kaiser et al. (2012). Biomass burning emissions estimated with a global fire assimilation system based on observed fire radiative power. *Biogeochemistry*, 9:527-554.



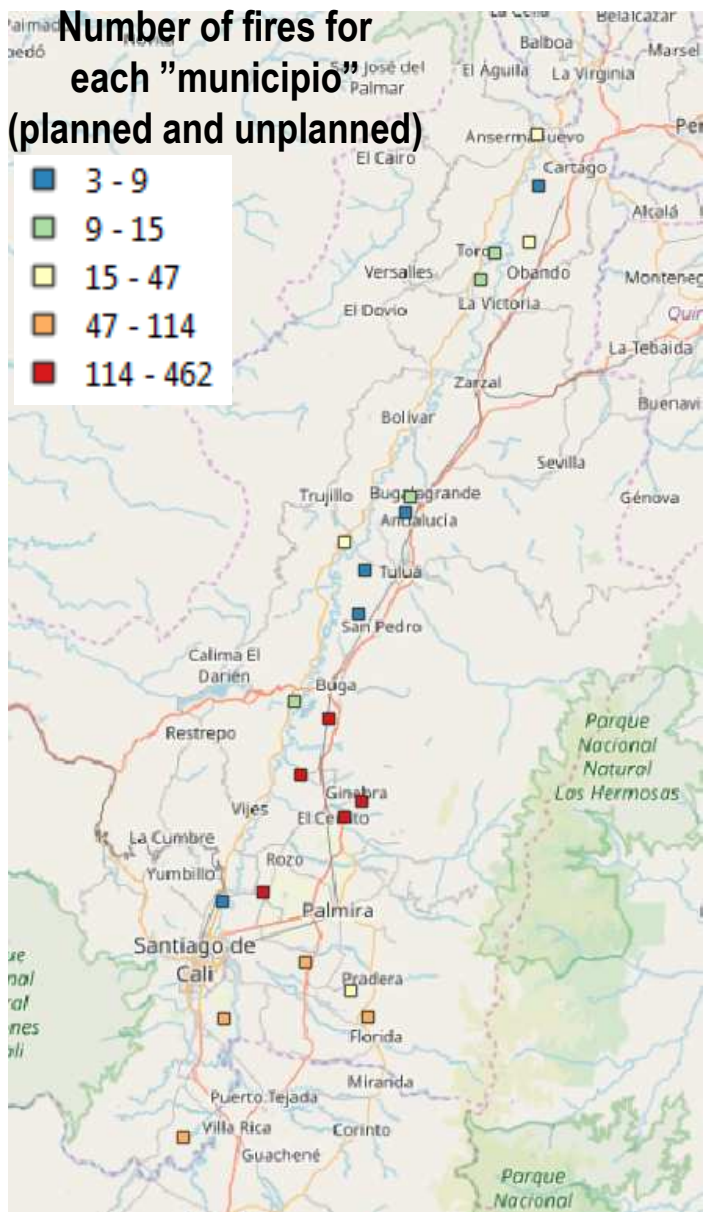
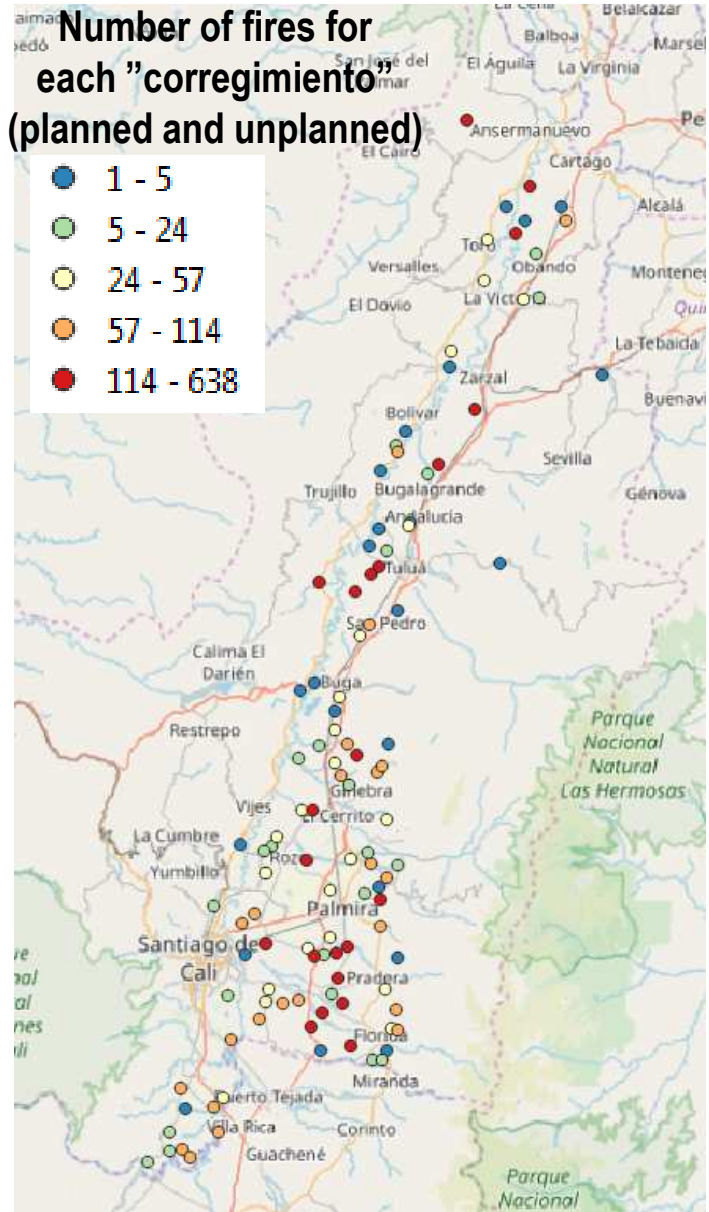
## GFAS parameters

<b>Gridded plume rise model parameters</b>	<b>units</b>
Mean altitude of maximum injection	m
Altitude of plume top	m
<b>GFAS analysis surface parameters (emissions)</b>	<b>units</b>
CO <sub>2</sub> , CO, CH <sub>4</sub> , NMHC, H, NO <sub>x</sub> , N <sub>2</sub> O, PM <sub>2.5</sub> , TPM, TC, OC, BC, combustion rate, SO <sub>2</sub> , individual hydrocarbons, DMS, NH <sub>3</sub>	kg m <sup>-2</sup> s <sup>-1</sup>
<b>Gridded satellite parameters</b>	<b>units</b>
Wildfire viewing angle of observation	degrees
Wildfire fraction of area observed	dimensionless
Number of positive FRP pixels per grid cell	
Wildfire radiative power	W m <sup>-2</sup>
Wildfire radiative power maximum	W

# Forest fires (large-scale, from satellite information)



# Agriculture biomass combustion (from Cenicaña)



**Fires 2018: 11.495**  
of which  
"quemadas": 80%  
"incendios": 20%

**Area affected for each fire:**  
mean: 4.0 ha  
median: 4.0 ha  
max: 57.2 ha

**Area affected for each "quema":**  
mean: 3.9 ha  
median: 4.0 ha  
max: 14.4 ha

# Biogenic emissions

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