Jet Propulsion Laboratory
California Institute of Technology

The Multi-Angle Imager for Aerosols (MAIA)

Providing Actionable Air Quality Data in Europe and Around the Globe

Abigail Nastan, MAIA Deputy Program Applications Lead
And the MAIA Team

EGU, May 26, 2022

Sharing is encouraged

Particulate matter (PM) air pollution is the **top environmental risk factor** for disease, but:

Sulfate, nitrate, BC, OC

BC, OC

NOMAD, CC BY 2.0

Nitrate

Aqua Mechanical, CC BY 2.0

BC, OC, nitrate

Dust

Leaflet, CC BY-SA 3.0

Sulfate

Which **types** of PM increase risks of which diseases?

MAIA was selected in March 2016 as part of **NASA's Earth Venture Instrument** program.

MAIA's science objectives are to study the effects of various **types** of particulate matter (PM) air pollution on:

✓ Acute illness and premature death

✓ Adverse birth outcomes

✓ Chronic disease

✓ Launch: Circa 2024

✓ Mission length: 3 years*

✓ Instrument: 14 spectral bands, multi-angular, polarimetric

✓ Targeted: 10+ urban areas where health studies will be done*

*baseline requirements

The MAIA investigation concept
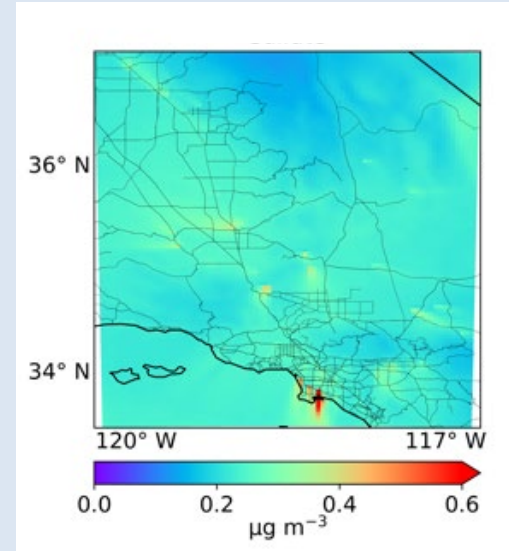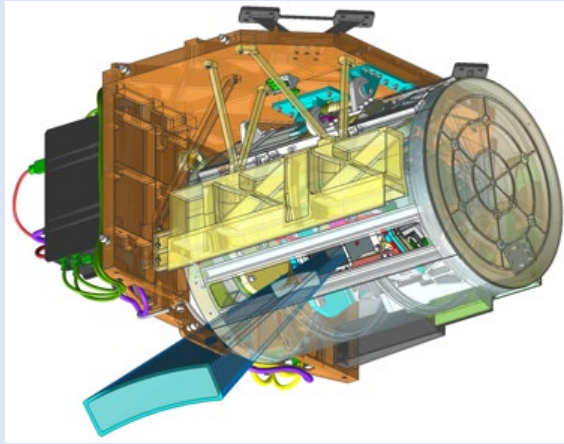
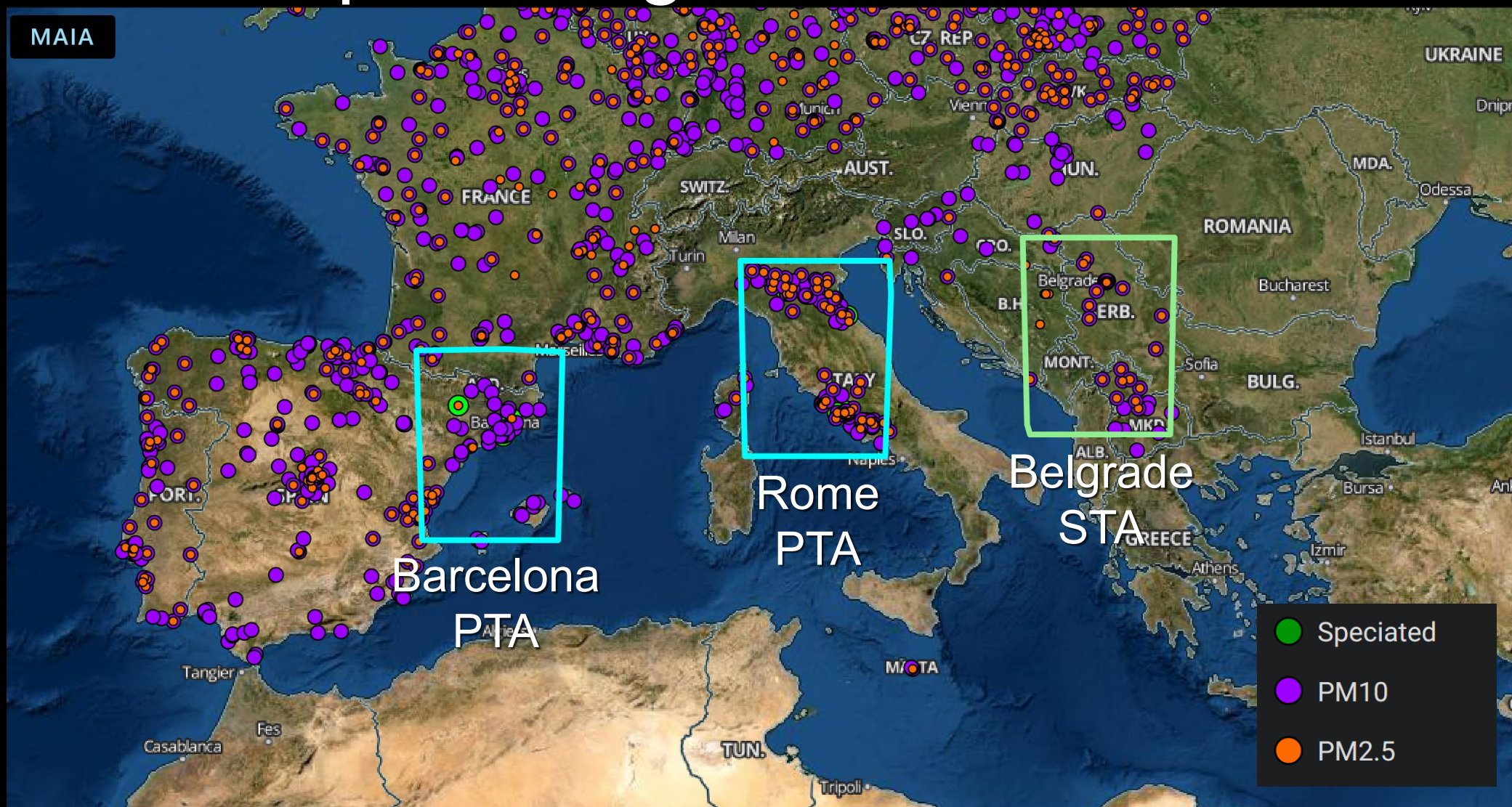| Satellite instrument	Surface PM monitors	Chemical transport model (CTM)	Birth, death, hospitalization records
Used to generate the archived and publicly distributed data products at the NASA Atmospheric Science Data Center (ASDC)			Privacy protected, not handled by NASA

MAIA health studies are planned on PM types for 10-plus **Primary Target Areas (PTAs)**
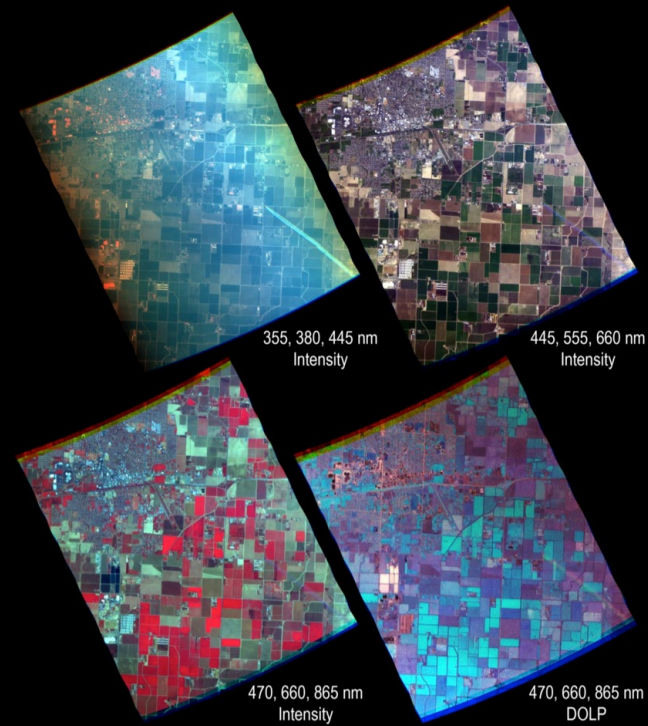
The PTA **candidates** have been chosen based on:

- ✓ Population
- ✓ PM characteristics
- ✓ Surface monitor data
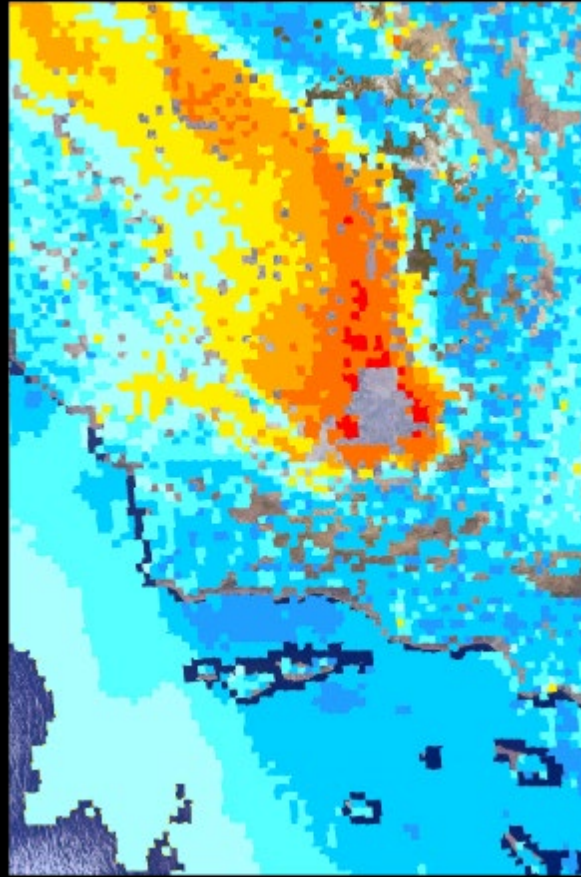- ✓ Health data
- ✓ Remote sensing considerations

Updated 4/22

Primary Target Areas
- 🔵 USA-LosAngeles
- 🔵 USA-Atlanta
- 🔵 USA-Boston
- 🔵 ESP-Barcelona
- 🔵 ITA-Rome
- 🔵 ZAF-Johannesburg
- 🔵 ISR-TelAviv
- 🔵 ETH-AddisAbaba
- 🔵 IND-Delhi
- 🔵 CHN-Beijing
- 🔵 TWN-Taipei

Secondary Target Areas
- 🟢 USA-Hilo
- 🟢 PAC-OceanStCu
- 🟢 USA-SanFrancisco
- 🟢 USA-Phoenix
- 🟢 USA-Denver
- 🟢 MEX-MexicoCity
- 🟢 CAN-Toronto
- 🟢 PER-Lima
- 🟢 CHL-Santiago
- 🟢 PRI-SanJuan
- 🟢 BRA-SãoPaulo
- 🟢 SEN-Dakar
- 🟢 GHA-Accra
- 🟢 ATL-OceanStCu
- 🟢 NGA-Lagos

- 🟢 ZAF-CapeTown
- 🟢 SRB-Belgrade
- 🟢 KEN-Nairobi
- 🟢 ETH-Harar
- 🟢 KWT-KuwaitCity
- 🟢 PAK-Karachi
- 🟢 IND-Chennai
- 🟢 BGD-Dhaka
- 🟢 THA-Bangkok
- 🟢 VNM-Hanoi
- 🟢 MNG-Ulaanbaatar
- 🟢 RUS-Yakutsk
- 🟢 KOR-Seoul
- 🟢 AUS-Sydney

Calibration/Validation Target Areas
- 🟠 USA-RailroadValley
- 🟠 MRT-Mauritania1
- 🟠 NAM-Gobabeb
- 🟠 LBY-Libya4

MAIA European target areas

Barcelona PTA

Rome PTA

Belgrade STA

Legend:
- Speciated (green)
- PM10 (purple)
- PM2.5 (orange)

MAIA data product summary

Concentrations of:
- Total PM_{10}
- Total $PM_{2.5}$
- Sulfate $PM_{2.5}$
- Nitrate $PM_{2.5}$
- OC $PM_{2.5}$
- EC $PM_{2.5}$
- Dust $PM_{2.5}$

355, 380, 445 nm Intensity

445, 555, 660 nm Intensity

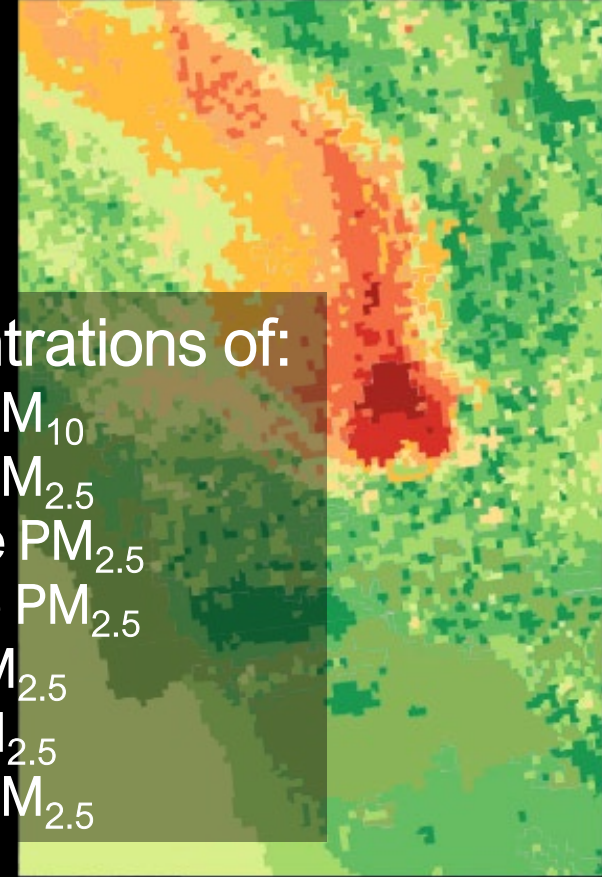470, 660, 865 nm Intensity

470, 660, 865 nm DOLP

Level 1 data: what the instrument is actually "seeing", mapped, 250 m

Level 2 aerosol data: AOD, other aerosol properties, mapped, 1 km
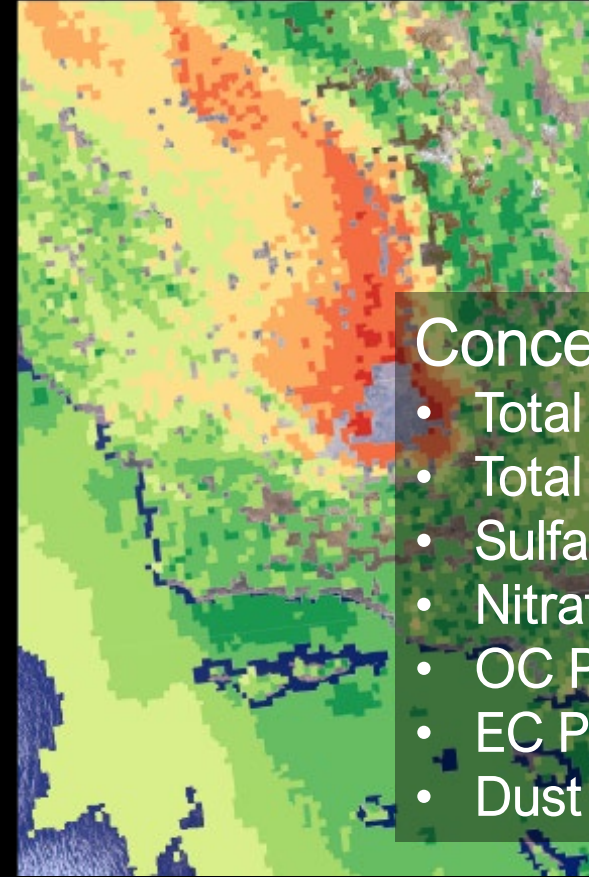
Level 2 PM data: PM concentrations, mapped, 1 km, daily averaged (days of overpass)

Level 4 PM data: PM concentrations, daily averaged, mapped, gap-filled, every day, 1 km

Thank you!

Interested in joining MAIA Early Adopters? Have other questions about MAIA?

Abigail.M.Nastan@jpl.nasa.gov

Apply to receive the MAIA Simulated Data:

https://maia.jpl.nasa.gov/resources/data-and-applications/