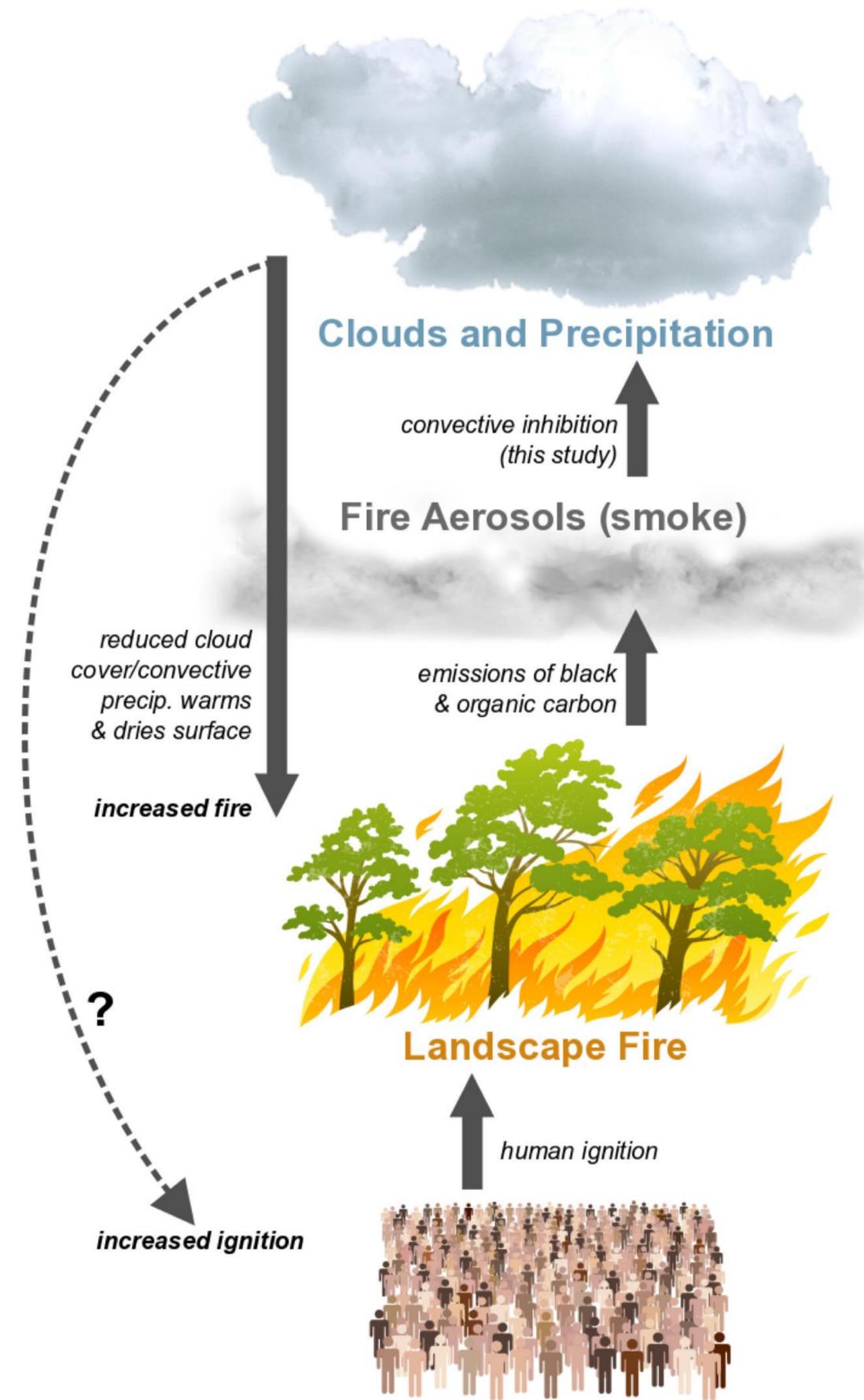


# FIRES LIMIT RAINFALL IN SUB-SAHARAN AFRICA

Feedback loop with implications for regional/global climate, local hydrology and agricultural practices in ecologically vulnerable tropical regions.



AGU PUBLICATIONS

Geophysical Research Letters

RESEARCH LETTER

10.1002/2015GL065063

**Key Points:**

- Satellite observations of temporal dynamics of aerosol-cloud interactions

**Human-caused fires limit convection in tropical Africa: First temporal observations and attribution**

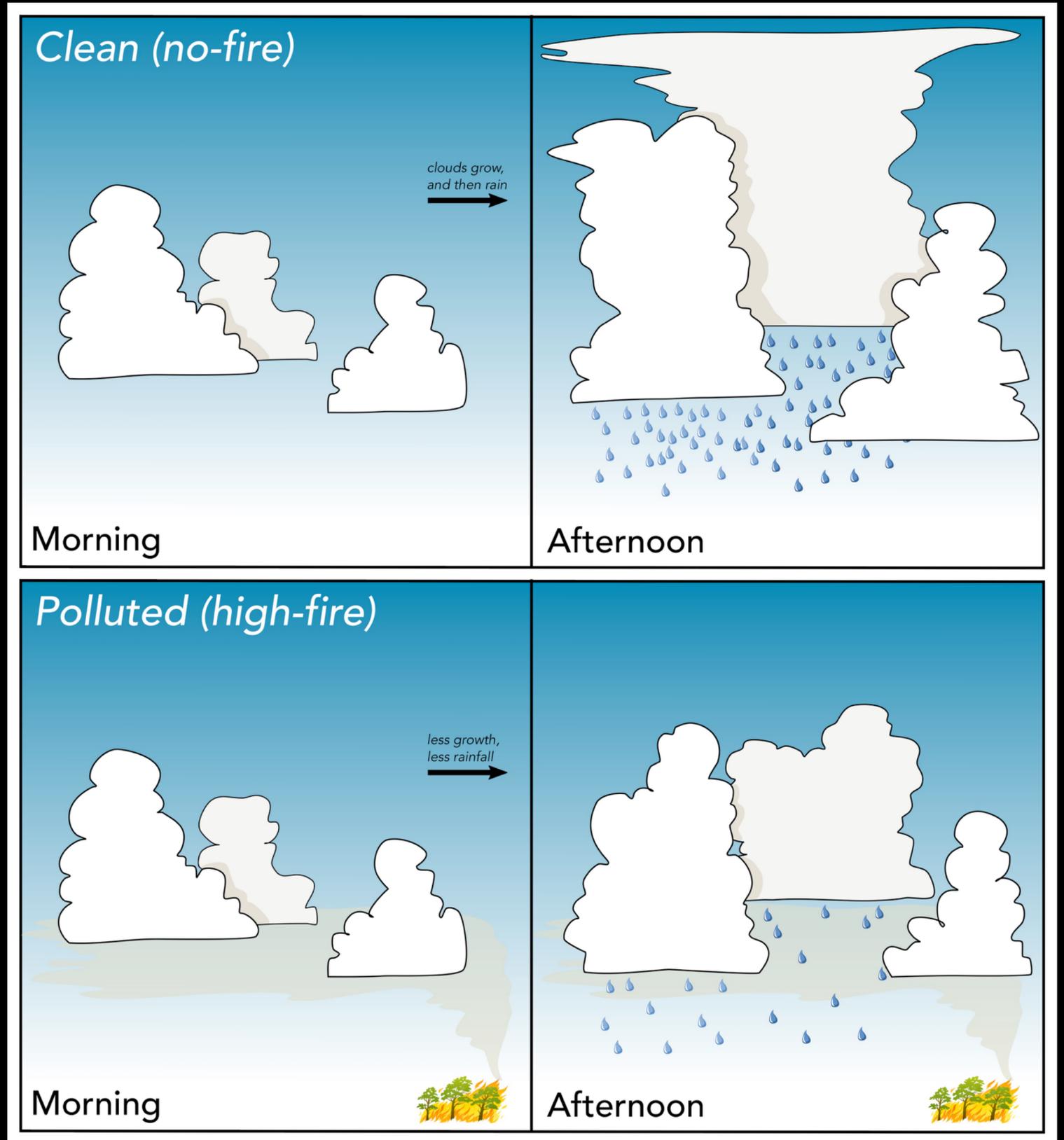
M. G. Tosca<sup>1</sup>, D. J. Diner<sup>1</sup>, M. J. Garay<sup>1</sup>, and O. V. Kalashnikova<sup>1</sup>

<sup>1</sup>Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, USA

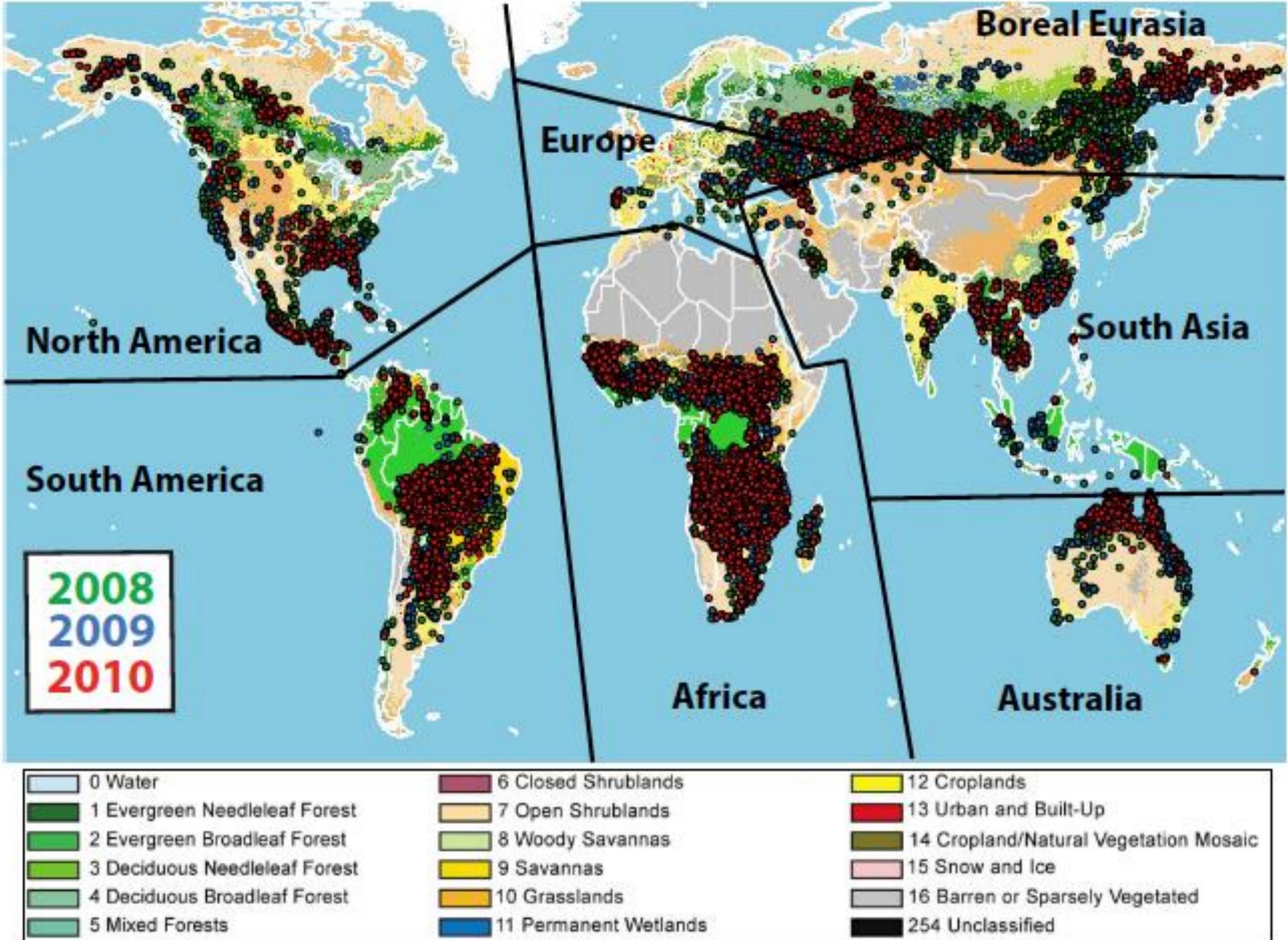
# FIRES LIMIT RAINFALL IN SUB-SAHARAN AFRICA

In clean conditions, as the Earth's surface warms throughout the day, air rises, clouds form, and rain commences

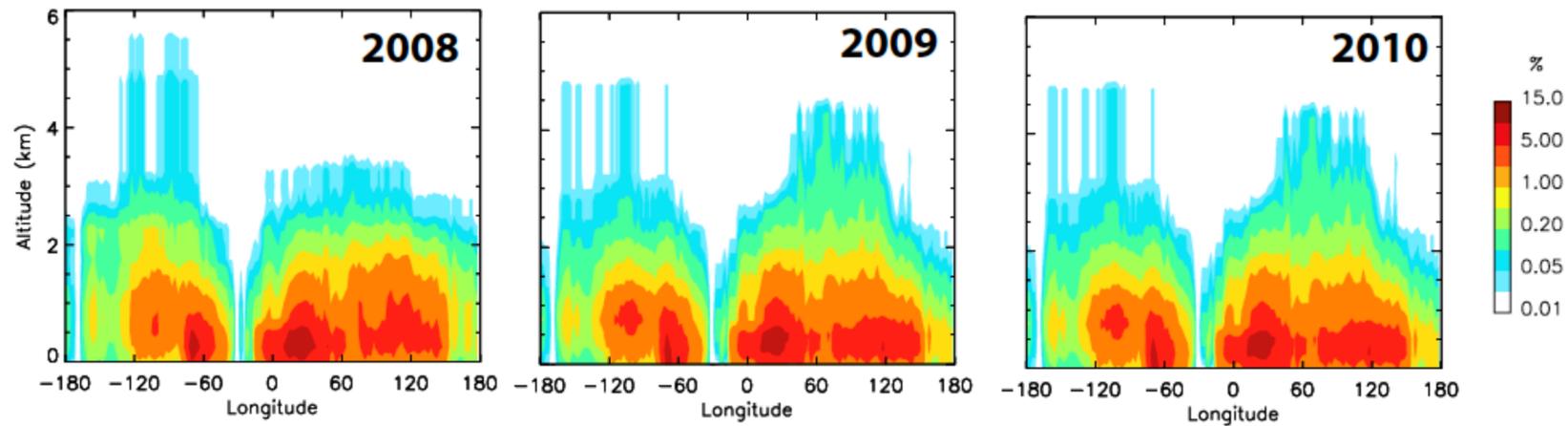
In polluted conditions, the Earth's surface warms less throughout the day, less clouds form, and less rain falls.



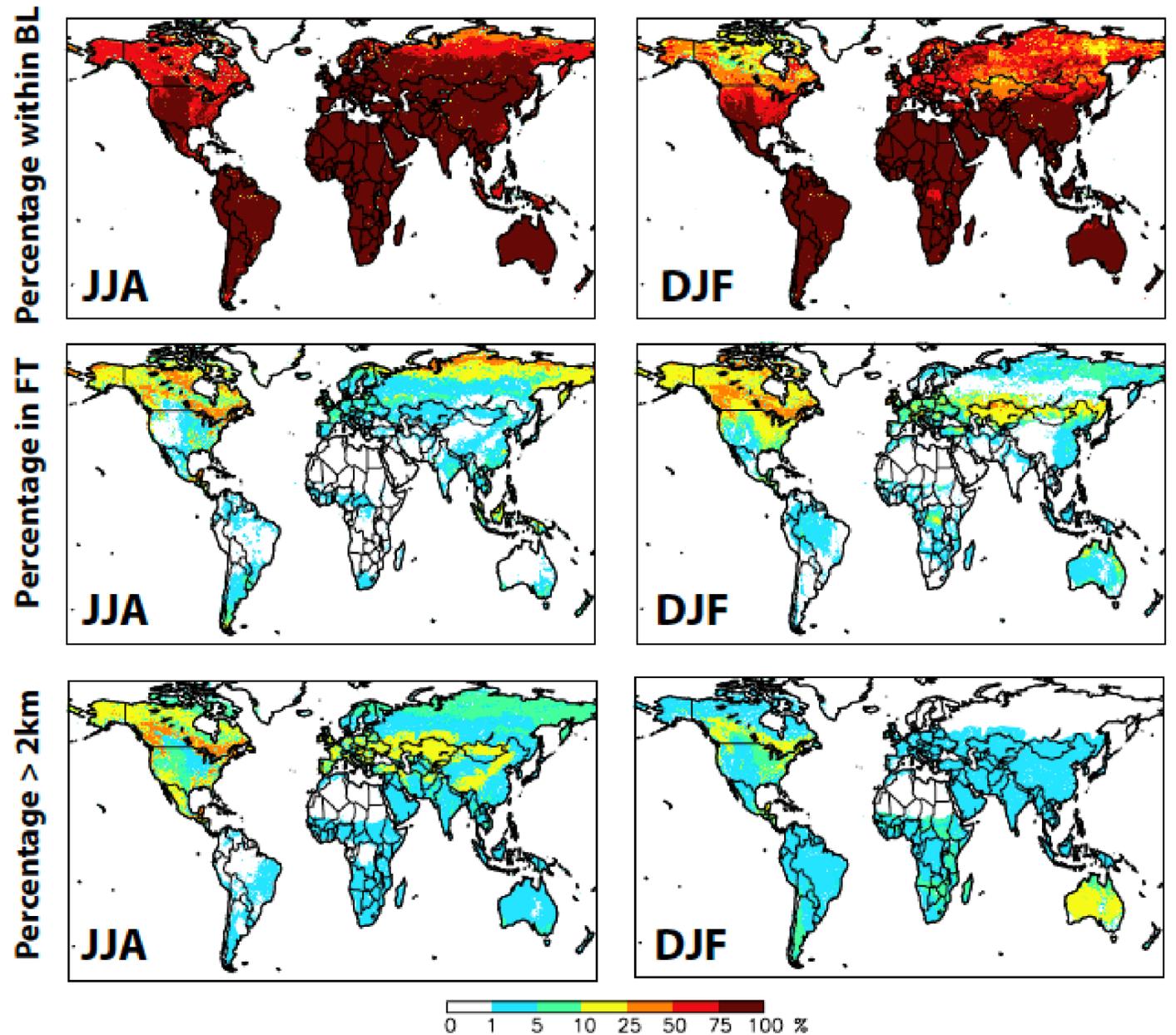
# WILDFIRE+CLIMATE GLOBAL IMPLICATIONS



# WILDFIRE+CLIMATE GLOBAL IMPLICATIONS



a) Percentage of total column biomass burning emissions



- ⊙ Vast majority of plumes are in Africa (but, very small fires)
- ⊙ Most fires on the planet occur between July and September (dominated by signal from southern Africa)
- ⊙ Smoke from wildfire generally does not make it above 2km, with some notable exceptions
- ⊙ Substantial fraction of plumes in high latitudes inject above the planetary boundary layer
- ⊙ Most plumes in tropics/subtropics are low-altitude injection events
- ⊙ Canada/Alaska seem to experience more high-injection plumes than Siberia?
- ⊙ Implications for climate?

# RADICAL COLLABORATIONS

The screenshot shows a web browser window with the URL <https://misr.jpl.nasa.gov/getData/accessData/MisrMinxPlumes2/>. The page is titled "MISR Plume Height Project 2" and is part of the "ACCESS DATA" section. The header includes the NASA Jet Propulsion Laboratory logo and navigation links for "JPL HOME", "EARTH", "SOLAR SYSTEM", "STARS & GALAXIES", and "SCIENCE & TECHNOLOGY". The main content area features the MISR logo and the text "Multi-angle Imaging SpectroRadiometer". A sidebar on the left contains a search bar and a menu with options like "Home", "Mission", "Get Data", "Gallery", "News and Events", "Publications", "FAQs", "Ask a Question", "About Us", "Other Resources", and "Internal". The main content area displays the "MISR Plume Height Project" title, the names of the project team members (David Nelson, Sebastian Val, Ralph Kahn, Ernest Koeberlein, Mike Tosca, David Diner, Cecelia Lawshe), and the date "July, 2015 - see what's changed". Below this, there is a note "Access data digitized with earlier versions of MINX" and three radio buttons for "Wildfire smoke plumes", "Volcanic plumes", and "Dust plumes". A "Search" button is located below the radio buttons. The bottom section is titled "Fast Search for All Plumes in a Clicked Region" and features a world map with colored regions (North America, South America, Europe, Africa, Asia, Oceania) and the text "For development purposes only" overlaid on the map.

VIEW



MODIFY KEY

COLOR ● DEFAULT

OPACITY ● DEFAULT

PLOT CONTROLS

PLOT TYPE MAP

DATA HEX PILLAR

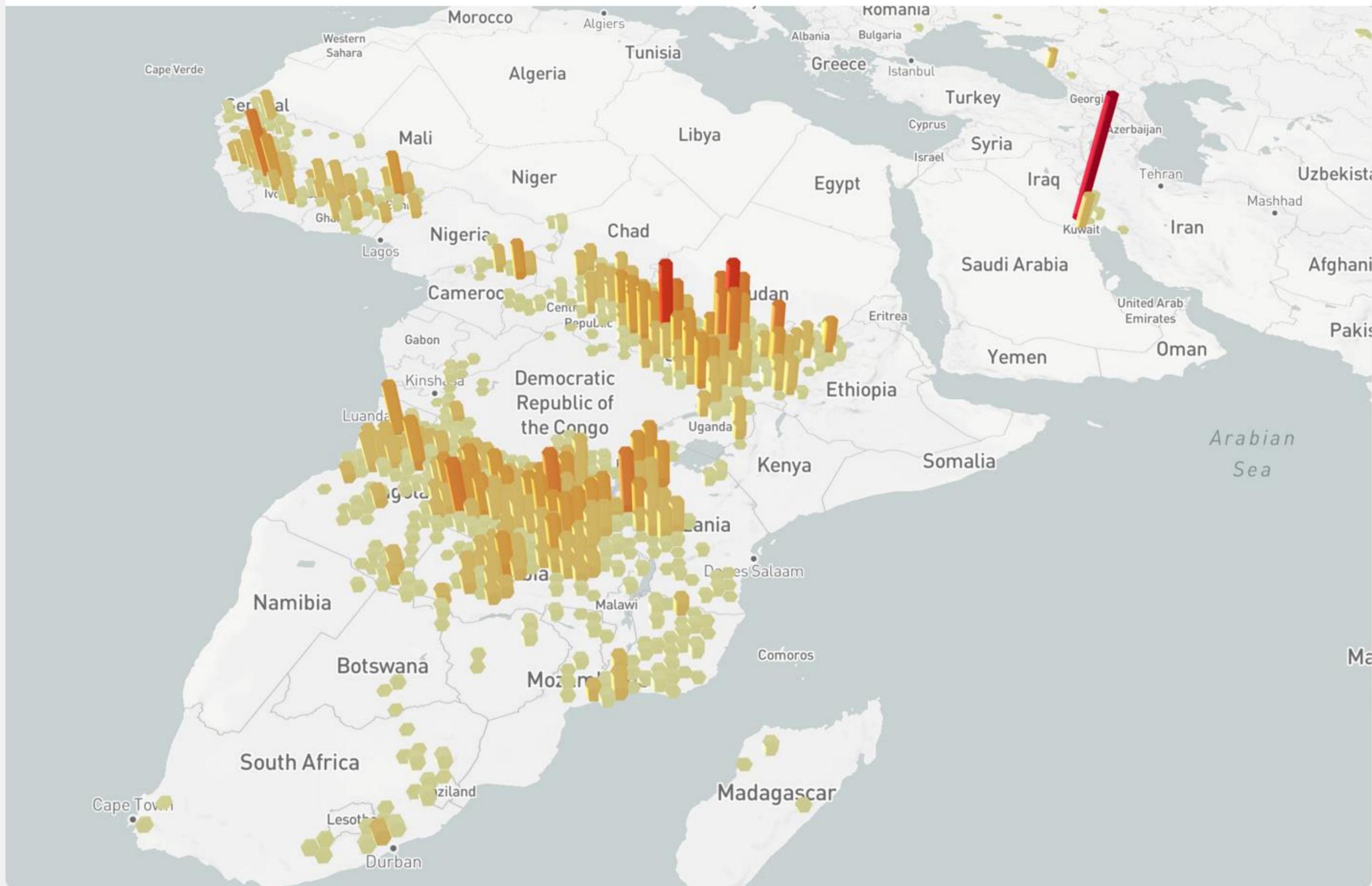
1

EDIT

FILTER 1



MAP 3D FIRE RADIATIVE POWER AND WIND CORRECTED PLUME HEIGHT



DATA

FILTER 1

FILTER 2

FILTER 3

FILTER 4



AFRICA REGION

ALL BIOME

DATE RANGE

01 / 01 / 2006

12 / 31 / 2011

2006

2007

2008

2009

2010

2011

# DESIGN PROCESS vs. SCIENTIFIC METHOD

