



# Interdisciplinary Biomass Burning Initiative

---

JOHANNES KAISER AND MELITA KEYWOOD  
(IBBI CO-CHAIRS)

**5<sup>th</sup> IBBI Workshop, July 2017, Boulder, CO, USA**

# What is IBBI?



- IBBI is the “**Interdisciplinary Biomass Burning Initiative**”.
- IBBI was founded in 2012, by
  - **iLEAPS** (Integrated Land Ecosystem-Atmosphere Processes Study),
  - **IGAC** (International Global Atmospheric Chemistry),
  - **WMO** (World Meteorological Organization).
- IBBI has been set up through a couple of **workshops**:
  - European Science Foundation (ESF) Exploratory Workshop (Farnham Castle, 2009)
  - Joint IGAC-iLEAPS-WMO workshop (WMO, 2012)



# What does IBBI do?

- Primary goal: improve **atmospheric composition and air quality** monitoring and forecasting through better **scientific understanding of processes** around biomass burning.

*science-driven, application-oriented*

- Approach: instigate new interdisciplinary research
  - <http://www.dl.mpic.de/ibbi>
  - <mailto:ibbi@lists.mpic.de>
  - workshops & conference sessions
    - Geneva Workshop July 2012 (IBBI 1)
    - EGU 2012 (IBBI 2), 2013, 2014, 2015, 2016; AsiaFlux 2013
    - Schloss Ringberg 2014 (IBBI 3); iLEAPS Science Conference 2014
    - Jakarta Workshop 2016 (IBBI 4)
- publications:
  - Special Issue of *Atmospheric Environment*
  - WMO Report

# ICAP Multi-Model Ensemble Smoke Forecast for Now



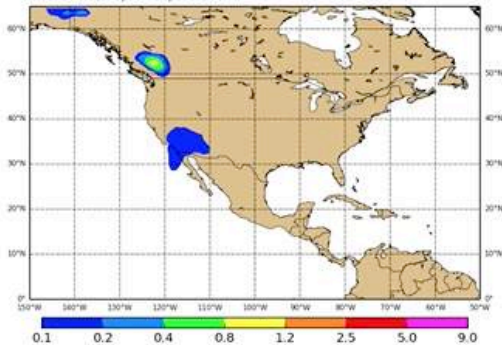
## NRL Monterey ICAP Multi-Model Ensemble

This page is an official U.S. Navy site and is intended as an internal research and development testbed.  
 Products should not be treated as operational forecasting tools!  
**NOT OFFICIAL FNMOG NAAPS** Privacy Policy Disclaimer  
 Marine Meteorology Division (Code 7500)  
 U. S. Navy Navy Recruiting Navy FOIA ONR

[previous / next](#)      [Main Listing / ICAP Multi-Model CONUS Smoke Aerosol Optical Depth Archive](#)

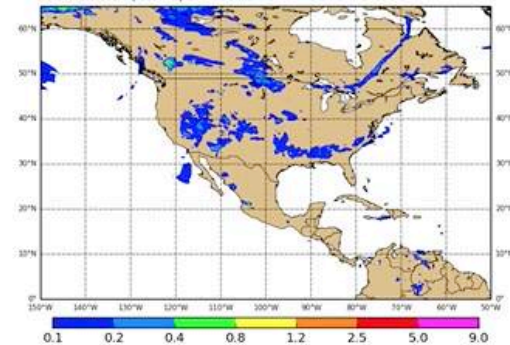
- t+hour
- 006
- 012
- 018
- 024
- 030
- 036
- 042
- 048
- 054
- 060
- 066
- 072
- 078
- 084
- 090
- 096
- 102
- 108
- 114
- 120

Saturday 8 July 2017 00UTC NAAPS Forecast t+030  
 Sunday 9 July 2017 06UTC Valid Time  
 SMOKE Aerosol Optical Depth at 550nm



Plots Generated Sunday 9 July 2017 12UTC NRL/Monterey Aerosol Modeling  
 NOT OFFICIAL FNMOG RUN

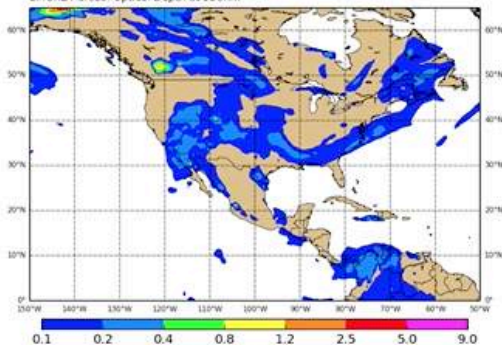
Saturday 8 July 2017 00UTC GEOS-5 Forecast t+030  
 Sunday 9 July 2017 06UTC Valid Time  
 SMOKE Aerosol Optical Depth at 550nm



Plots Generated Sunday 9 July 2017 12UTC NRL/Monterey Aerosol Modeling  
 GEOS-5 model output produced by NASA Global Modeling and Assimilation Office

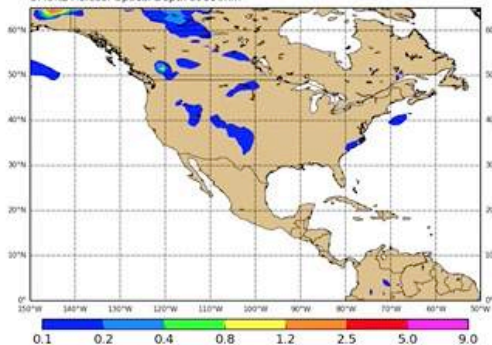
BSC Imagery Unavailable

Saturday 8 July 2017 00UTC CAMS Forecast t+030  
 Sunday 9 July 2017 06UTC Valid Time  
 SMOKE Aerosol Optical Depth at 550nm



Plots Generated Sunday 9 July 2017 12UTC NRL/Monterey Aerosol Modeling

Saturday 8 July 2017 00UTC MASINGAR Forecast t+030  
 Sunday 9 July 2017 06UTC Valid Time  
 SMOKE Aerosol Optical Depth at 550nm



Plots Generated Sunday 9 July 2017 12UTC NRL/Monterey Aerosol Modeling

NGAC Imagery Unavailable

- sulfate
- dust
- smoke
- seasalt
- total
- global
- niosea
- byzantium
- eastasia
- subtropat
- pacific
- conus
- satlantic
- sioaus
- npolar

# Results of workshop at Schloss Ringberg



Preface

Preface for Atmos. Env. Special issue on IBBI

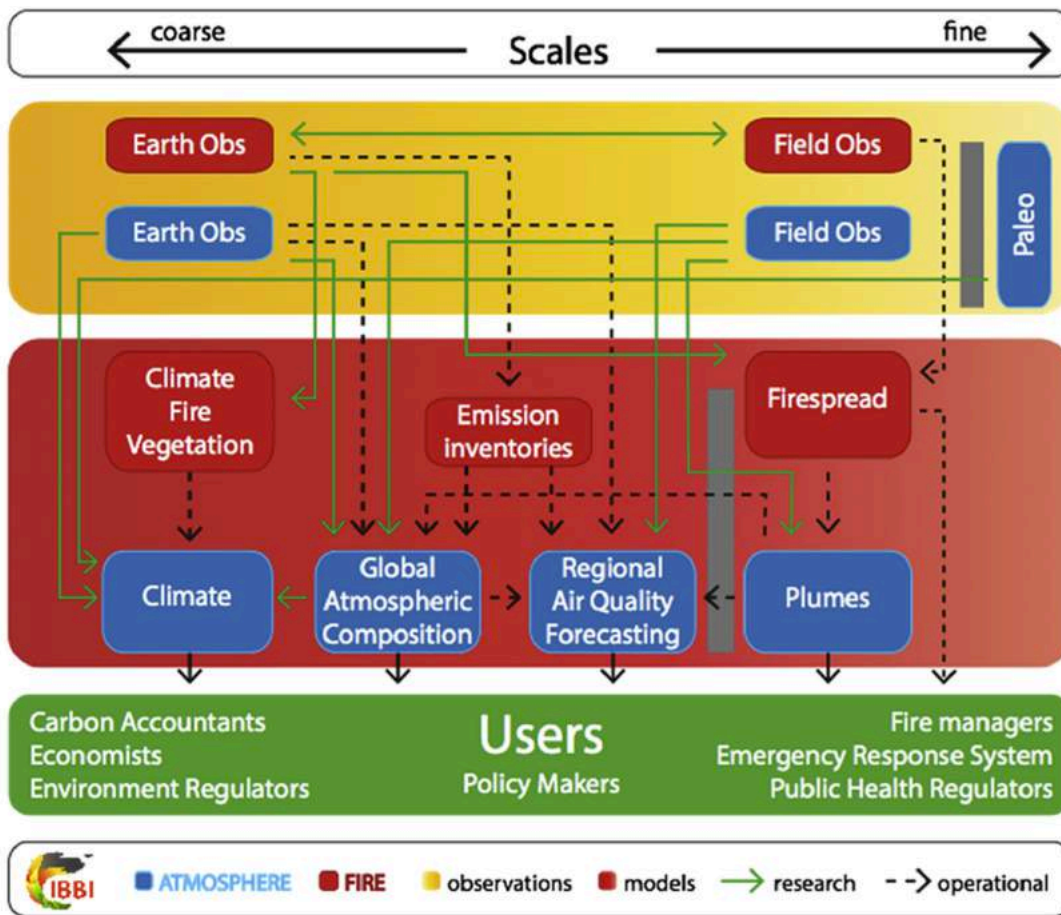


Fig. 1. Biomass burning data processing pathways and two major blocks (grey boxes) identified during the 3rd IBBI workshop.

# Specific Result 1: Use different information sources to estimate global fire emissions for CMIP6

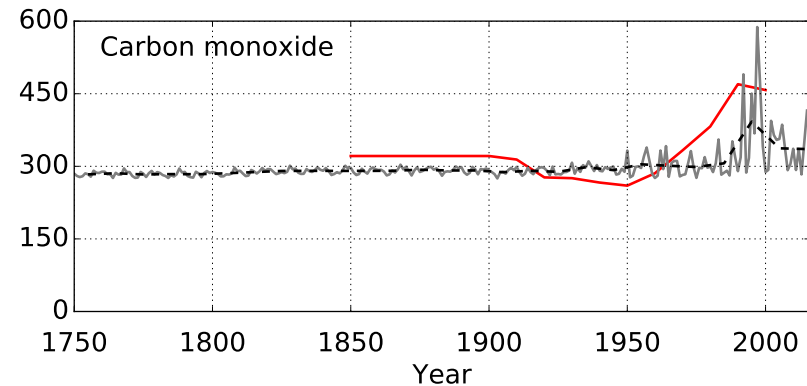
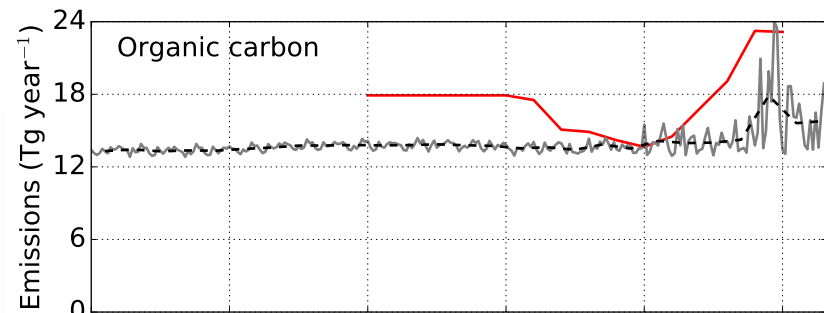
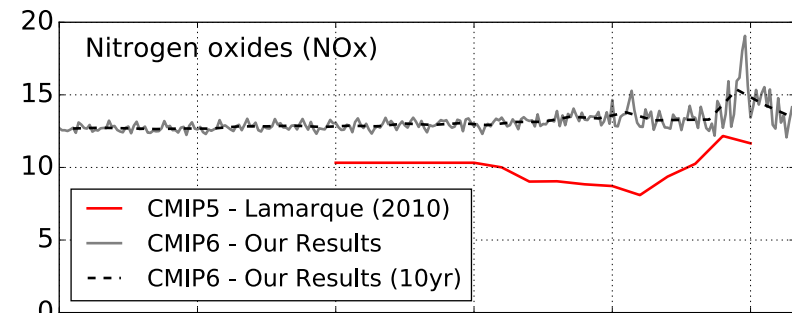
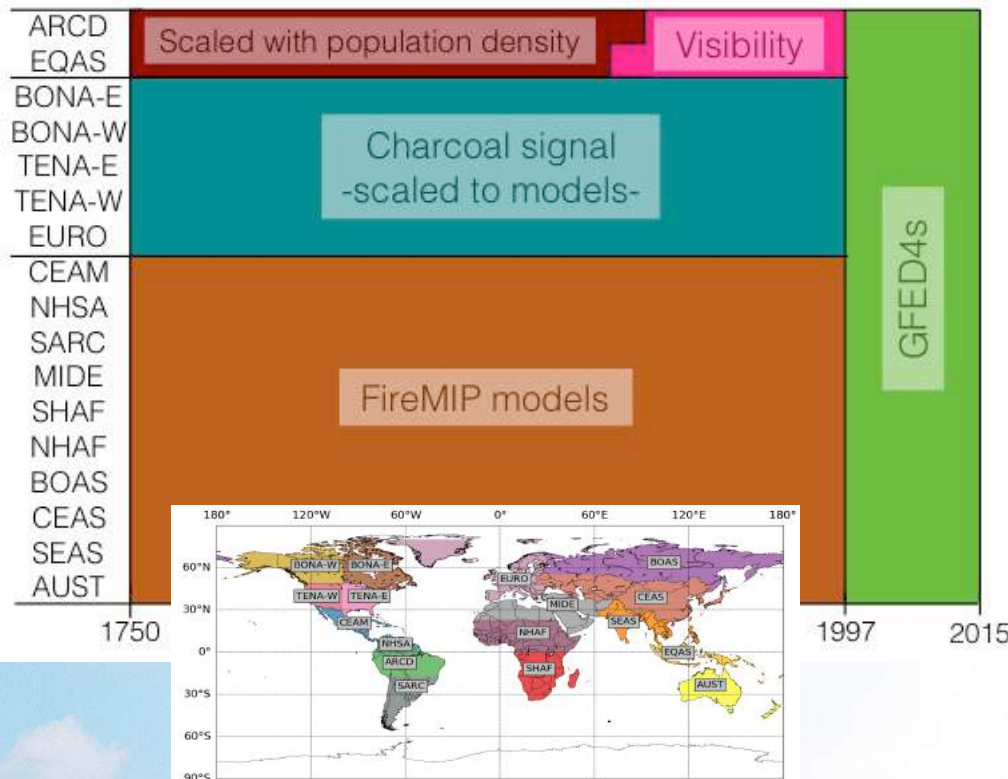


Geosci. Model Dev. Discuss., doi:10.5194/gmd-2017-32, 2017  
 Manuscript under review for journal Geosci. Model Dev.  
 Discussion started: 8 February 2017  
 © Author(s) 2017. CC-BY 3.0 License.



## Historic global biomass burning emissions based on merging satellite observations with proxies and fire models (1750-2015)

Margreet J.E. van Marle<sup>1</sup>, Silvia Kloster<sup>2</sup>, Brian I. Magi<sup>3</sup>, Jennifer R. Marlon<sup>4</sup>, Anne-Laure Daniau<sup>5</sup>, Robert D. Field<sup>6</sup>, Almut Arneht<sup>7</sup>, Matthew Forrest<sup>8</sup>, Stijn Hantson<sup>7</sup>, Natalie M. Kehrwald<sup>9</sup>, Wolfgang Knorr<sup>10</sup>, Gitta Lasslop<sup>2</sup>, Fang Li<sup>11</sup>, Stéphane Mangeon<sup>12</sup>, Chao Yue<sup>13</sup>, Johannes W. Kaiser<sup>14</sup>, Guido R. van der Werf<sup>1</sup>



# Specific Results 2: Bridging scales

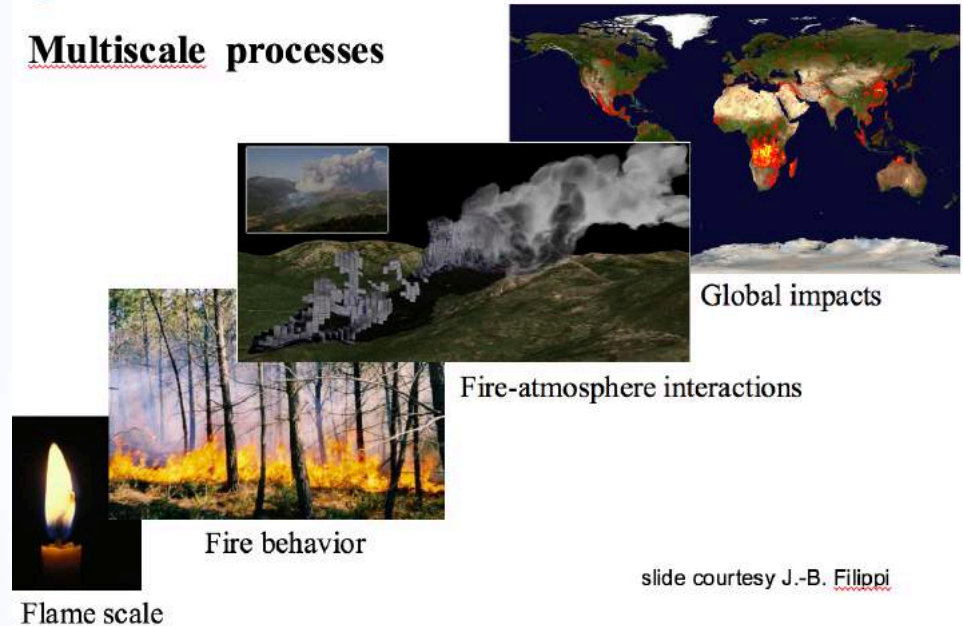


Ad-hoc IBBI working group:

**integrated case study of individual fire/plume event**

(Filippi, Field, Kaiser)

Multiscale processes



slide courtesy J.-B. Filippi

IBBI workshop, 23-26 April 2014 [Schloss Ringberg](#)

## 2017 Conference on Fire Prediction Across Scales



The 2017 Conference on Fire Prediction Across Scales will take place **October 23rd - 25th 2017** on Columbia University's **Morningside Campus**.

# Workshop Indonesia in 2016



## Forecasting Emissions from Vegetation Fires and their Impacts on Human Health and Security in South East Asia

International workshop organized by the World Meteorological Organisation (WMO) and the International Biomass Burning Initiative (IBBI)

Supported by the WMO, UNISDR/IWPM, GIZ, IGAC, UNU, the Global Wildland Fire Network and Indonesian Agency for Meteorological, Climatology and Geophysics (BMKG), Jakarta, Indonesia  
29 August – 1 September 2016

### Result:

WMO Report detailing expert recommendation for the establishment of a *Regional Vegetation Fire and Smoke Pollution Warning and Advisory Center* in SE Asia

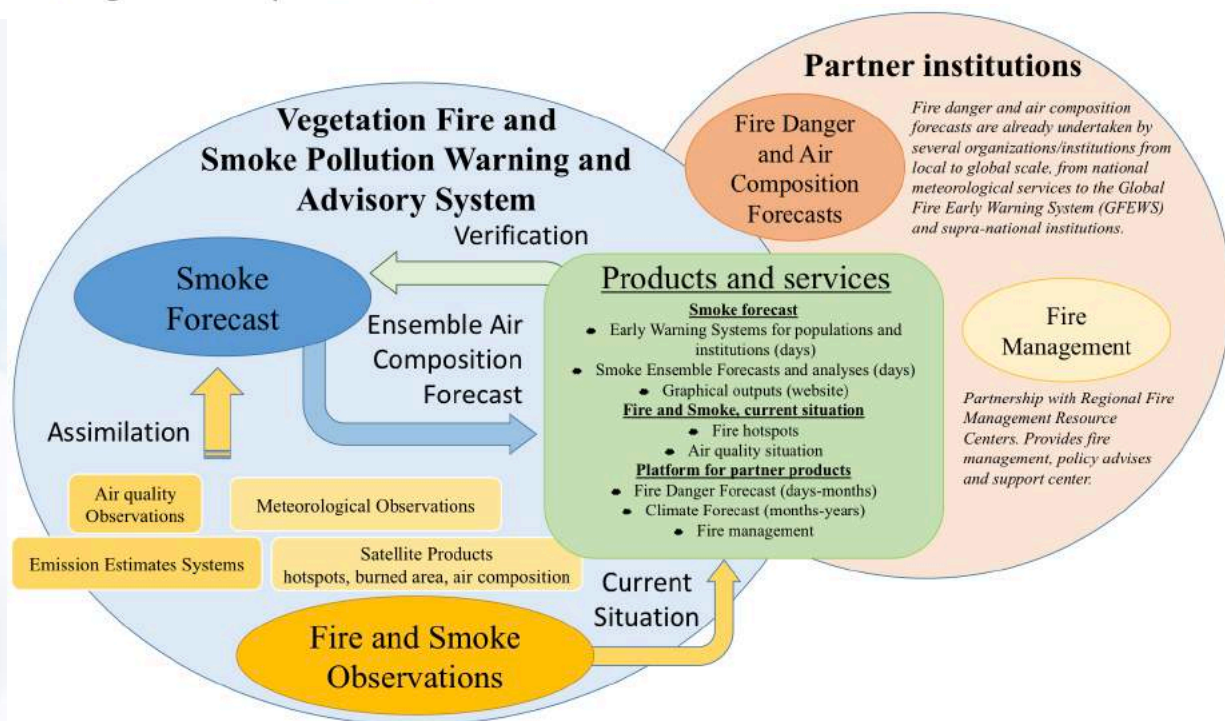


Figure 2. Overview of a potential Vegetation Fire and Smoke Pollution Warning and Advisory System



# Workshop rational

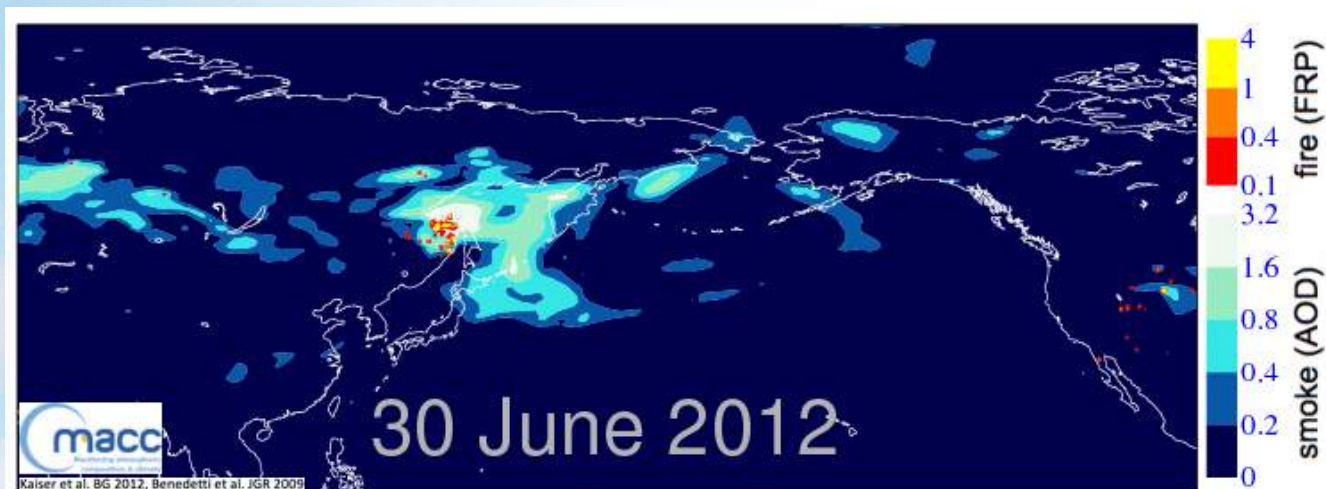
- Current field campaigns study biomass burning in the US in great detail.
- Other parts of the world are studied less intensively, while facing similar questions.
- Operational global forecasting system still have large uncertainties.

**Q1: What are the most pressing questions that people want the US campaigns to investigate?**

**Q2: Which information will the US campaigns provide that might benefit operational systems and global research?**



futureearth



# Workshop agenda



**Monday 10 July 2017**

**University of Colorado Center for Community Flatirons Room**

9:00 – 10:30 Welcome and Introductions

9:00	Welcome and Introductions	<i>Megan Melamed</i>
9:20	Welcome from local organizations (NOAA, NCAR, CIRES, Future Earth)	<i>David Fahey, David Edwards, Waleed Abdalati, Josh Tewksbury</i>
10:10	IGAC Overview	<i>Megan Melamed</i>
10:10	WMO GAW Overview	<i>Alexander Baklanov</i>
10:20	IBBI Overview and Workshop Goals	<i>Johannes Kaiser/Melita Keywood</i>

10:30-11:00 Coffee/Tea Break

11:00-12:30 Introduction to the 2018/2019 US Field Campaigns

11:00	WE-CAN 2018	<i>Emily Fischer</i>
11:15	FIREX 2019	<i>Carsten Warneke</i>
11:30	FireChem 2019	<i>Jim Crawford</i>
11:45	FASMEE	<i>Roger Ottmar</i>
12:00	BBOP	<i>Art Sedlacek</i>
12:15	Discussion	

12:30-13:30 Lunch

13:30-15:30 Challenges for Forecasting and Modeling Biomass Burning

13:30	CAMS Forecasting	<i>Mark Parrington</i>
13:50	Australian Smoke Forecasting System	<i>Martin Cope</i>
14:10	NAME – prediction of smoke haze pollution	<i>Christopher Gan</i>
14:30	FLAMBE	<i>Edward Hyer</i>
14:50	Regulatory impacts of fires	<i>Kirk Baker</i>
15:10	Discussion	

15:30-16:00 Coffee/Tea Break

16:00-17:30 Fire Products from Satellites

16:00	ESA	<i>Johannes Kaiser</i>
16:20	NASA	<i>Amber Soja</i>
16:40	NOAA	<i>Brad Pierce</i>
17:00	Discussion	

**Tuesday 11 July 2017**

**University of Colorado Center for Community Flatirons Room**

9:00-10:30 ACCORD Biomass Burning Synthesis Effort and selected non-US activities

9:00	ACCORD Synthesis Effort	<i>Christine Wiedinmyer/Louisa Emmons</i>
9:30	RVFSP-WAS	<i>Alexander Baklanov</i>
9:45	BrFLAS	<i>Daniela Franca</i>
10:00	FireCaster	<i>Jean-Baptiste Filippi</i>
10:15	Discussion	

10:30-11:00 Coffee/Tea Break

11:00-12:30 Breakout Session “How can the U.S. led field campaigns, the synthesis effort, and NASA/NOAA/ESA fire products contribute to enhancing non-US activities and improve forecasting and modelling of biomass burning”

11:00	Introduction Presentations	
	<ul style="list-style-type: none"> <li>How the outcomes of the US Field Campaigns can be transferred beyond the US and into the future. <i>Jim Roberts</i></li> <li>How US Field Campaigns can serve to verify and enhance satellite products. <i>Nancy French</i></li> <li>How US Field Campaigns, satellite products, and non-US activities can address the challenges of forecasting and modeling biomass burning. <i>Robert Field</i></li> <li>How the US Field Campaigns can help to meet the goals and needs of biomass burning research outside the US. <i>Mei Zheng</i></li> </ul>	
11:20	World Café Breakout Session	

12:30-13:30 Lunch

13:30-15:00 Reports from Breakout Groups/Plenary Discussion

13:30	Breakout Group Reports
14:30	Plenary Discussion

15:00-15:30 Coffee Break

15:30-17:30 Closing Session: Identification/leadership of actions

15:30	Linking US Efforts to International research
16:00	Linking US Efforts to Forecasting and Modeling
16:30	US Field Campaigns and Capacity Building
17:00	Concluding Remarks

# ICAP and WMO-SDS multi-model ensembles

**International Cooperative for Aerosol Prediction**  
 Link will go public soon

**WMO Sand and Dust Storm Warming Advisory and Assessment System**

**Northern Africa-Middle East-Europe Regional Centre Public link:**

**<http://sds-was.aemet.es/forecast-products/dust-forecasts/compared-dust-forecasts>**



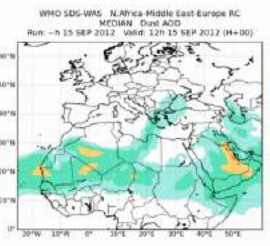
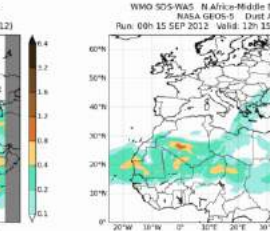
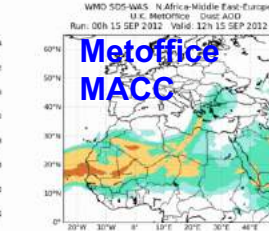
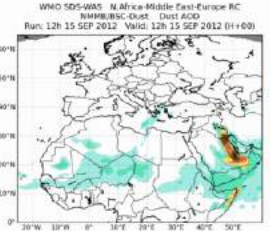
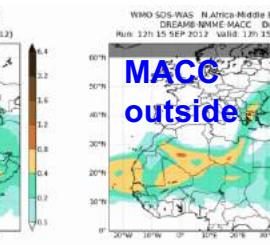
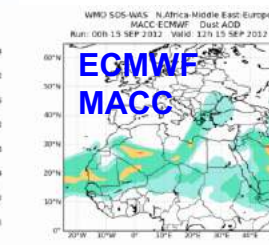
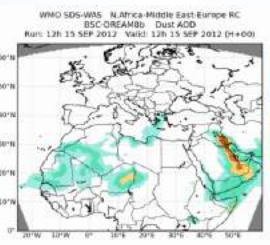
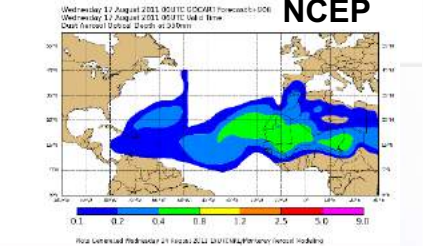
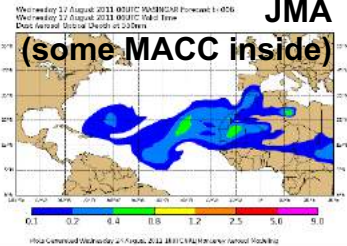
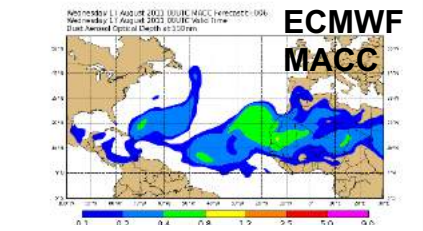
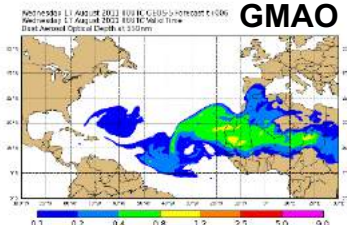
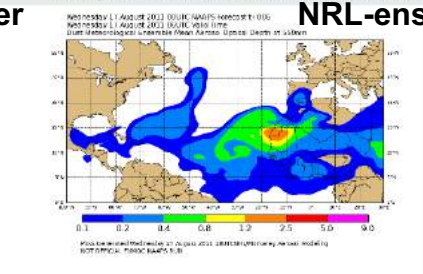
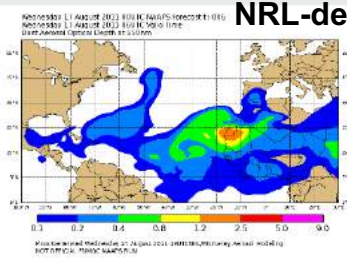
NRL Monterey NAAPS Forecast

This page is an official U.S. Navy site and is intended as an internal research and development tested. Products should not be treated as operational forecasting tools!  
 NOT OFFICIAL FNMOC NAAPS Privacy Policy Disclaimer  
 Marine Meteorology Division (Code 7501)  
 U. S. Navy Navy Recruiting Navy FOIA ONR

Matt Lebey / NAAPS Subtropical Atlantic Dust Aerosol Optical Depth Comparison Archive

T-HOUR  
 006  
 012  
 018  
 024  
 030  
 036  
 042  
 048  
 054  
 060  
 066  
 072  
 078  
 084  
 090  
 096  
 102  
 108  
 114  
 120

satellite  
 obs1  
 obs2  
 obs3  
 total  
 global  
 hcoast  
 bycountry  
 eastasia  
 subtropical  
 pacific  
 comex  
 southern  
 southa  
 northa

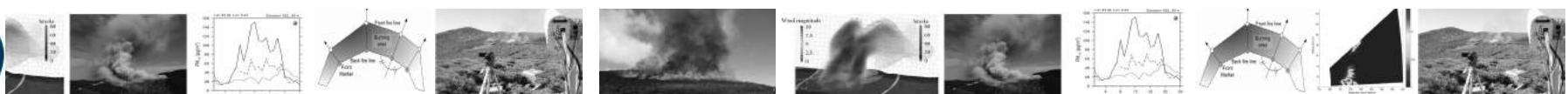


**MACC contributes through:**

1. global run from ECMWF at 80 Km
2. Global run from Met Office at 25 Km
3. Boundary condition for regional model DREAM8\_MACC (Serbian Met Service)

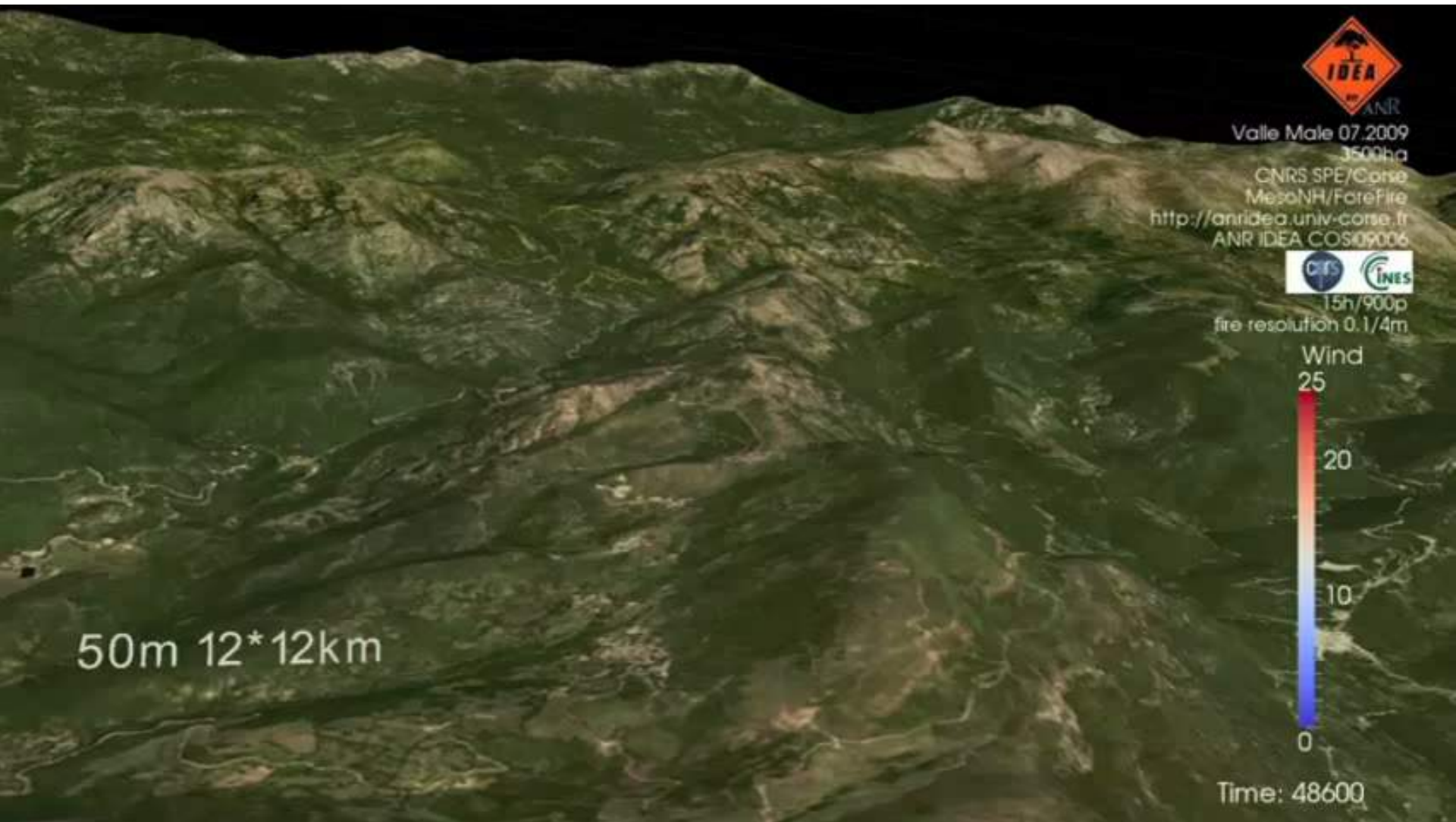
Graphics by:  
 Walter Sessions, NRL

Graphics by:  
 Francesco Benincasa, BSC



# The AULLENE 2009 fire

3500 ha – 900 proc – 24 millions of grid points



ANR  
Valle Male 07.2009  
3500ha  
CNRS SPE/Corse  
Me:zNH/ForeFire  
<http://anridea.univ-corse.fr>  
ANR IDEA COS09006



15h/900p  
fire resolution 0.1/4m



Time: 48600