

ATMOSPHERIC BROWN CLOUDS

(ABC)

Observatory Group Meeting

21-23 October 2010

Surya village in India

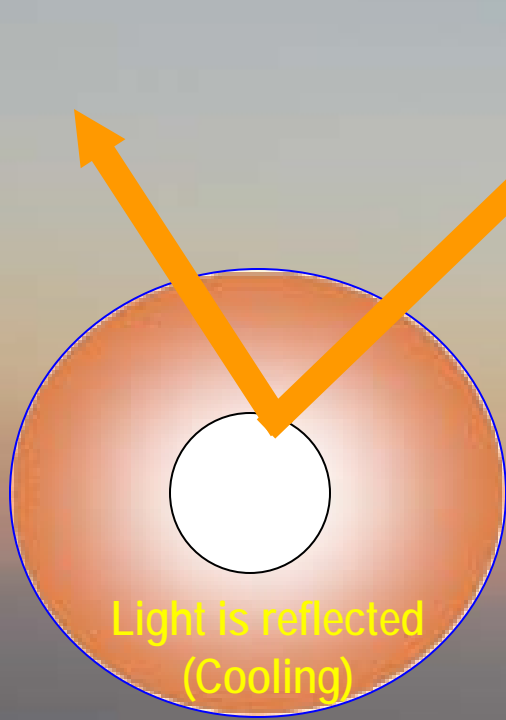
Tested several stoves and the most efficient stove replaced the mud stoves.

- Less Black Carbon (80%)
- Less fuel wood (50%)
- Less cooking time
- Less price (\$120 to \$40)

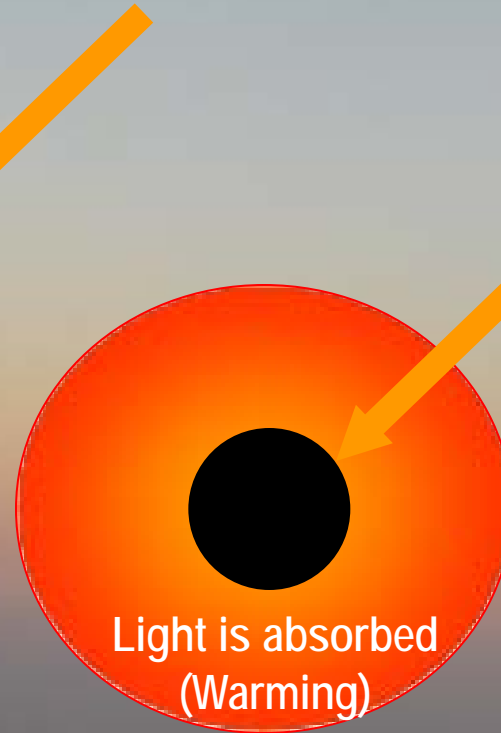


ABCs and Climate Change

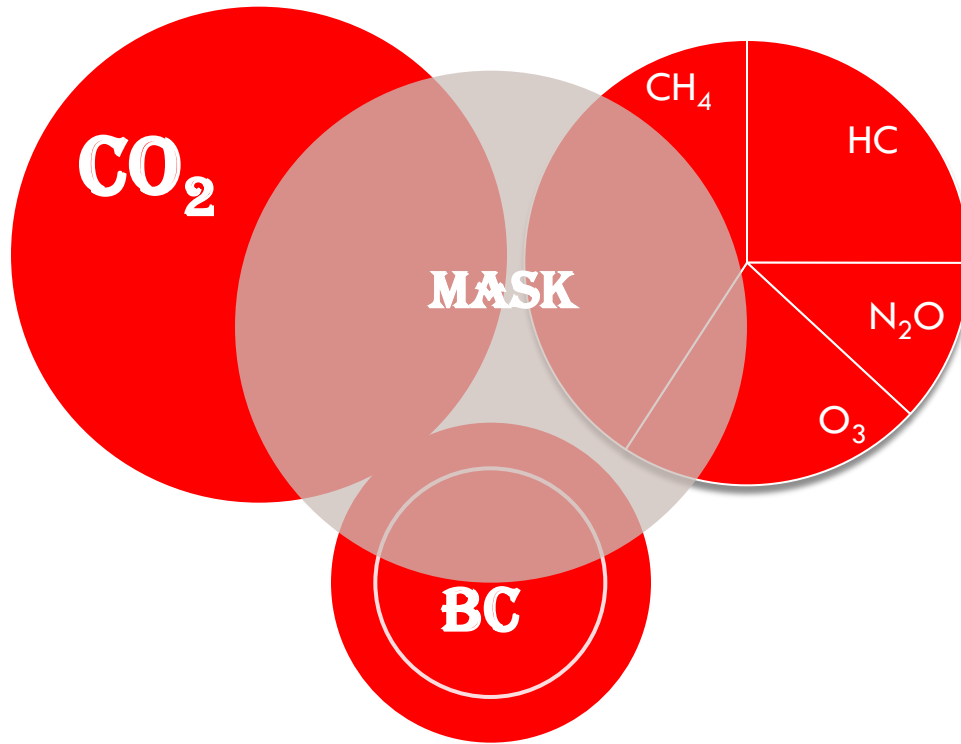
Scattering particles
(Almost all except
BC)



Absorbing
particles
(BC)



Magnitudes of Climate Forcing (2005)

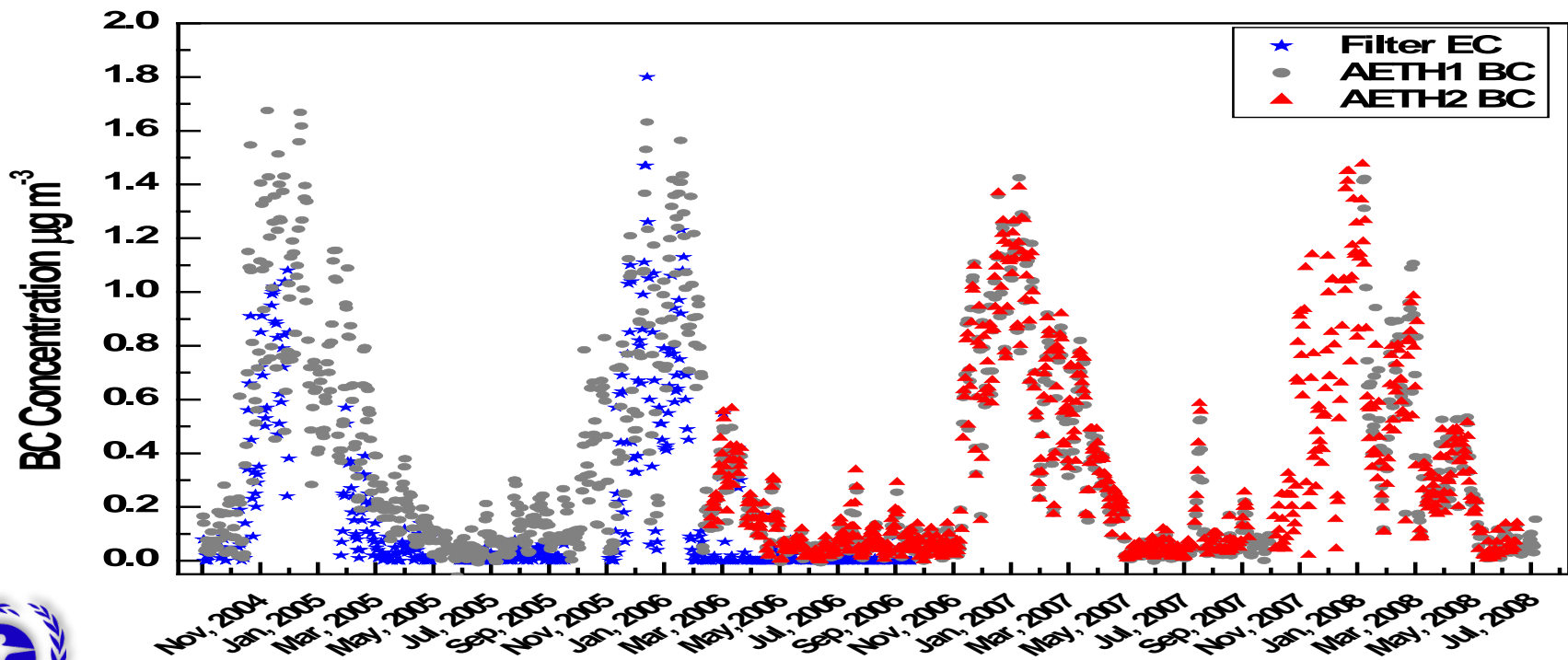


Red circles: Heat Trapped by CO_2 , Non- CO_2 gases, and Black Carbon [Getting larger]

Blue circle: Masking by Sulfates-Nitrates-Organic Aerosols [Getting smaller]

ABC: Current Status

Continues measurements for the last 7 years



Black carbon mass concentration from both filter based measurements and aethalometer measurements from October 2004.

ABC: Impact Assessment

A collaborative effort between Asia, Europe and USA.

3 Parts:

I. Regional Climate Effects of GHGs and ABCs.

Lead. ABC Science Team (China, India, Japan, Korea, Germany, Italy, USA & Sweden)

II. Agriculture Impacts

Lead : India

III. Health Impacts

Lead : Thailand

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The Report in its entirety should be referred to as: V. Ramanathan, M. Agrawal, H. Akimoto, M. Aufhammer, S. Devotta, L. Emberson, M. lyngararasan, A. Jayaraman, M. Lawrance, T. Nakajima, T. Oki, H. Rodhe, M. Ruchirawat, S.K. Tan, J. Vincent, J.Y. Wang, D. Yang, Y.H. Zhang, H. Atrup, L. Barregard, P. Bonasoni, M. Brauer, B. Brunekreef, G. Carmichael, C.E. Chung, J. Dahe, Y. Feng, S. Fuzzi, T. Gordon, A.K. Gosain, N. Htun, J. Kim, S. Mourato, L. Naeher, P. Navasumrit, B. Ostro, T. Panwar, M.R. Rahman, M.V. Ramana, M. Rupakheti, D. Settachan, A. K. Singh, G. St. Helen, P. V. Tan, P.H. Viet, J. Yinlong, S.C. Yoon, W.-C. Chang, X. Wang, J. Zelikoff and A. Zhu (2008), Atmospheric Brown Clouds: Regional Assessment Report with Focus on Asia. Published by the United Nations Environment Programme, Nairobi, Kenya. Please note individual parts of this report have their own list of authors and should be referred to accordingly.

SUMMARY

**ATMOSPHERIC
BROWN CLOUDS**

REGIONAL ASSESSMENT REPORT WITH FOCUS ON ASIA



**ATMOSPHERIC
BROWN CLOUDS**

REGIONAL ASSESSMENT REPORT WITH FOCUS ON ASIA



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UNEP

www.rrcap.unep.org/abc/impact/index.cfm

ABC: Unmanned Aerial Vehicles (UAVs)



Instruments

- Condensation Particle Counter
- Optical Particle Counter
- Cloud Condensation Nuclei Counter
- Aethalometer
- Cloud Droplet Probe
- Pyranometer
- PAR Radiometer
- Spectral Radiometer



Regional Atmospheric Characterization experiments

Field campaigns APMEX (2004) and MAC (2006) conducted from ABC super site at Haminaadhoo in Maldives
EAREX (2005) and EAREX 2007 (in collaboration with PACDEX) conducted from ABC super site at Jeju in Korea
improve our understanding of ABCs in South Asia and East Asia



Global Distributions Distinct Regional Components

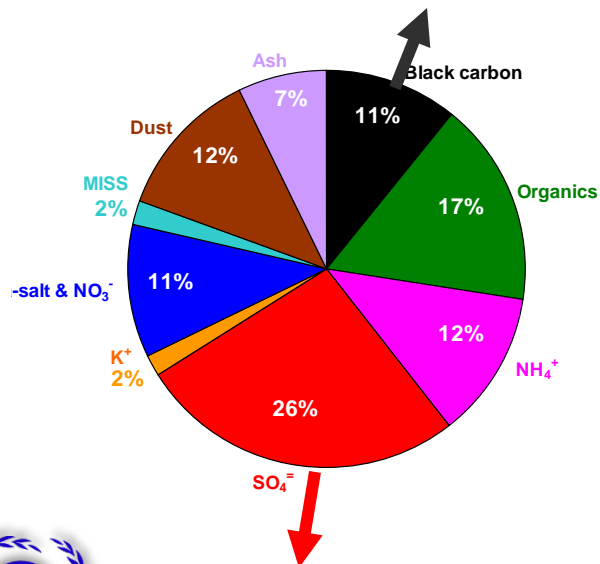
Greenhouse Forcing = 3

W/m^{**2}

Brown Cloud Masking= -1.5

(+50%) W/m^{**2}

Traps sunlight and heats the air



Reflects sunlight and cool

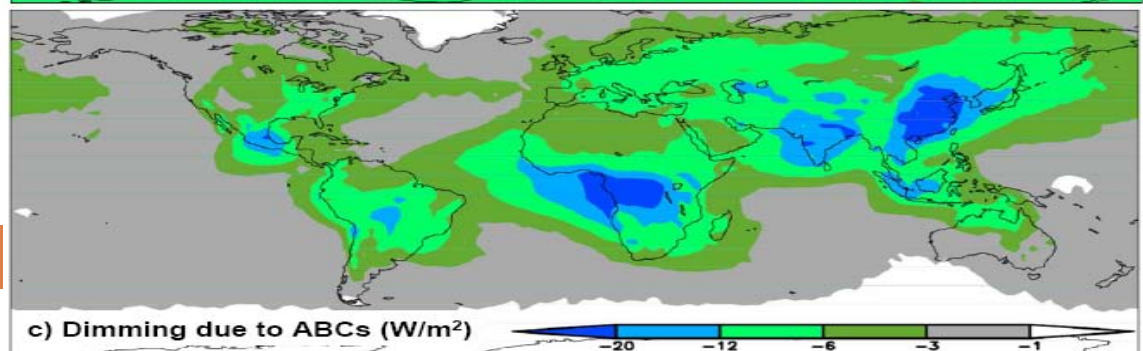
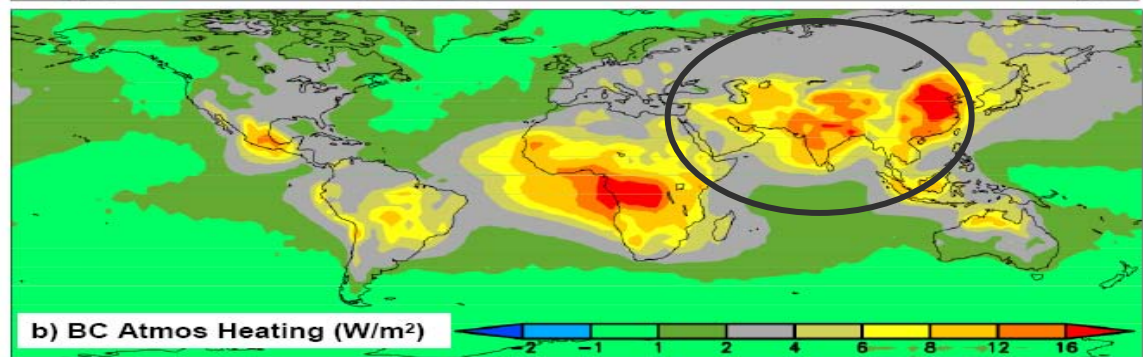
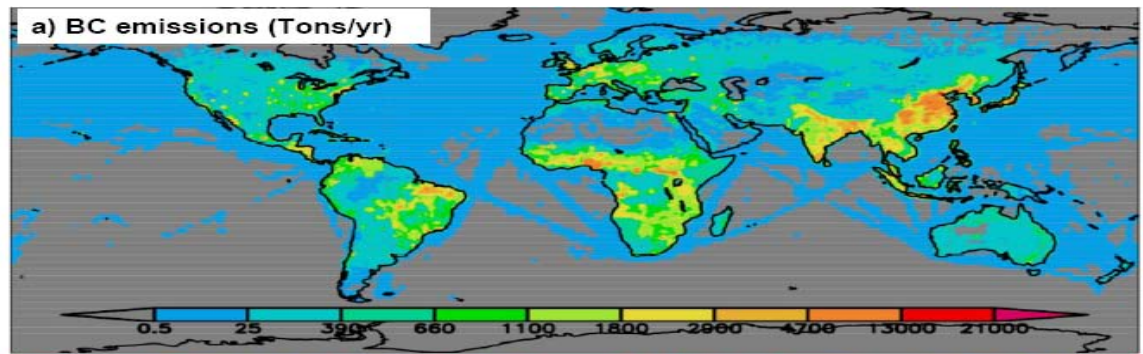


Figure Source: V. Ramanathan, and G. Carmichael, Nature Geoscience, 2008



Surface Observatories

An integrated network of 12 strategically located state-of-the-art ABC surface climate observatories throughout the Indo-Asia-Pacific region (a major achievement in this relatively poorly monitored part of the world)

