30 Years of ICCPA

Devoted to the Founder of ICCPA
Dr. T. NOVAKOV

30 Years of ICCPA

Year and Venue	Proceedings
1978 Berkeley	Lawrence Berkeley National Laboratory, Report #LBL-9037, 1979
1983 Linz	Science of the Total Environment, Vol. 36, 1984
1987 Berkeley	Aerosol Science and Technology. Vol. 10(1&2) 1989; Vol. 12(1) 1990
1991 Vienna	Atmospheric Environment, Vol. 27A, No.8, 1993
1994 Berkeley	Journal of Geophysical Research, Vol. 101, D14, 1996
1997 Vienna	Atmospheric Environment, Vol. 33, No. 17, 1999
2000 San Juan	Journal of Geophysical Research, Vol. 107, D21, 2002
2004 Vienna	Atmospheric Chemistry and Physics, Special Issue 2005
2008 Berkeley	

CARBONACEOUS PARTICLES
IN THE ATMOSPHERE

March 20-22, 1978
LAWRENCE BERKELEY LABORATORY
UNIVERSITY OF CALIFORNIA

The Beginning

Program Committee

T. Novakov Chairman
R.J. Charlson
M.O. Amdur
R.A. Carrigan
D. Ballantine
J. Holmes
J. Suder
R.M. Perhac
W.E. Wilson
H. Rosen Secretary

The Seeds of the 1st ICCPA

- Major Topics

Analytical Determination of BC/OC
MALISSA, HUNTZICKER, MACIAS, HANSEN, ROSEN, BROSSET, HEINTZENBERG, WEISS, TRUEX

Organics Speciation Lab Experiments
GROSJEAN

Organics Speciation Ambient Aerosol – „Source Analysis“
CRONN, FITCH, DUBAY, SIMONEIT, APPEL, KNEIP, CURRIE-^{14}C

Effects on Health
PITTS, DAISEY, HECHT, KADEN

Effects on Climatic Relevant Parameters („Size and Properties“)
WHITBY, BERGSTROM, PATTERSON, HEINTZENBERG, CAHILL, NOLAN, HALL

Catalytic Effects
CHANG, EATOUGH, CHUNG, FREIBERG, MENOTTI, MATTESON

Emissions
BUTCHER, KITTELSON, SEIZINGER, PIERSON, FISHER

A ROLE FOR CARBON AND CARBON COMPOUNDS IN THE PARTICULATE EMISSIONS OF SMALL WOOD STOVES

Samuel S. Butcher
Chemistry Department, Bowdoin College
Brunswick, Maine 04011

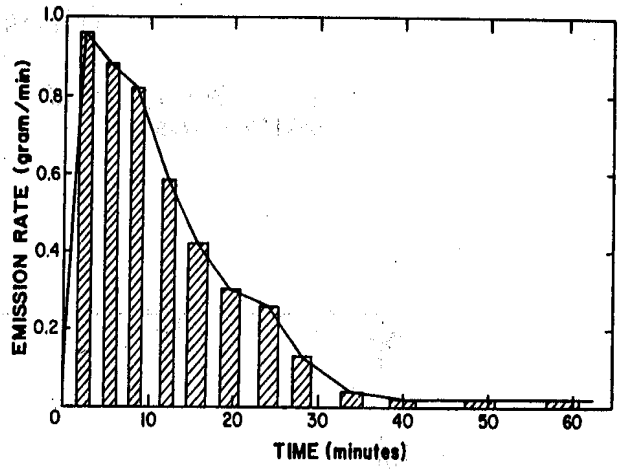


Fig. 1. Emission rate during the combustion of 2.77 kg of oak.

Two surveys[1,2] in Maine and New Hampshire suggested that fuelwood was providing 4-8% of the space heating requirement in 1976. The emission data, when combined with heating requirements, meteorological data, and an assumption of a one hour refuel time indicates that ambient 24 hr average particulate matter concentrations could reach 100 $\mu g/m^3$ under poor atmospheric dispersion conditions in northern New England communities if the entire space heating load were carried by wood.

Review of ICCPA 1-5

JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 101, NO. D14, PAGES 19,373–19,378, AUGUST 27, 1996

Carbonaceous particles in the atmosphere: A historical perspective to the Fifth International Conference on Carbonaceous Particles in the Atmosphere

Joyce E. Penner[1]
Global Climate Research Division, Lawrence Livermore National Laboratory, Livermore, California

T. Novakov
Energy and Environment Division, Lawrence Berkeley National Laboratory, Berkeley, California

- Major Threats of Carbonaceous Aerosol in Perspective:

SMOKE – SMOG – ACID RAIN - ARCTIC HAZE - NUCLEAR WINTER –

- MEGA CITIES - **CLIMATE EFFECTS**

30 Years of ICCPA

Hot Topics in Past and Future

- YESTERDAY - 1978

  Analytical Determination of BC/OC

  Organics Speciation Lab Experiments

  Organics Speciation Ambient Aerosol – „Source Analysis“

  Effects on Health

  Effects on Climatic Relevant Parameters „Size and Properties“

  Catalytic Effects

  Emissions

- TODAY - 2008

  Brown / Polymeric Carbon Interference not Resolved

  New Hetero-Organics (O, N, S) to be Assessed (Still Missing OC in Aerosol Carbon Balance)

  Source Analysis Deserves Refinements for Bio-Aerosol, New Types of SOA and other „Insoluble OC“

  Chemically Resolved Effects Unknown

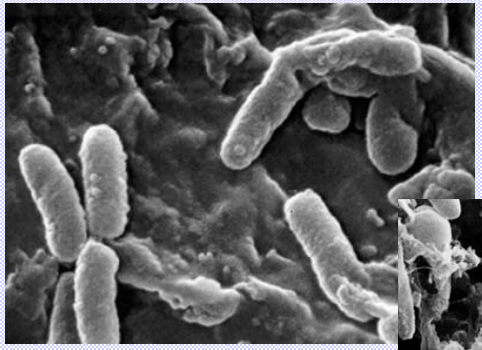
  Role on Cloud Droplet and Ice Crystal Formation; Understanding of Chemistry and Structures on the Single Particle Level; Parameters for Global Climate Models

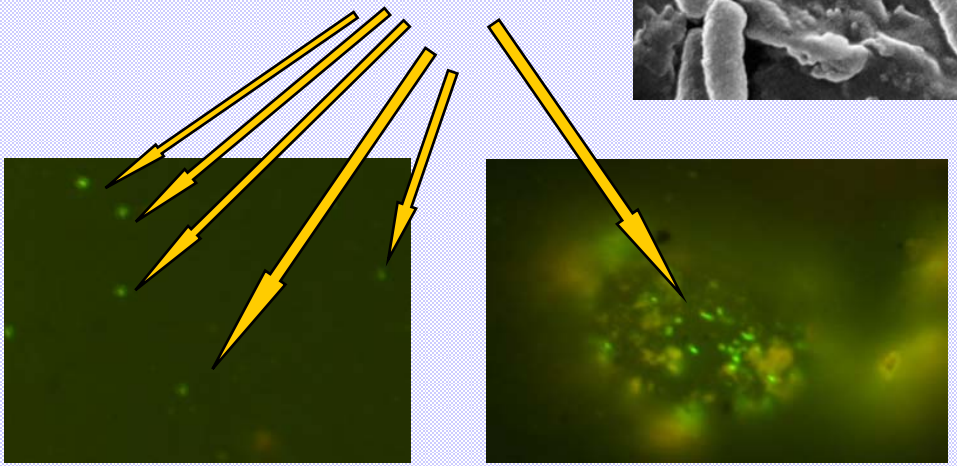
  Surface Properties of Bio-Aerosol

  Bio-Emissions, Domestic Sources, Global Emissions, New Technologies

Bio-Aerosol PBAP

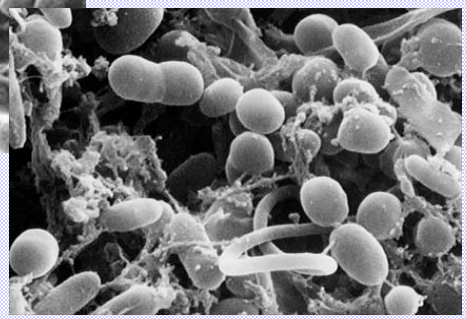
Bacteria

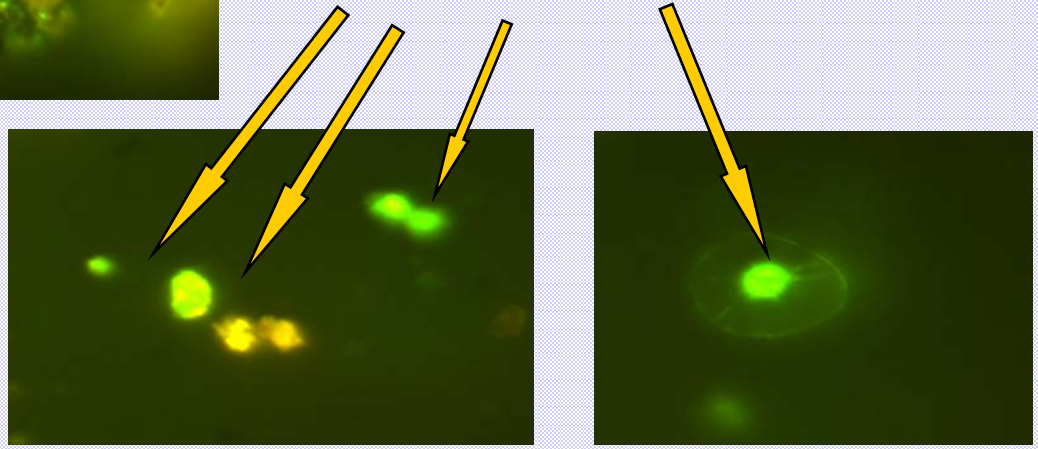




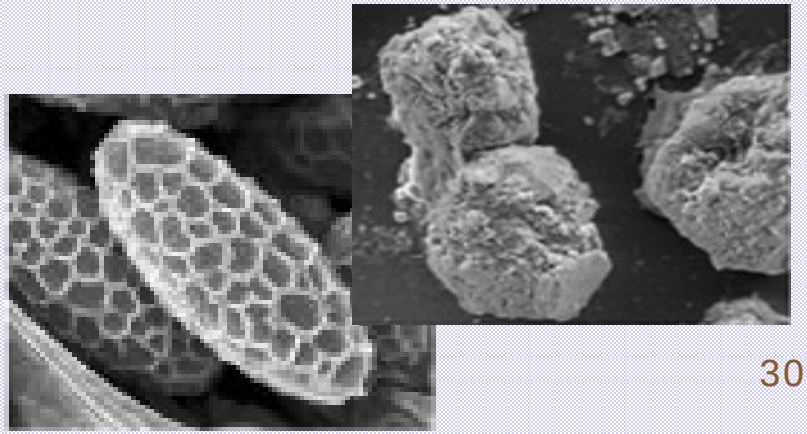
dyed with SYBR® Gold Nucleic Acid Gel Stain

Fungal Spores





dyed with SYBR® Gold Nucleic Acid Gel Stain



30 Years of ICCPA

From Heidi Bauer

Progress of 9 ICCPA Meetings

BC/OC - On-Line Determination:
Aethalometer and a sequence of „New Monitors“

BC/OC – Quality Control
Intercomparison Studies, Standard Materials, Interferences/Charring

Organics Speciation Lab Experiments:
Bio-SOA and „Atmospheric Oligomer Formation“, HULIS and Brown Carbon, Organosulfates, Nitro-Organo-Sulfates

Organics Speciation Ambient Aerosol – „Source Analysis“
Organic CMB, Polycarboxylic Acids, Saccharides, Tetrols, Organosulfates, Further New Heteroorganics (S-N-O-C); ^{14}C-Improvements

Effects on Health
„Macromolecular SOA“ Health Effects

Effects on Climatic Relevant Parameters „Size and Properties“
Gradual Inclusion of BC and OC in Global Climate Models, Historical Trends Analysis from Ice-Cores

Emissions
Natural Sources (Gas-Precursors, PBAP), Biomass-Emissions, BC/OC Emission Inventories, Marine OC-Source

Properties
Ageing, Surface Properties, CCN, IN Formation, Light Absorption and Scattering

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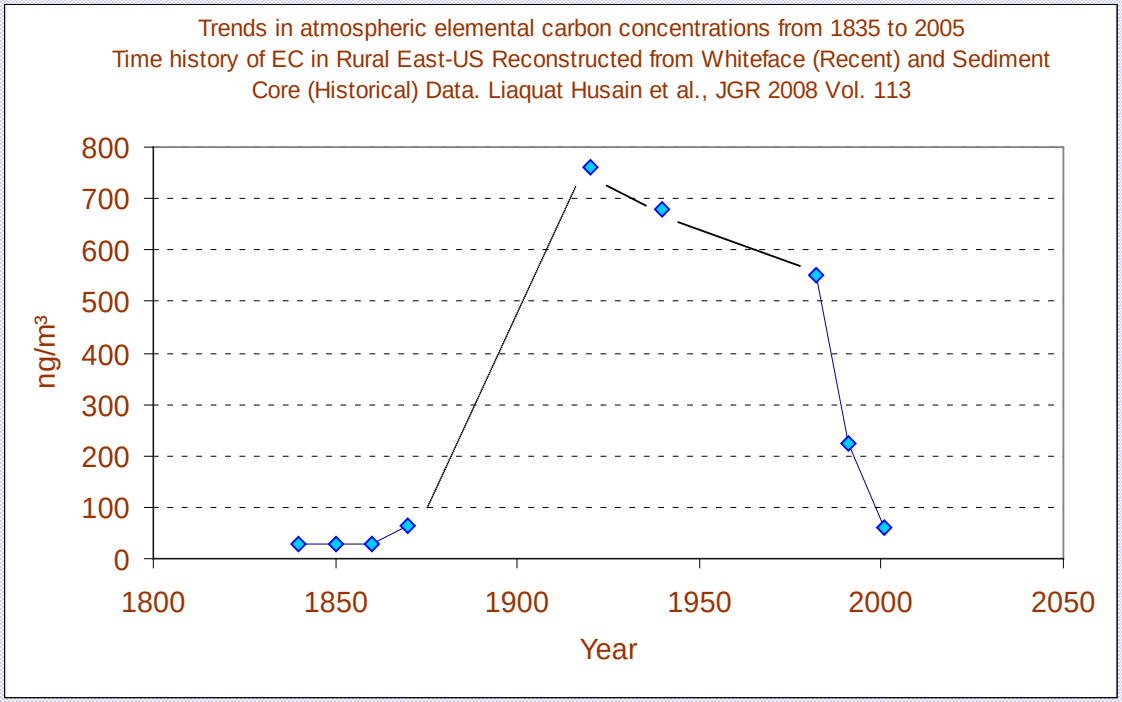
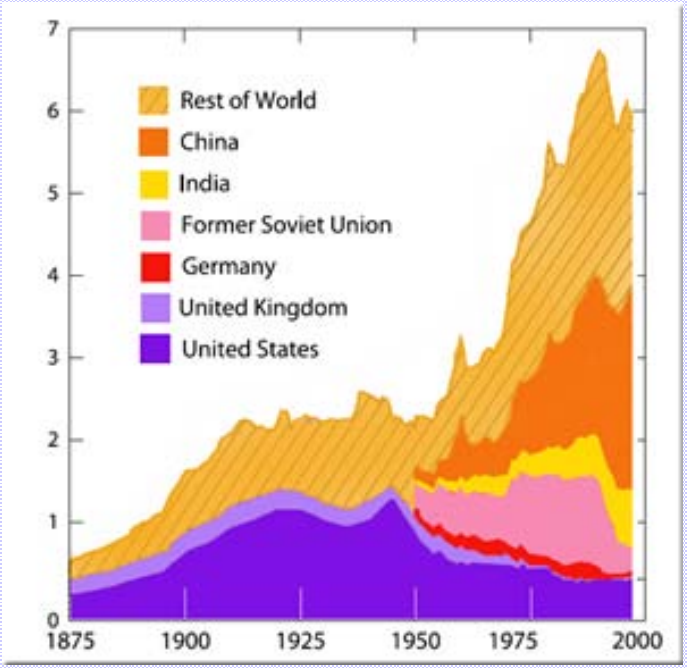
The BC Century in the US





Novakov et al. GRL

Who was Inventing ICCPA?

- We ask Google:

Tihomir Novakov

Atmospheric Sciences

Lawrence Berkeley
National Laboratory
1 Cyclotron Road, MS 70R0108B
Berkeley, CA 94720

Work before 1st ICCPA

- **EETD Newsletter Summer 2004 pg. 9**

Carbonaceous Aerosols and Climate Change: How Researchers Proved Black Carbon is a Significant Force in the Atmosphere

Novakov, called the **"godfather of black carbon studies"** by eminent NASA researcher **J. Hansen**, heads the atmospheric aerosol research group in LBL (EETD). **This group began studying carbon aerosols during the 1970s**; their work was one of the division's earliest research areas. In **1974**, Novakov, with S.G. Chang and A.B. Harker, published a paper in **Science** claiming that carbon constitutes 50 percent of the total particulate concentration in urban atmospheres and that as much as 80 percent of particulate carbon is in the form of soot or BC. A **1977** paper, for example, reviews the use of electron spectroscopy for chemical analysis **(ESCA)** methods for making the first attempt to characterize the chemical components of particulate carbon.

TICA & ESCA

Nature **266**, 708 - 710 (21 April 1977); doi:10.1038/266708a0

Raman scattering and the characterisation of atmospheric aerosol particles

H. ROSEN & T. NOVAKOV

Who was Inventing ICCPA?

NSF Award Abstract #7720076

The Role of Primary Particulates in Urban Air Pollution

NSF Org: CBET Division of Chemical, Bioengineering, Environmental, and Transport Systems

Initial Amendment Date: August 24, 1977
Award Number: 7720076
Program Manager: name not available
Start Date: October 1, 1977
Expires: March 31, 1980 (Estimated)

Awarded Amount to Date: $408200

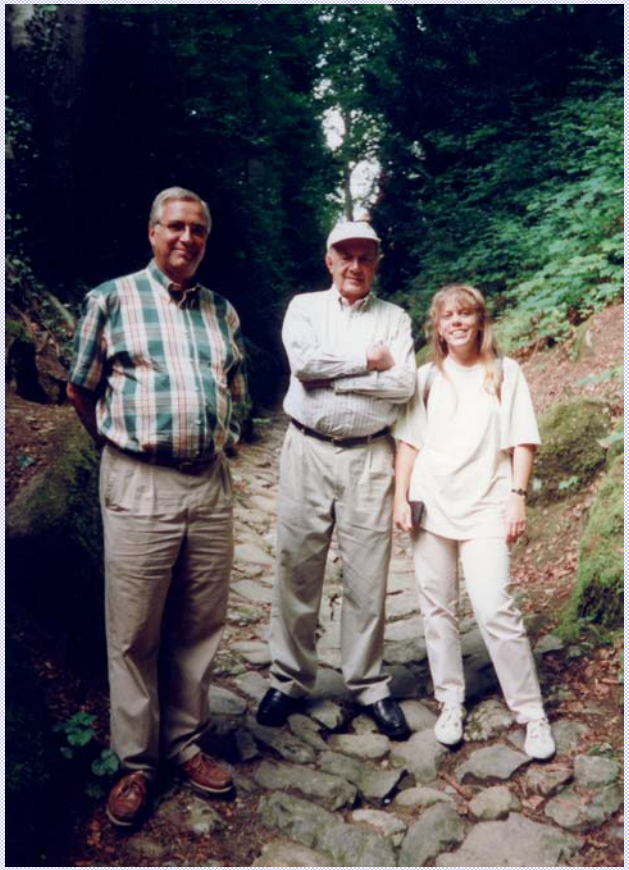
Investigator(s): Tihomir Novakov (Principal Investigator)

Sponsor: Lawrence Berkeley Laboratory, Sponsored Projects Office
Berkeley, CA 94720 510/486-6618
NSF Program(s): CHEMICAL THREATS TO MAN & ENVI

LBL Research Meeting

30 Years of ICCPA

Studies in Europe



2nd ICCPA Linz Austria 1983

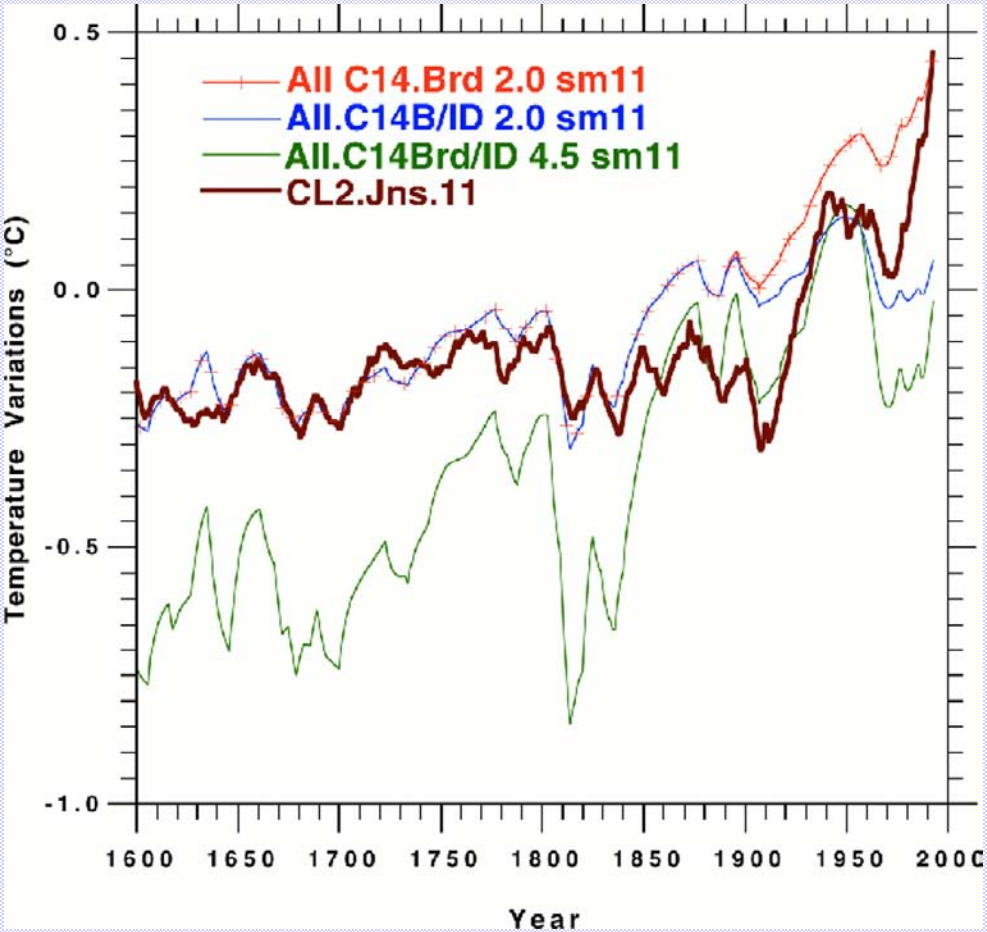
Hohle Gasse Switzerland 1997

30 Years of ICCPA

Global Effects

- In a **1993 Novakov** and J. **Penner** of Lawrence Livermore National Laboratory, demonstrated that **organic carbon** is effective as CCN as sulfate particles.

- Research on Global Effects with
  J. Penner
  P.V. Hobbs
  V. Ramanathan
  J.E. Hansen
  M.O. Andreae

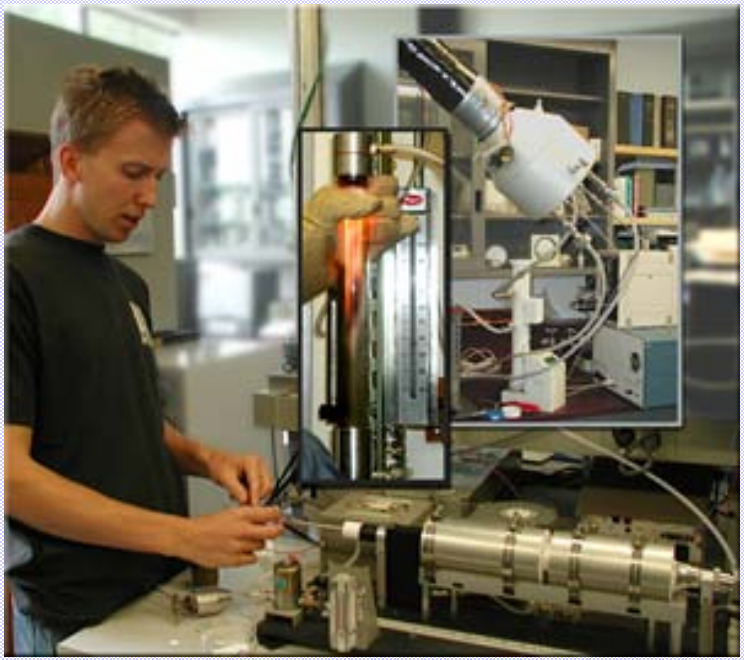


J. E. Penner et al.
Science 290, 407a (2000)

Glimpses on Current Work

Cooperations in
AERONET
SAFARI
INDOEX

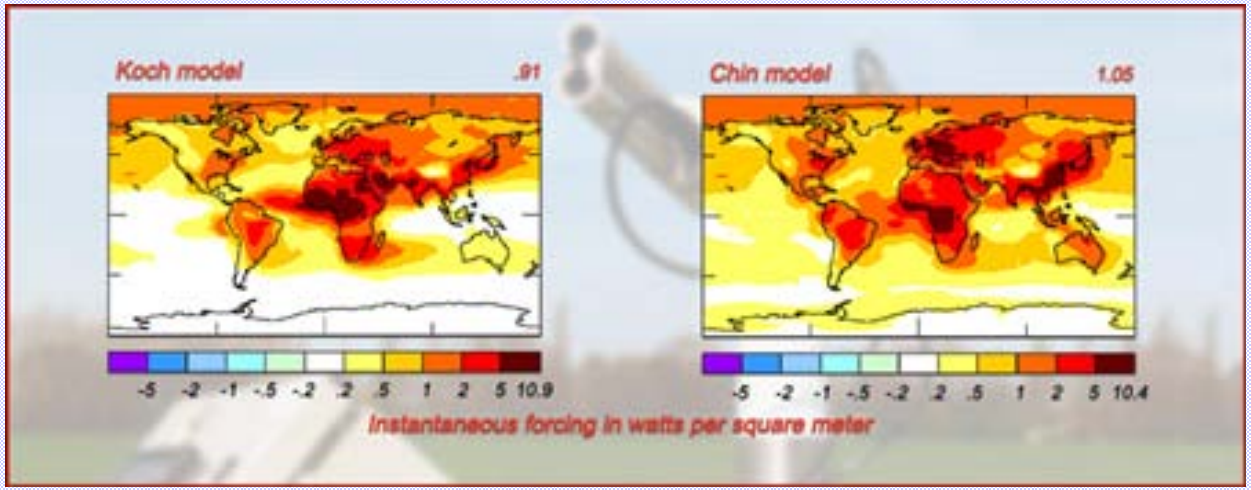
Climate Impact of Biomass Combustion

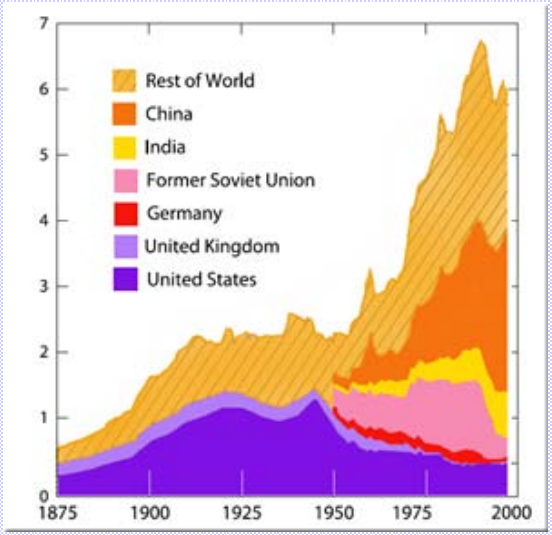


Tom Kirchstetter and the multiple wavelength light transmission instrument (MULTI) (Photo Ted Gartner)

30 Years of ICCPA

2004: BC Global Effects





Sato et al., 2003: Climate forcing from BC: Two different computer models using AERONET data collected by "sunphotometers" show forcing caused by black carbon and organic carbon from human sources.

London Fog Chromatic Mystery

EYEWITNESS: The Chromatic Effects of Late Nineteenth-Century London Fog

Anna Novakov and T. Novakov

like a yellow silken scarf, the thick fog hangs along the quay[1]

The Thames nocturne of blue and gold
Changed to a Harmony in grey:
A barge with ochre-coloured hay
Dropt from the wharf: and chill and cold
The **yellow fog** came creeping down
The bridges, till the houses' walls
Seemed changed to shadows and St. Paul's
Loomed like a bubble o'er the town.[O. Wilde]

30 Years of ICCPA

Thanks to TICA for the 30 Years of ICCPA

Thanks to
Tom Kirchstetter
Dick Schmidt
Cindy Tast
Anthony Strawa
Lara Gundel
Ray Dod
Tamie Bond

30 Years of ICCPA