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**FIRE IN THE
ENVIRONMENT
THE ECOLOGICAL,
ATMOSPHERIC, AND
CLIMATIC IMPORTANCE
OF VEGETATION FIRES**

**Edited by
P. J. Crutzen
J. G. Goldammer**



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Fire in the Environment

The Ecological, Atmospheric, and Climatic Importance of Vegetation Fires

Edited by

P.J. CRUTZEN and J.G. GOLDAMMER

Report of the Dahlem Workshop held in Berlin
15–20 March 1992

Program Advisory Committee:

P.J. Crutzen and J.G. Goldammer, Chairpersons
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Contents

| | |
|---|------------|
| The Dahlem Konferenzen | ix |
| List of Participants with Fields of Research | xi |
| 1 Fire in the Environment: Scientific Rationale and Summary of Results of the Dahlem Workshop <i>J.G. Goldammer and P.J. Crutzen</i> | 1 |
| 2 Emissions from the Combustion Process in Vegetation <i>J.M. Lobert and J. Warnatz</i> | 15 |
| 3 Dynamics and Modeling of Vegetation Fires: Observations <i>F.A. Albini</i> | 39 |
| 4 Emissions Measurements from Vegetation Fires: A Comparative Evaluation of Methods and Results <i>D.E. Ward and L.F. Radke</i> | 53 |
| 5 Satellite Remote Sensing of Fires: Potential and Limitations <i>C.O. Justice, J.-P. Malingreau, and A.W. Setzer</i> | 77 |
| 6 Modeling the Influence of Fires on Atmospheric Chemistry <i>P.J. Crutzen and G.R. Carmichael</i> | 89 |
| 7 Effect of Fires on Global Radiation Budget through Aerosol and Cloud Properties <i>R.E. Dickinson</i> | 107 |
| 8 Climate Change-Fire Interactions at the Global Scale: Predictions and Limitations of Methods <i>M.A. Fosberg, L.O. Mearns, and C. Price</i> | 123 |

- 9 Case Study of Atmospheric Measurements in Brazil: Aerosol Emissions from Amazon Basin Fires**
P. Artaxo, M.A. Yamasoe, J.V. Martins, S. Kocinas, S. Carvalho, and W. Maenhaut 139
- 10 Biomass Burning in Africa: An Overview of Its Impact on Atmospheric Chemistry**
J.-P. Lacaux, H. Cachier, and R. Delmas 159
- 11 Paleocology of Fire**
J.S. Clark and J. Robinson 193
- 12 Nutrient and Organic Matter Dynamics in Tropical Ecosystems**
J.-C. Menaut, L. Abbadie, and P.M. Vitousek 215
- 13 Fire Regimes and Ecosystem Dynamics**
N.L. Christensen 233
- 14 Keeper of the Flame: A Survey of Anthropogenic Fire**
S.J. Pyne 245
- 15 Historical Biogeography of Fire: Circumpolar Taiga**
R.W. Wein 267
- 16 Historical Biogeography of Fire in Temperate and Mediterranean Ecosystems**
L.V. Trabaud, N.L. Christensen, and A.M. Gill 277
- 17 Historical Biogeography of Fire: Tropical and Subtropical**
J.G. Goldammer 297
- 18 Fire Management: Principles and Options in the Forested and Savanna Regions of the World**
B.J. Stocks and W.S.W. Trollope 315
- 19 Group Report: Quantification of Fire Characteristics from Local to Global Scales**
J.-P. Malingreau, Rapporteur
F.A. Albin, M.O. Andreae, S. Brown, J.S. Levine, J.M. Lobert, T.A. Kuhlbusch, L. Radke, A. Setzer, P.M. Vitousek, D.E. Ward, and J. Warnatz 329

| | | |
|-----------|---|------------|
| 20 | Group Report: What Is the Impact of Fires on Atmospheric Chemistry, Climate, and Biogeochemical Cycles? <i>J. Fishman, Rapporteur</i> <i>J. Logan, P.E. Artaxo, H. Cachier, G.R. Carmichael, R. Dickinson, M.A. Fosberg, G. Helas, M. Kanakidou, J.-P. Lacaux, and F. Rohrer</i> | 345 |
| 21 | Group Report: Impacts of Fires on Ecosystems <i>D. Binkley, Rapporteur</i> <i>P. Becker-Heidmann, J.S. Clark, P.J. Crutzen, P. Frost, A.M. Gill, A. Granström, F. Mack, J.-C. Menaut, B. van Wilgen, and R.W. Wein</i> | 359 |
| 22 | Group Report: The Role of Humans in Shaping Fire Regimes and Ecosystem Properties <i>J.B. Kauffman, Rapporteur</i> <i>N.L. Christensen, J.G. Goldammer, C.O. Justice, T. May, S.J. Pyne, B.J. Stocks, L.V. Trabaud, W.S.W. Trollope, K.-F. Weiß, and M. Williams</i> | 375 |
| | Author Index | 389 |
| | Subject Index | 391 |

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characterization of atmospheric aerosol in background areas*

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*Dynamics of soil organic matter, using natural abundances of isotopes,
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*Interactions of fire, vegetation, and nutrient dynamics in neotropical and
temperate ecosystems*
- T.A. KULHBUSCH Max Planck Institute for Chemistry, Airchemistry Department,
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*Atmospheric chemistry in tropical regions (precipitation chemistry, NO_x and
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Atmospheric chemistry; global cycles of trace gases

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*Including "fire" into the High Resolution Biosphere Model to specify the
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Monitoring biomass burning using remote sensing; tropical forest monitoring
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prehistoric times (from the Late Glacial onward); post-fire vegetation
dynamics in different Mediterranean ecosystems*
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FIRE IN THE ENVIRONMENT THE ECOLOGICAL, ATMOSPHERIC, AND CLIMATIC IMPORTANCE OF VEGETATION FIRES

Edited by
P. J. Crutzen and J. G. Goldammer

Concentrations of several trace gases in the Earth's atmosphere that are important for climate and atmospheric chemistry are strongly increasing due to various human activities. Recently, more emphasis has been given to the effects of tropical deforestation and other vegetation fires on atmospheric CO₂ concentrations. There are also significant emissions of trace gases, such as CO, NO_x, CH₄, and nonmethane hydrocarbons, to the atmosphere. Some of these trace gases are photochemically or climatically active and serve as catalysts and precursors in photochemical smog formation. Prehistorical and historical fire data reveal that natural and anthropogenic vegetation fires are not a new phenomenon. Fires have contributed significantly to the process of shaping and maintaining valuable forest and savanna ecosystems. Traditional use of fire is essential for maintaining the productivity of agricultural lands and is still practised by rural populations. Forestry in many parts of the world has integrated the use of prescribed fire in forest ecosystem management.

Modern fire regimes, e.g. in the tropics and elsewhere are undergoing major changes. Forest and savanna ecosystems are increasingly utilized by rapidly growing populations in the developing world. Humans also interfere in the remote northern boreal and circumpolar vegetation and largely affect natural fire regimes.

Because of the lack of reliable data on the extent and impact of vegetation fires and other biomass burning on the global environment, and because of its strong interdisciplinary nature, a Dahlem Workshop was convened to elaborate on a new multi- and interdisciplinary approach toward a global fire science. The workshop was based on 17 background papers, prepared by 34 contributors from relevant sciences, e.g. from fire ecology, biology, wildland fire science, forest sciences, anthropology, cultural history, biogeochemistry, atmospheric sciences (especially atmospheric chemistry), physics, climatology, remote sensing and modelling. The results of the discussions are laid down in four group reports jointly prepared by the workshop participants. This volume represents the first organized synthesis of a global fire ecology and defines the most urgent problems to be tackled scientifically.

Goal of this Dahlem Workshop: to examine the role and impact of natural and anthropogenic fires on ecosystems, the atmosphere, and climate.

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