

FOG

Newsletter

October 2000 / Issue 5

A newsletter for those working on fog and dew related projects

We have slightly delayed the mailing of this newsletter in order to bring you up-to-date on happenings in St. John's. Support for the Second Fog Conference is growing in the community and we are pleased to announce the following new co-sponsors: **The Government of Newfoundland and Labrador**, through the Department of Industry, Trade and Technology, which has provided support in several important areas; **Molson Canada**, one of the largest and best known breweries in the country and **Rodrigues Winery**, maker of fine fruit wines, have both very kindly agreed to donate products for events at the conference.

We are also very pleased to welcome the following companies as Exhibitors for the conference in 2001.

Science Engineering Associates, Inc., of Mansfield Center, Connecticut, USA is a manufacturer of airborne and ground based dated acquisition systems and cloud in-situ and remote sensing instrumentation, with a specialization in cloud and fog microphysics.
SciEng@CompuServe.com

Kipp & Zonen Inc., with head offices in Saskatoon, Saskatchewan, Canada and Delft, The Netherlands, manufactures a range of meteorological instrumentation, with a specialization in quality solar radiation measurements. We would also like to thank **Kipp & Zonen Inc.** for valuable core funding for the conference.
jennifer.huisman@kippzonen.com

The low Canadian dollar continues to make Canada a very inexpensive destination for international visitors.

With each visit to St. John's, we are more convinced than ever that our delegates will have a fabulous time in this warm and welcoming city. We hope you will join us there next year.

FOG COLLECTION PROJECT IN ATIQUIPA, PERU

*Submitted by
Percy Jiménez*

The coastal lomas (hills) of Peru and the north of Chile are special ecosystems that are islands of vegetation or "fog oases" in the middle of the desert. They depend exclusively on fog to obtain their water. The fog, which originates as cloud over the ocean, is pushed against the hills, the trees, and the shrubs by the wind. The fog droplets are captured by the leaves and the branches. One part of this water is used by the plants and the rest infiltrates into the soil where it may appear as springs in the quebradas (valleys). The lomas of Atiquipa are the most extensive, the ones with the most diverse biology, and the ones that are the best preserved of all the coastal lomas. In these lomas live more than 60 families dedicated to agriculture and raising animals. They cultivate some 70,000 hectares that they irrigate with water from springs and they raise goats that eat the sparse vegetation of the lomas.

Overgrazing and deforestation of the lomas of Atiquipa has diminished the availability of water from the springs. This has resulted in greater poverty for the inhabitants and a migration to nearby cities. In an effort to resolve these problems, The Regional Institute of Environmental Sciences of the National University of San Agustín in Arequipa (IRECA-UNSA), with the economic



Professor Hans Puxbaum and his wife Sigy during the Banquet/Boat Cruise at the 1998 Vancouver Fog Conference. Hans is the Chair of the Scientific Committee for the Second Fog Conference in 2001.



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Contributions of short articles, news items and photographs for upcoming issues of the Newsletter are welcome. They should be sent to:

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or by mail to:

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Copies of the Newsletter are available to individuals or groups working in fog studies (physics, chemistry, meteorology, instrumentation, forecasting, hazards, satellite observations, etc.), studies of fog deposition to tropical and temperate forests, studies of dew, and applications of fog collection for use in both developing countries and in commercial concerns. A voluntary contribution of \$10 US per subscription would be appreciated to cover printing and mailing costs. The Newsletter will appear three times a year.

assistance of the Embassy of Great Britain in Peru, has constructed a system of 20 fog collectors with a total surface area of 960 m². The water from the collectors goes through a pipeline to a reservoir, which is connected to the irrigation system that the peasants use. Previous studies in the area have shown some very impressive water production data, with, for example, a maximum production of 200 liters per square meter of mesh per day in 1996 and averages of 15 L m⁻² day⁻¹ in 1997.

The fog collection system was put into operation in 1999 and the official inauguration was in May 2000. It has produced about 6000 m³ of water in one year, which has greatly increased the water available for irrigation of the crops. For more information please contact Percy Jiménez at ireca@unsa.edu.pe

TROPICAL MONTANE CLOUD FORESTS

*Submitted by
Sampurno Bruijnzeel*

The Tropical Montane Cloud Forest Initiative (a joint effort of IHP-UNESCO, IUCN, WWF International and the World Conservation Monitoring Centre, Cambridge) has recently published a lavishly illustrated 40-page brochure on the hydrological and biodiversity values of tropical montane cloud forests, entitled: 'Decision Time for Cloud Forests'. Written by Sampurno Bruijnzeel and Lawrence S. Hamilton in a style that should appeal to a non-specialist readership. The document explores the occurrence of cloud forests in the tropics and subtropics, their



Professor Xiang Ren Yu beside a fog collector at the Lushan Cloud and Fog Test Station in China.

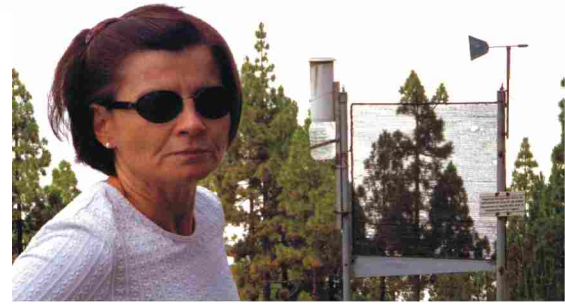
hydrological functioning (including the 'stripping' of water from passing fog) and biodiversity values (high endemism), as well as the numerous threats that these unique and little explored ecosystems face nowadays. The brochure ends with a call for action, requesting, inter alia, stepped up research efforts to further document the hydrological value of cloud forests as a first step towards complete protection. For free copies, contact m.bonell@unesco.org or ferwerda@nciucn.nl. For information on the TCMF Initiative, contact: maldrich@wwfint.org or philip.bubb@wcmc.org.uk.

A MODELING STUDY ON THE EFFECTS OF ECOLOGICAL ENVIRONMENTS ON FOG

*Submitted by
Zihua-Li and Shi Chune*

Chongqing is the famous fog city of China, while Xishuangbanna is the famous tropical rainforest and foggy-region. Considering the uneven distribution and obvious three-dimensional construction of these fogs, and the complex terrain, we developed a three dimensional fog model on complex terrain to study the physical processes and the main factors affecting the above fogs.

We use the hypotheses of static equilibrium and incompressibility, and a turbulence parameterization, thus resulting in a series of 3D time-integral equations of wind speed, potential temperature, specific humidity and mixing ratio of liquid water in fog. It is assumed that the water vapor condenses to form fog droplets as soon as the air reaches saturation, and the droplets evaporate in the



Professor María Victoria Marzol beside a Standard Fog Collector on Tenerife, Canary Islands, Spain.

unsaturated air. The model considers the long- and short-wave radiation in detail and the effects on the long-wave radiation of the absorbing effect of water vapor, CO₂, water droplets and aerosol particles. Gravitational deposition is considered after the fog droplets form. As for the underlying surface, the effects of different covers are considered. In order to consider the effects of the topography, a topography coordinate system is used in the model.

Using the three dimensional fog model, we simulated the distribution characteristics and the formation and development processes of the urban fog of Chongqing and the mountain fog of Xishuangbanna successfully. We studied the effects of ecological environment on fog, including:

- 1) The effects of the mountain and the Changjiang River on the formation and development of fog.
- 2) The double effects of the urban area on fog.
- 3) The effect of the aerosol particles on the fog formation.
- 4) The effect of vegetation on fog formation and development.

For more information or copies of publications contact lizihua@sina.com or shichune@mail.ustc.edu.cn

A PRELIMINARY STUDY OF THE SPATIAL AND TEMPORAL VARIATIONS OF FOGWATER COLLECTION AT TENO (NW TENERIFE, CANARY ISLANDS)

Submitted by
M^a Victoria Marzol



Twenty-one fog collectors, each 50 cm x 50 cm, have been installed in the Teno Rural Park on Tenerife.

In January 2000, twenty-one 50 cm x 50 cm fog collectors were constructed with the collaboration of the Department of the Teno Rural Park (Tenerife, Canary Islands) and M^a Victoria Marzol (University of La Laguna). These collectors have been installed at locations with elevations between 600 and 1340 meters.

This study will last one year. The objective is to determine the fogwater fluxes in the mountainous regions of the northwest of Tenerife, in order to potentially provide drinking water for birds and goats, water for reforestation at eroded sites and water for the reservoirs in the forest in case of fire.

Twelve fog collectors have been erected at the top of the ravine Monte del Agua with hydrological and ecological objectives, and nine collectors have been installed at Teno Alto, where a rural community of 125 people live with pastureland (800 goats) and agriculture. The fog collectors will provide water for the goats and help fight against erosion.

The Teno Rural Park has an extension of 8064 ha and its objectives are to preserve the countryside (a forest of *Laurisilve - prunus lauretea Azoricae* - with an extension of 500 ha) and facilitate the socioeconomic development and standard of living of its inhabitants (20,000 people).

The highest water collection rates have been more than 123 L/m² in 24 days and 40L/m² in 24 hours. This latter collection rate was at the fog collector installed at 1340 meters above sea level and occurred because the clouds in the winter are at a very high altitude. We expect to obtain larger quantities at the collectors installed at the lower altitudes (in Teno Alto) during the summer when the clouds are lower. Contact Maria Victoria Marzol at mmarzol@ull.es



Fog at an altitude of 1300 m in Teno, Tenerife.

NEW PUBLICATIONS

Bruijnzeel, L.A.: Hydrology of tropical montane cloud forests: A reassessment. In Proc. Second Intl. Colloquium on Hydrology and Water Management in the Humid Tropics (2000). Ed. J.S. Gladwell, UNESCO, Paris and CATHALAC, Panama.

Facchini, M.C., S. Decesari, M. Mircea, S. Fuzzi and G. Loglio: Surface tension of atmospheric wet aerosol and cloud/fog droplets in relation to their organic carbon content and chemical composition. Atmospheric Environment (2000) **34**, Iss. 28, 1352-2310.

Flynn, M.J., K.N. Bower, T.W. Choularton plus seven authors: Modelling cloud processing of aerosol during the ACE-2 HILLCLOUD experiment. Tellus Series B (2000) **52**, Iss. 2, 779-800.

Gelencser, A., M. Sallai, Z. Krivacsy, G. Kiss, E. Meszaros: Voltammetric evidence for the presence of humic-like substances in fog water. Atmospheric Research (2000) **54**, Iss. 2-3, 157-165.

Gleick, P.H.: The World's Water 2000-2001. Island Press (2000) Washington D.C.

Hameed, S., M.I. Mirza, B.M. Ghauri plus six authors: On the widespread winter fog in Northeastern Pakistan and India. Geophysical Research Letters (2000) **27**, Iss. 13, 1891-1894.

Kidron, G.J.: Dew moisture regime of endolithic and epilithic lichens inhabiting limestone cobbles and rock outcrops, Negev Highlands, Israel. Flora (2000) **195**, Iss. 2, 146-153.

Krivacsy, Z., G. Kiss, B. Varga plus eleven authors: Study of humic-like substances in fog and interstitial aerosol by size-exclusion chromatography and capillary electrophoresis. Atmospheric Environment (2000) **34**, Iss. 25, 1352-2310.

Limbeck, A. and H. Puxbaum: Dependence of in-cloud scavenging of polar organic aerosol compounds on the water solubility. J. Geophysical Research (2000) **105**, Iss. D15, 19857-19867.

Malek, E., G. McCurdy and B. Giles: Dew contribution to the annual water balances in semi-arid desert valleys. J. Arid Environ. (1999) **42**, 71-80.

Matthias-Maser, S., B. Bogs and R. Jaenicke: The size distribution of primary biological aerosol particles in cloud water on the mountain Kleiner Feldberg / Taunus (FRG). Atmospheric Research (2000) **54**, 1-13.

Mei Jiang and R. Jagels: Detection and quantification of changes in membrane-associated calcium in red spruce saplings exposed to acid fog. Tree Physiology (1999) **19**, 909-916.

Menon, S., V.K. Saxena and B.D. Logie: Chemical heterogeneity across cloud droplet size spectra in continental and marine air masses. J. Appl. Meteor. (2000) **39**, Iss. 6, 887-903.

Ogawa, N., R. Kikuchi and T. Okamura: Evaluation of ionic pollutants in cloud droplets at a mountain ridge in northern Japan using constrained oblique rotational factor analysis. Atmospheric Research (2000) **54**, Iss. 4, 279-283.

FOG COLLECTION PROJECTS

Keith MacQuarrie, CECI Canada, together with representatives from Nepalese NGOs are completing ten new large fog collectors for Danda Bazar, **Nepal**. Fermín Lara and Cameron Zywna, of ADESJO, have completed the first ten months of an evaluation project in the **Dominican Republic** with promising results. A new not-for-profit corporation to carry out fog collection projects has been started. It is called **FogQuest**. For information contact Sherry Kornblum or Robert Schemenauer.

NEWS

Marina Mileta began measurements with a Standard Fog Collector (SFC) on Mt. Velebit in Croatia in June. **Simon Berkowicz** initiated a program in September to measure fog fluxes with SFCs at a number of locations in Israel. **Todd Dawson** is now the director of the Center for Stable Isotope Biogeochemistry of the University of California - Berkeley and is actively working on fog-plant interactions. The World's Water 2000-2001 by **Peter Gleick** contains a section on fog collection. **Sampurno Bruijnzeel** and **Fred Scatena** have started an intercomparison of fog collectors in Puerto Rico. **Michael Kalina** and **Hans Puxbaum** have started a new series of field campaigns at Achenkirch, Austria to measure carbon species in fog, rain, aerosols and gases.

SECOND FOG CONFERENCE

July 15 - 20, 2001

Pre-Registration



Presently, there are 260 pre-registrants from 59 countries. As well as providing us with relevant contact information, the pre-

registration forms provide important information on the session topics of most interest to the delegates. We urge you to pre-register using the form on the web

site or by mail. A registration package will be mailed out in January only to those who have pre-registered.

Visas for Canada

It is the responsibility of each delegate to determine if he or she requires a visa to enter Canada. The nearest Canadian Embassy or your travel agent should be able to help you with this information. We are pleased to announce that as a result of discussions with the Department of Foreign Affairs we have arranged that the processing fee for visas will be waived for delegates attending the Conference. Note that this waiver will only apply to delegates to the Conference. It does not apply to other family members or to journalists attending the Conference.

Call for Papers

The deadline for receipt of short abstracts of papers has passed. Questions regarding late submissions should be addressed to Professor Hans Puxbaum, Technical University of Vienna, Institute of Analytical Chemistry, Getreidemarkt 9-151, Vienna A-1060, Austria.

hpuxbaum@mail.zserv.tuwien.ac.at

Web Site

Please see the web site for answers to most queries and for electronic copies of the *Fog Newsletter*.

The Conference Hotel

A hotel reservation form is now available on the conference web site. The standard room rate is \$141 CAN (about \$93 US) per night, single or double occupancy.

Scientific Committee and Working Groups

A list of the members of the Scientific Committee and the names of the Working Groups can be found on the conference web site.

FOG CONFERENCE ADDRESSES

The Second Fog Conference web site address is: <http://www.msc-smc.ec.gc.ca/armp/fog/icffc2.html>

mailing address:

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HOW TO RECEIVE THE NEWSLETTER

The Newsletter is available to anyone working in the areas noted on page 1. Your name, title, and complete mailing address should be sent to us along with a brief statement about the area you are working in or interested in. There is no charge for the Newsletter. We realize that some people do not have the resources to pay for a publication nor the means to transfer funds; therefore, after considerable thought, we decided to make the Newsletter free and seek sponsors to assist with the costs.

We have also decided to ask for a voluntary contribution of \$10 US per year from those individuals who have the means and desire to support the Newsletter. Those in Canada or the US can send a cheque payable to the Fog Conference. People in other countries should not send cheques or bank transfers as the fees to cash them are too high. We can accept payment by MasterCard, if you provide us with your card number and the expiry date. Do not send credit card information by email. We will use these funds to help cover the costs and to increase the circulation.

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