



Issue #16

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Editorial

Tibet and the 1997-98 El Niño

A particularly severe winter in 1997-98 caused the greatest natural disaster to hit Tibet in recent years. Consistently low temperatures of -40°C and abnormally large amounts of snow affected over a million herdsmen in the Naqu regions of Tibet and Yushu region of Qinghai who were moving between pastures when the freeze hit. It is estimated that 20% of all livestock was wiped out – the road up to Largen-la to Man-tso was littered with yak carcasses in 1998. The disaster went largely unnoticed in the West, though medical agencies, such as Medicins Sans Frontières, joined in bringing relief to the more accessible regions.

from *The Lonely Planet*, 1999, p. 31

The Tibetan plateau has played a major role in scientific research activities on long-range forecasting. Around 1900, it was used as an indicator to see if the Indian monsoon would fail and drought and famine would occur.

Many atmospheric research modelers today use the Tibetan Plateau snow cover, for example, in their modeling activities to improve their understanding of climate variability from one year to the next. But there are other climate and climate-related reasons to focus attention on the Tibetan Plateau.

If the global atmosphere warms up, its impacts will likely show up in the margins first. By margins, I mean the

dry margins along desert edges, the cold margins in the high latitudes (polar regions, for example) and the high margins with regard to mountainous areas. Scientists speculate that a 1°C warming in the middle latitudes would mean a 4°C warming in the polar areas. As a warming occurs, temperature increases would occur in the high margins vertically up the slope.

Therefore, the Tibetan Plateau might be a good place to look for the first signs of global warming. It is also the location of the headwaters of many of Asia's major rivers that serve many nations and half of the world's population, about 3 billion people.

Any changes in the hydrological cycle (with either more or less water in the Tibetan Plateau), as well as changes in land and water use in this region, would mean less water flowing downstream in these rivers (Brahmaputra, Ganges, Irawadi, Mekong, Yangtze, Yellow, etc.).

This could create major problems for the downstream populations as well as for those inhabiting the Tibetan Plateau. Maybe it is time to consider developing an all-inclusive highlands project on climate and socio-economic impacts in the Tibetan Plateau region, along with other parts of the globe in a similar situation: West Africa's Fouta Djallon, Central Asia, the western United States, and the Ethiopian and East African highlands.

--Michael H. Glantz

LET'S HEAR FROM YOU!

Please send news items, publications, Web sites, and articles of interest to our readers to the address below by **30 April 2001**. This newsletter values input from its readers, which has now reached over 2,000. If you are interested in receiving the newsletter only on line, please subscribe there. You will be notified electronically when a new issue is released. Feedback is encouraged!

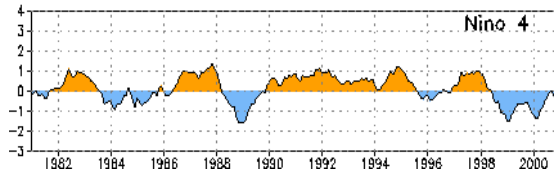
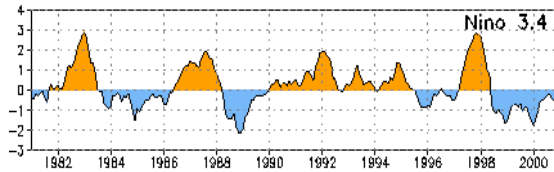
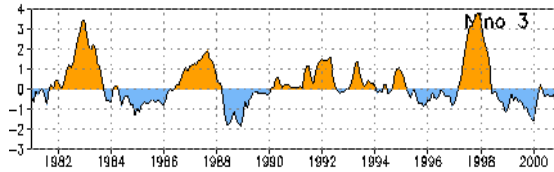
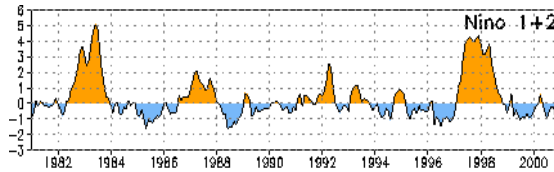
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CURRENT STATE OF THE TROPICAL PACIFIC

(from the Climate Prediction Center's *Climate Diagnostics Bulletin*)
www.cpc.ncep.noaa.gov

Cold episodes strengthened during December 2000, as sea surface temperatures dropped to more than 1.0°C below normal across the central equatorial Pacific between 180°-160°W. This cooling resulted in the mean SST over the central equatorial Pacific dropping below 28°C, generally considered to be the value for deep tropical convection. The strengthening cold episode is reflected by a drop in the Nino4 and Nino3.4 regions. These values are approximately one-half of the amplitudes observed last winter during strong La Niña conditions. Tropical convection during December was below normal over the central Pacific and above normal over the western Pacific, Indonesia, and northern Australia. This

anomalous pattern is consistent with La Niña conditions and has largely persisted since mid-1998. Intraseasonal activity (Madden-Julian Oscillation or MJO) has also continued to impact tropical convection. During the past few months, the period of this MJO activity has shortened from around 45 days to around 35 days.



The strengthening cold episode is reflected by drops in Nino4 and Nino3.4.

MADDEN-JULIAN OSCILLATION

The Madden-Julian Oscillation (MJO) is the major mode of variability in the tropics on a month-to-month time scale (less than a season). It is also referred to as the 30-60 or 40-50 day oscillation of zonal (west to east) wind anomalies in the tropical Pacific Ocean. The MJO

involves variations in wind, sea surface temperature, cloudiness, and rainfall. It affects the entire tropical troposphere, but it is most evident in the Indian Ocean and the western Pacific Ocean. In 1971 and 1972, Roland Madden and Paul Julian (both of the National Center for Atmospheric Research) identified the oscillation while analyzing zonal wind anomalies in the tropical Pacific. At that time, they submitted the first articles about the oscillation named after them, to the *Journal of Atmospheric Science*.

Since the 1997-98 El Niño event, interest in the MJO increased and numerous articles and Web sites on the phenomenon have appeared. A major workshop held at NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) in Princeton, New Jersey in March 2000, brought together more than 70 people from 8 countries to examine the possible influence of the MJO on ENSO events. Unusual MJO events in the winter of 1996-97 coincided with the onset of the 1997-98 El Niño event. Because this El Niño was strong and exhibited an unusually rapid onset (missed by the existing forecast models), the MJO is being examined by some researchers as a possible explanation. Since the 1997-98 El Niño was observed by the newly completed TAO (Tropical Atmosphere-Ocean) Array, essential information was gathered for the first time. That may give researchers a better understanding of the different mechanisms by which SST anomalies can be induced by the MJO. The back page of this newsletter contains links to Web sites for those interested in obtaining more information about the MJO.

Madden, R.A. and P.R. Julian, 1971: Detection of a 40-50 day oscillation in the zonal wind in the tropical Pacific. *Journal of Atmospheric Sciences*, **28**(5), 702-708.

Madden, R.A. and P.R. Julian, 1972: Description of global-scale

circulation scales in the tropics with a 40-50 day period. *Journal of Atmospheric Sciences*, **29**, 1109-1123.

Madden, R.A. and P.R. Julian, 1994: Observations of the 40-50 day tropical oscillation: A review. *Monthly Weather Review*, **122**(5), 814-837.

McPhaden, M.J., 1999: Genesis and evolution of the 1997-98 El Niño. *Science*, **283**, 950-954.

Slingo, J.M., D.P. Rowell, K.R. Sperber, and F. Nortley, 1999: On the predictability of the interannual behavior of the Madden-Julian Oscillation and its relationship to El Niño. *Meteorological and Geophysical Abstracts*, 51, 20264.



CLIMATE VARIABILITY IN AGRICULTURE

Australia is a land of highly variable and extreme climatic conditions. The Climate Variability in Agriculture (CVAP) R&D Program targets the Australian agricultural sector. In the last decade, climate research, in particular ENSO research, has given farmers new tools to better understand and adapt to the extremes of Australia's climate. CVAP builds on climate science and information and applies it to practical and risky decisions in farm and natural resource management. In the next few months, around 20 new projects from the current phase of the program will finish. One project, "Masters of the Climate," contains case studies to assist researchers and the media to understand how land holders are using climate information to manage land resources.

CVAP in collaboration with other Australian organizations also publishes a newsletter twice a year, which is available on its Web site at www.cvap.gov.au/ It contains progress reports on projects and news on current issues in applying climate information and seasonal forecasts and to help improve the sustainable management of land, water, and vegetation. For more information on CVAP, visit the above Web site or contact the CVAP Coordinator, Barry White, PO Box 916, Indooroopilly QLD 4068, Australia; tel/ fax: 61-7-3371-5878; email bjwhite@b022.aone.net.au



ARGO

Argo is a broad-scale global array of 3,000 temperature/salinity floats and is part of the integrated global observation strategy (IGOS). The name Argo was chosen to emphasize the strong complementary relationships of the global float array with the Jason altimeter mission. For the first time, the physical state of the upper ocean can be systematically measured and assimilated in near real-time. Nations presently having Argo plans that include float procurement or production include Australia, Canada, France, Japan, the UK, and the United States. International planning for Argo is coordinated by the Argo Science Team. The next meeting of the Team will be held in Sidney, British Columbia, Canada, 20-22 March 2001 at the Institute of Ocean Sciences. For more information about the meeting, see the Web site at www-sci.pac.dfo-mpo.gc.ca/osap/projects/iast3/home.htm or write to the Institute of Ocean Sciences, 9860 W. Saanich Rd., Sidney,

BC V8L 4B2, Canada; tel: 250-363-6534; fax 250-363-6746; email freelandhj@pac.dfo-mp.gc.ca. More information about Argo is available at www.argo.ucsd.edu

NEW STUDY ON GLACIAL CLIMATE INSTABILITY

A recent study of paleoclimatic records has revealed that climate was probably highly variable during glacial times. Two decades ago, glacial climate was believed to have been relatively stable. It has long been suspected that ocean circulation in the North Atlantic is involved in the abrupt cooling and warming during glacial periods. An article in the 11 January 2001 issue of *Nature*, "Rapid changes in glacial climate simulated in a coupled climate model," uses an intermediate-complexity climate model to investigate this theory. The authors used the model to describe the sensitivity of glacial climate to small changes in the amount of fresh water in the North Atlantic. For more information, contact A. Ganopolski at ganopolski@pik-potsdam.de or see the *Nature* Web site at www.nature.com

Ganopolski, A. and S. Rahmstorf, 2001: Rapid changes of glacial climate simulated in a coupled climate model. *Nature*, **409**, 153-158.

NEW FACE FOR BAMS

In spring 2000, the American Meteorological Society (AMS) formed an Interim Editorial Board (IEB) for the *Bulletin of the American Meteorological Society* (BAMS). In September, the AMS Council directed the IEB to proceed with plans for revitalizing the *Bulletin*. Material previously published in *BAMS* will be split between two new publications. For continuity, one of the two new publications will continue to be called *BAMS*, and the other will be

called *AMS News*. Examples of subject areas to be covered in the new *BAMS* include biometeorology, numerical analysis and prediction, oceanography, climate, observing systems, extreme events, and field projects, among many others. Articles on the relationship between subject areas and policy, education, societal and economic impacts, history, development of technology, and decision-making and assessment are especially solicited. The *AMS News* will replace the current newsletter and will contain its usual news stories, as well as recent weather events. Authors are encouraged to submit proposals for articles beginning in February 2001. A sample layout of the new *BAMS* will appear on the Web site in the near future. For more information, contact Ken Heideman, Director of Publications, AMS, 45 Beacon St., Boston, MA 02108-3693; tel: 1-617-227-2426, Ext. 303; email kheideman@ametsoc.org or the Web at www.ametsoc.org/AMS

ENSO EVENTS AND RAINFALL EXTREMES

Researchers at the University of Maryland Baltimore County (UMBC) and the National Aeronautics and Space Administration (NASA) who study changes in tropical precipitation patterns have noted a higher frequency of El Niño and La Niña events over the last 21 years. They note that when either of these events occur, global rainfall anomalies increase. Scott Curtis of the University of Maryland (UMBC) and Robert Adler of NASA presented a paper at the 2001 Annual Meeting of the American Meteorological Society on 15 January. Curtis and Adler used data from the World Climate Research Project's Global Precipitation Climatology Project (GPCP) and the three-year Tropical Rainfall Measuring Mission (TRMM) data sets to study global and regional variations in rainfall.

For more information, contact the Joint Center for Earth Systems Technology (JCET)/UMBC, Academic IV, A-wing, Room 114, 1000 Hilltop Cir., Baltimore, MD 21250; tel: 1-410-455-6362; fax: 1-410-455-1291; www.jcet.umbc.edu

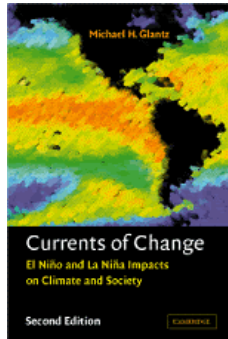
TAO/TRITON ARRAY

Development of the Tropical Atmosphere Ocean (TAO) Array was motivated by the 1982-83 El Niño event, the strongest of the century up to that time. The event highlighted the need for real-time data from the tropical Pacific for monitoring, predicting, and improving understanding of El Niño. The Pacific Marine Environmental Labs (PMEL) then began development of the ATLAS (Autonomous Temperature Line Acquisition System) mooring. The full array of nearly 70 moorings was not completed until December 1994. On 1 January 2000, The TAO array officially became the TAO/TRITON array, with sites west of 165°E occupied by TRITON (Triangle Trans Ocean Buoy Network) buoys maintained by the Japan Science and Technology Center (JAMSTEC). The TAO/TRITON array is currently supported by NOAA (United States), JAMSTEC (Japan), and the Institut de Recherche pour le développement (France). For a complete history of the array, see the newly redesigned TAO Project Web site at www.pmel.noaa.gov/tao/

IMECOCAL

The California Cooperative Oceanic Fisheries Investigations (CalCOFI) program has monitored the California Current System for five decades. Around 1980, the sampling area was reduced and now surveys are conducted off southern California by the Scripps Institution of Oceanography. In 1997, a new program called IMECOCAL (Investigaciones Mexicanas de la

Corriente de California) was started by several research institutions in Mexico. In October 1997 and January 1998, during the mature phase of an El Niño, IMECOCAL sampled and characterized the prevailing conditions. They continued to sample during the subsequent La Niña event. The program has completed 11 cruises to the region off Baja California, Mexico, following the same strategies used by the CalCOFI program in the United States. The program will continue for at least three more years (2003). Preliminary results and more information (in Spanish), is available at the Web site at imecocal.cicese.mx or contact Gilberto Gaxiola at ggaxiola@cicese.mx



SECOND EDITION CURRENTS OF CHANGE

Michael Glantz (*ENSO Signal* editor) has updated his 1996 book, *Currents of Change*, to include new chapters on La Niña, forecasting the 1997-98 El Niño, El Niño and health, the media and El Niño, and why ENSO events continue to surprise us. The book explores what we can learn from past events, what we can do to ameliorate the worst excesses of these phenomena, and how climate change might affect them in future decades.

Glantz, M.H., 2001: **Currents of Change: El Niño and La Niña Impacts on Climate and Society.**

Cambridge, UK: Cambridge University Press. Order on Web at uk.cambridge.org

EL NIÑO IMPACTS STUDY NOW AVAILABLE

As noted in the previous *ENSO Signal*, a study focusing on improving early warning mechanisms and general preparedness for extreme El Niño-related climate events has been released. The Executive Summary, *Lessons Learned from the 1997-98 El Niño: Once Burned, Twice Shy?*, was released in October 2000 at the United Nations in New York. This Summary is also available in PDF format at www.esig.ucar.edu/un/enFinal.pdf. If you are in the United States and would like a paper copy, write to the *ENSO Signal*'s Managing Editor. For those in other regions, write directly to the Public Affairs Section, United Nations University, 53-70, Jingumae 5-chome, Shibuya-ku, Tokyo 150-8925, Japan. Copies are free of charge. The Full Summary will be published by the UNU Press along with the complete reports from each of the 16 country teams in mid-2001.

EL NIÑO, LA NIÑA AND THE US NAVY

A Web site has been created to address the Naval significance of ENSO events on the US Navy. Changes in sea temperatures, wave heights, and atmospheric changes are certain to play a role in these operations. Thus far, the operational effect on the Navy has been minimal, but the potential effect is great. The awareness of these potential effects better allows the Center in Pearl Harbor to inform ships at sea of the impending dangers to safe passage that such anomalies can create. For more information, see the Web site at www.oc.nps.navy.mil/webmodules/ENSO/navy.html

GUEST EDITORIAL

Predicting Climate Anomalies Based on the Forecasted ENSO State

Over the last decade, progress in identifying the El Niño-Southern Oscillation (ENSO) phenomenon, and its climate impacts worldwide, has been quite impressive. The relationships recognized long ago by Sir Gilbert Walker have not only been confirmed using additional data, but also explained in physical terms relative to ENSO; additional relationships under the ENSO umbrella have now been added to that list.

Climate forecasts are usually based on shifts in a probability distribution, where the size of the shift is relatively small compared with the width of the distribution of the year-to-year climate. This means that while the forecasted climate shift has a greater-than-normal likelihood of materializing, there is much more than a tiny possibility that it will not. For example, during an El Niño, there is an enhanced probability that a major portion of the east coast of Australia (particularly southeastern Queensland and northeastern New South Wales) will receive less than the normal amount of rainfall during the period of January through March. In these locations, however, the probability of receiving above the historically derived median rainfall amount is approximately 25%, and below that amount is 75%. This tilt of the odds, while very noticeable and certainly significant in terms of its potential consequences for the Australian economy, provides much less certainty than that of a comparable short-term weather event for the coming day's weather. The Australian example is given because it represents a typical regional impact of an El Niño of modest to moderate strength. Other regions having impacts of similar strength, but for wetter-than-normal climate during El

Niño, are eastern Africa in October through December, the southeastern United States in December through February, and southeastern South America (e.g., Uruguay) during its early summer. A few small regions have more certain impacts, such as northeastern Brazil in March through May. The most guaranteed impact is found in the equatorial Pacific itself, such as in the islands of Kiribati during any season that an El Niño is active. Here the probabilities for above-normal wetness approach those of an expected weather event at a one-day lead time. However, most of the globe does not have even moderate probability shifts with an El Niño event, and for most of those that do the effects are limited mainly to one part of the year, such as a three- to four-month period. Europe and much of Asia (except in the south and southeastern sections) have little or no El Niño influence.

It is clear that the climate is determined by much more than ENSO alone. Given the severe limitation on the amount of climate variability that is explained by ENSO, it is urgent that climatologists identify other factors that drive the climate. Strong individual weather events that are not associated with any particular long-lived forcing factors (e.g., sea surface temperatures), but yet place more than a "dent" into the seasonal mean climate, may never be able to be factored into a climate forecast. These are essentially random "blips" whose timing may always remain inherently elusive. Factors such as fluctuations in the Atlantic SST, decadal-scale changes based in the Pacific basin, changes in atmospheric constituents (e.g., CO₂), or even solar variables may eventually be understood and used in addition to ENSO in forming a robust climate forecast.

Tony Barnston
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EMPLOYMENT & EDUCATIONAL OPPORTUNITIES

The University of Maryland is seeking two postdoctoral research associates in analysis and modeling of climate variability. The first position will focus on dynamically oriented diagnosis of interannual variability in observations and climate model simulations. Project tasks include modeling of observed and simulated climate variability related to ENSO, PNA and NAO/AO modes. The second position will focus on the analysis of US warm-season circulation and hydroclimate (drought, streamflow) variations. The structure and causes of recurrent stationary and transient moisture flux variability over North American will be analyzed. Linkage to both the Pacific and Atlantic SST variability will be investigated. Both positions have a second-year renewal option. Both positions are available immediately. A Ph.D. in meteorology or related field is required. Send CV, a one-page statement of research interests, and names of 3 references to Sumant Nigam, Dept. of Meteorology, 3403 Computer & Space Sci. Bldg., University of Maryland, College Park, MD 20742-2425; tel: 1-301-405-5381; fax: 1-301-314-9482; email nigam@atmos.umd.edu; web at metosrv2.umd.edu/~nigam

The Nicholas School of the Environment Marine Lab is offering an educational opportunity from 9 July-10 August 2001. Duke University's Integrated Marine Conservation Program teaches the principles necessary for the conservation and preservation of the coastal and oceanic environment. Participants in the Program usually enroll in the Program's "core" course (Conservation Biology and Policy) and one of 7 elective courses offered concurrently. Scholarships are available, including several earmarks for international students. In order to receive full consideration, applications

for general scholarships must be received by 1 April 2001. Applications for the Integrated Marine Conservation Program will be accepted until the program is full. For more information, see the Web site at www.env.duke.edu/marinelab/mlterm2.html or contact Helen Nearing at Duke University, tel: 1-252-504-7502; email hnearing@duke.edu

SUMMARIES OF PAST MEETINGS

A Workshop on the MJO and ENSO was held 15-17 March 2000 at NOAA's Geophysical Fluid Dynamics Laboratory, Princeton, New Jersey USA. The workshop explored topics related to the Madden-Julian Oscillation (MJO)-El Niño-Southern Oscillation (ENSO) problem, proposed a set of competing hypotheses, and made a set of recommendations for future studies on this issue. More information on the workshop, its background, agenda, list of attendees, and abstracts of presentations can be found at the workshop website, orca.rsmas.miami.edu/mjomip/mjo.enso. workshop, or contact Chidong Zhang, University of Miami, Rosenstiel School of Marine & Atmospheric Science, 4600 Rickenbacker Causeway, Miami, FL USA 33149-1098; tel: 1-305-361-4000; fax: 1-305-361-4711; email: czhang@rsmas.miami.edu

International Workshop on Climatic Change: Implications for the Hydrological Cycle and for Water Management was the theme for the Year-2000 edition of the Wengen Workshops on Global Change Research. The workshop was held 27-29 September 2000 in Wengen, Switzerland, with over 70 participants representing 20 different nationalities. The program was divided into the following sessions: 1. Sensitivity of precipitation regimes to climatic change:

observations and models; 2. Floods and droughts: past, present and future; 3. Sensitivity of precipitation and runoff to climatic signals such as the North Atlantic Oscillation (NAO); 4. Climate projections and hydrological assessments; 5. Water resource management: property rights, conflicts, transboundary sharing. For more information, contact Professor Martin Beniston, Director, Department of Geography, University of Fribourg, Perolles, CH-1700 Fribourg, Switzerland; tel: 41-26-300-9011; fax: 41-26-300-97-46; email: Martin.Beniston@Unifr.ch; Website: www.unifr.ch/iguf/EVENTS/Wengen/00/W2000PP1A.htm

Cli-Manage 2000, Conference on Australian Climate Variability: Improving the Ability of Australians to Make Climate-related Decisions was held 23-25 October 2000 in Albury, New South Wales, Australia. Convened by the National Climate Center, this program was supported by the Agriculture, Forestry and Fisheries Australia and Australia's rural R&D Corporations under the Climate Variability in Agriculture Program (CVAP). Cli-Manage 2000 focused on climate variability and climate change. Areas of discussion included agriculture, water supply (including the influence of El Niño/La Niña on Australian rainfall), energy supply, natural disasters, urban design/infrastructure, tourism, and resource management. For more information, contact Linda Sampson, Climate Analysis Section, National Climate Centre, Bureau of Meteorology, GPO Box 1289K, Melbourne, Victoria 3001, Australia; tel: 61-03-9669-4000; fax: 61-03-9669-4678; email: L.Sampson@bom.gov.au; internet: www.bom.gov.au/climate/

The XIV Scientific Meeting on El Niño was held 25-27 October 2000 in Callao, Peru at IMARPE. Participants included scientists in climatology, oceanography, meteorology, and representatives from

social and economic organizations in Chile, Colombia, Ecuador, and Peru. Objectives and results of the meeting included: an evaluation of ocean conditions in the Southeast Pacific from 1999-2000 with special reference to the 1999-2000 La Niña; preparation for participation in the next joint meeting of COI-OMM-CPPS to be held this year on El Niño; preparation of a plan of action of the ERFEN (an important research program on El Niño conducted by the South East Pacific Permanent Commission) for the next period; review the final report of the Third Oceanographic Cruiser, executed in May 1999. The final report from this meeting will be completed in the upcoming months. For more information, contact Manuel Flores via email: mjflores@andinanet.net

International Symposium: La Niña and its Biological Effects was held 9-10 November 2000 at San Marcos University, Lima, Peru. This symposium reviewed and discussed problems related to La Niña and its possible effects. The program was presented by the organization RIBEN (The Biological Impact Network of El Niño Events) and CONCYTEC (The Science and Technology National Council). The symposium consisted of four main topics: Climatological and oceanographic aspects of La Niña; Effects on marine biological resources; Effects on terrestrial and continental biological resources; and Socio-economic repercussion of La Niña events. Those attending included biology and related sciences researchers, representatives of governmental and non-governmental institutions with El Niño- and La Niña-related themes, students and interested parties. For more information, please contact Juan Tarazona, CONCYTEC, El Comercio 197, San Borja, Lima, Peru, or P.O. Box 1984, Lima 100, Peru. Tel: 51-1-225-1150, ext. 163; fax: 51-1-225-1150, ext. 167; email: jtarazona@concytec.gob.pe; www.concytec.gob.pe

ANNOUNCEMENTS OF UPCOMING MEETINGS

The International Conference on Forecasting Monsoons from Days to Years will be held *21-22 March 2001*, followed by **The Second WMO Workshop on Forecasting Monsoons from Days to Years**, to be held *23-28 March*. This seminar is presented by the India Meteorological Department (IMD) and the India Meteorological Society (IMS), in New Delhi, India. This two-fold event's main focus is to review the current understanding of the mechanisms affecting monsoon variability and its predictability, and the role of monsoons in global climate variability. The conference will also include such topics as model projections and empirical weather forecasts, ENSO-Monsoon variability, and Global Climate Change and Monsoon. For more information, contact Professor S. K. Dube, Chairman, Local Organizing Committee, Centre for Atmospheric Sciences, Indian Institute of Technology, New Delhi-110 016, India; tel: 91-11-4694639; fax: 91-11-4690108; email: skdube@cas.iitd.ernet.in; website: www.ncmrwf.gov.in/icom.html

The Twelfth Global Warming International Conference and Expo (GWXII): Year 2001 Conference, hosted by the Global Warming International Program Committee and Global Warming International Center, will be held at Cambridge University, United Kingdom, *8-11 April 2001*. This conference includes tracks covering the following: Climate Change and Global Warming; Climate History and Climate Future; El Niño and La Niña; North Atlantic Oscillation (NAO); the Ocean and Global Warming; El Niño and La Niña modeling; International Law and Policy making; State and Local Government Actions; Sustainable Environment and Health in the Face of Global Climate Change; Policy and Economics Related to Kyoto

Compliance; and Greenhouse Gas Emissions. The conference also includes the GWXII Expo to promote networking among participants. For more information contact the Global Warming International Center, 22W381 75th Street, Naperville, IL 60565, USA; tel: 1-630-910-1551; fax: 1-630-910-1561; email: gw12@globalwarming.net; web: www.globalwarming.net

The Global Change Open Science Conference: Challenges of a Changing Earth will be held *10-13 July 2001* in Amsterdam, The Netherlands. This conference will present the latest scientific understanding of global environmental change and of natural and human-driven changes. The conference will focus on four issues of major societal importance: air quality, carbon cycle, water resources, and food systems. Parallel sessions will include: El Niño-Southern Oscillation in the context of past and future climate variability; fire and global change; Megacities and global change; science and the policy process—IPCC and beyond; global carbon cycle; societal transformations; oceans and global change; predicting land-use change; and integrated regional modeling and assessment. The conference is aimed toward the global change scientific community. In addition, it will also be informative for the science communication field and the general media. For more information, contact the Conference Secretariat, Congrex Holland BY, PO Box 302, 1000 AH Amsterdam, The Netherlands; tel: 31-20-5040-208; fax: 31-20-5040-225; email: annemiek@congrex.nl; website: www.sciconf.igbp.kva.se

Climate Conference 2001 will be held *20-24 August 2001* at the Institute for Marine and Atmospheric Research Utrecht (IMAU) in The Netherlands, in cooperation with the Netherlands Centre for Climate Research (CCR). Conference themes include the following: Radiative Forcing of Climate-

The Physics; Dynamics and Radiation of Clouds; Atmospheric Composition and Solar Variability; Boundary Layers in Climate Models; Climate Variability on Time Scales, Reaching from Decades to a Century Such as NAO and ENSO; and Sea Level Change – Land-ice and Climate, Geodynamics, Thermal Expansion, Meteorological Aspects, Integrated Assessments, Impact on Coastal Systems. For further information, contact the Utrecht University Congress Bureau, c/o M. van Haersma Buma, P.O. Box 80125, 3508 TC Utrecht, Netherlands; tel: 31-30-253-2728; fax: 31-30-253-5851; email: m.buma@fbu.uu.nl; website: www.phys.uu.nl/~wwwimau/cc2001/.html

Environmental Health Risk 2001: First International Conference on the Impact of Environmental Factors on Health organized by the Wessex Institute of Technology, UK, will be held *10-12 September 2001* in Cardiff, Wales, United Kingdom. This conference is of interest to health specialists, as well as researchers and scientists involved in environmental health risk. Topics include: Water Supply and Quality; Waste Water and Surface Water Problems; Desertification and Health; Social and Economic Issues; Emergency Response; Education and Training; and Policy Planning. Contact Conference Secretariat, Environmental Health Risk 2001, Wessex Institute of Technology, Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK; tel: 44-23-80-293223; fax: 44-23-80-292853; email: shanley@wessex.ac.uk; website: www.wessex.ac.uk/conferences/2001/envh01

The IAPSO/IAMAS/CLIVAR Symposium: Role of the Ocean on Climate Variability over South America will be held *21-28 October 2001* in Mar del Plata, Argentina, as part of the Joint Assembly of the International Association for the

Physical Sciences of the Oceans (IAPSO) and the International Association for Biological Oceanography (IABO). Oceanic climate variability has well-documented impacts over South America, and the ENSO phenomenon is associated with rainfall and river streamflow anomalies in several regions of South America. This conference will focus on obtaining a better understanding of the impacts of oceanic variability on the South American climate. Questions to be addressed include: What are the mechanisms through which the ocean can play a role on climate variability in South America? Do these mechanisms vary with season? Do SST anomalies in the extratropical south Atlantic play an active role or are they the passive response to similar anomalies in the Pacific? Do oceanic anomalies lead to interannual and interdecadal modulations of the South American summer monsoon, which drive remote climate anomalies? Does interannual variability in the confluence of the Brazil and Malvinas currents influence the atmosphere, and is ocean-atmosphere coupling important? For further information and registration, please contact Dr. Gerardo M. E. Perillo, INSTITUTO ARGENTINO DE OCEANOGRAFIA, CC 804, Florida 8000 Complejo CRIBABB Edificio E1, 8000 Bahia Blanca, Argentina; tel: 54-291-486-1112/1519/1309; fax: 54-291-486-1527/1112/1519; email: perillo@criba.edu.ar; website: www.criba.edu.ar/2001_ocean

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WEB RESOURCES

www.pmel.noaa.gov/tao/

This web site allows people to plot the time series data to see intra-seasonal MJO-related surface wind and oceanic variability during 1997-98 or any other time during the past 10 years or so in the equatorial Pacific.

rainbow.lidgo.columbia.edu/ees/climate/slides/ocean_atm_index.html

This web site contains numerous links to various graphics and articles on the topics of ENSO Mechanism and Research History, Impacts of El Niño and Case Studies, and Ocean-atmosphere Observations and ENSO Prediction.

www.cpc.ncep.noaa.gov:80/products/monitoring_and_data/ENSO_connections.html

CPC produces maps of the United States that show probability of precipitation and temperature being above or below normal based on data from previous ENSO events.

www.pmel.noaa.gov/~kessler/mjo/mjo.html

Numerous graphics on MJO observations.

www.ncdc.noaa.gov/coare/

This web site contains information about TOGA COARE datasets and provides direct access to data centers.

mpa.gov

This new web site is designed to provide information, facilitate partnerships, help identify key needs and challenges, and encourage public participation in the design, implementation and evaluation of marine protected areas (MPAs).

www.ncdc.noaa.gov/ol/climate/elnino/elnino.html

This page provides a one-stop source for NOAA National Data Center (NNDC) reports and data related to El Niño and La Niña. It links to on-line reports describing El Niño/La Niña-influenced weather events to various datasets and images, and to other sites with additional information.

www.mbari.org/bog/Projects/Atlas/

This web site has all the hydrographic information during the 97-98 El Niño along the entire west coast from Baja California to British Columbia.

www.jcet.umbc.edu/

The official web site for JCET (The Joint Center for Earth Systems Technology) which operates under cooperative agreement between the University of Maryland Baltimore County and the Goddard Space Flight Center (GSFC). Job opportunities are listed on this site.

THE ENSO SIGNAL

The ENSO Signal will be published four times a year by the Environmental and Societal Impacts Group at the National Center for Atmospheric Research, with financial support from the National Oceanic and Atmospheric Administration's Office of Global Programs. It is available both in hard copy and an electronic version.

The *ENSO Signal* is intended for those interested in the ENSO cycle and its impacts on ecosystems and societies. We intend to provide news items, publications, web sites, and articles of interest to our readers. Please give any feedback about the Signal to the Managing Editor. It is published quarterly free of charge. Subscribe on line or at the address below. For the next issue, please send any materials for inclusion by **30 April 2001**.

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