Outlook evaluation[29]

The Southeastern South America Climate Outlook indicated that above normal rainfall was expected in southeast Paraguay, western Uruguay, and northeastern Argentina from January to March, 1998, consistent with observed wetter than normal precipitation amounts. The increased likelihood for below normal precipitation in northwestern Argentina and a portion of southeast Brazil generally did not match observed conditions, although the tercile probabilities in these areas were not significantly different than climatology.[30] Similarly, above normal rainfall was observed in eastern Uruguay and the remainder of southeast Brazil, where the forecast was essentially climatology.

Climate Outlook - Rainfall

Statement from the Southeastern South America Regional Climate Outlook Forum
December 10, 1997, Montevideo, Uruguay

El Niño-Related Climate Forecast South-eastern South America Outlook
January 1998 - March 1998

SUMMARY

Wetter than average conditions over the period January-March 1998 are expected over much of the central parts of south-eastern South America, including north-eastern Argentina, southern Paraguay and parts of southern Brazil and western Uruguay. Dry conditions are expected only in areas further north and close to the Andes. Stronger impacts in the year following El Niño events typically occur only in autumn and early winter, after the period covered in this Outlook.

THE CLIMATE OUTLOOK FORUM

On 10 December 1997 a South-eastern South American Climate Outlook Forum convened to formulate consensus guidance for the early 1998 season in the region. The Forum was attended by Meteorological Services from South-eastern South American countries, and climate scientists from universities and national and international research institutes. These specialists reviewed the state of the global climate system and its implications for South-eastern South America. One of the principal factors taken into account is the major El Niño event occurring in the tropical Pacific Ocean. Although much stronger impacts in the year following El Niño events typically occur only in autumn and early winter, after the period covered in this Outlook, recent El Niño occurrences have had significant impacts on rainfall across much of the region south of 20°S during January-March.

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[29]For a description of the qualitative method used to evaluate the Outlook, see Comparison of Climate Outlooks and Observations in the Methodology section.

[30]A forecast for climatology indicates an equal probability of below-, near-, or above-normal rainfall (33% each) For the purposes of this evaluation, terciles with values of 45% or greater are defined as significantly different than climatology.

The Forum was co-sponsored by the Association Rural del Uruguay, IAI, NOAA, IRI and WMO. Participants at the Forum included representatives of Meteorological Services from four countries (Argentina, Brazil, Paraguay and Uruguay) and climate scientists and other experts from national, regional and international institutes and organizations (University of Buenos Aires, Department of Atmospheric Sciences; CIMA/CONICET/UBA; Federal University of Parana, Department of Physics; INPE/CPTEC; National University of Asuncion, Faculty of Exact and Natural Sciences; University of the Republic, Uruguay; WMO; IRI; NOAA-OGP).

METHODOLOGY

The regional climate assessment began with consensus agreement that the current El Niño will remain over the forecast period (January-March 1998). The sea-surface temperature (SST) forecasts were based on coupled ocean-atmosphere models, physically-based statistical models and expert interpretation. The region considered included continental areas bounded from 20 to 40°S and east of the Andes to 47°W. This area was divided into sub-regions according to previous statistical analyses of the impact of El Niño events in the region. The outlook was based on dynamical forecasts presented by INPE/CPTEC and IRI models as well as results of detailed studies of El Niño impacts in this region

The current status of seasonal to inter-annual forecasting allows prediction of spatial and temporal averages, and may not fully account for all factors that influence regional and national climate variability. This Outlook is relevant only to seasonal timescales and relatively large areas, and local variations may occur.

OUTLOOK

The experts provided probability distributions to indicate the likelihood of below-, near- or above-normal rainfall for each sub-region (see Map). Above-normal rainfall is defined as within the wettest third of historically recorded precipitation totals in each region; below-normal rainfall is defined as within the driest third of precipitation totals; near-normal is the third centered around the climatological median. Users are strongly advised to contact participating institutions and other climate information sources for interpretation of this Outlook and for additional guidance.

Above-normal rainfall is expected in southern Paraguay, the south-western part of southern Brazil, western Uruguay and north-eastern Argentina. Normal to above-normal rainfall is expected in central eastern Argentina. In Brazil, normal rainfall in the south is considered most likely, however, north of about 22°S, normal to below-normal rainfall may occur. Near the Andes, dry conditions are expected in north-western Argentina, and there is a zone immediately to the east where average conditions are anticipated. Further south, in central western Argentina, rainfall prospects are uncertain.

Temperatures during January-March are expected to be cooler than average where above-average rainfall is indicated.

The confidence that can be placed in a three-month outlook is relatively high. Beyond three months the reliability of statements about rainfall prospects for the region decreases because of uncertainty in the evolution of SSTs at longer time-scales. However, there are no signs that widespread dry conditions will occur in April-June, and there are indications of wet conditions in the south-eastern part of southern Brazil, Uruguay and eastern Paraguay.

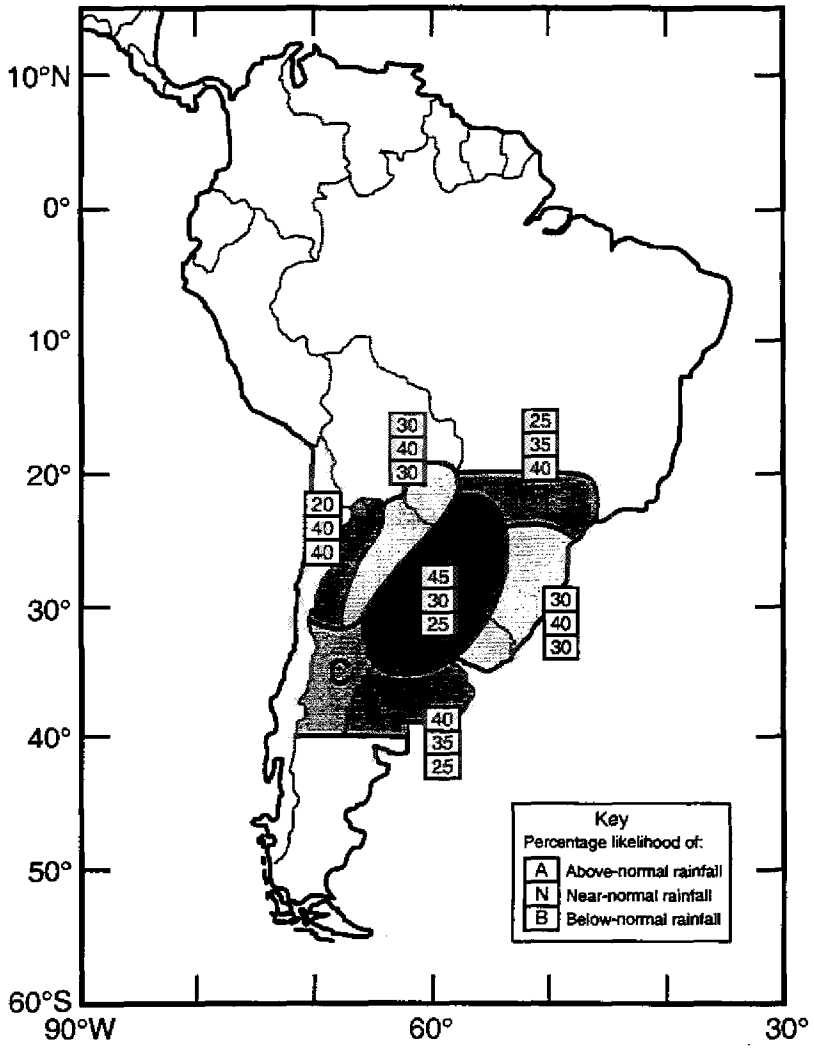
Consensus Climate Guidance

South-eastern South America Regional Climate Outlook Forum

December 10, 1997 *Montevideo, Uruguay*

(for list of participants and explanatory text see associated discussion)

January - March 1998



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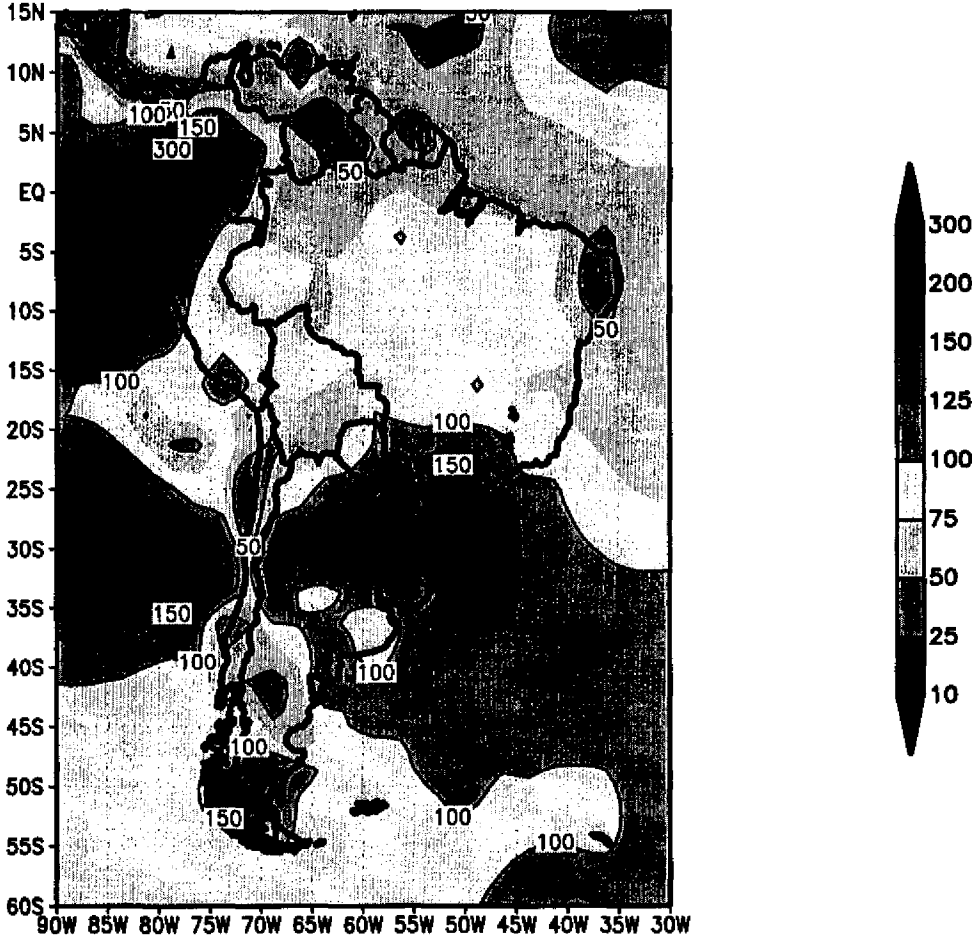

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Northeastern South America - January 1998

Using the general approach of the first two Climate Outlook Fora in South America, the Northeastern South America Climate Outlook Forum was held in Fortaleza, Brazil, January 1998.[31] Countries addressed at this event, which was hosted by Fundação Cearense de Meterologia e Recursos Hídricos (FUNCEME - Brazil) and Instituto Nacional de Pesquisas Espacias (INPE - Brazil), included Brazil, Venezuela, Columbia, and the Guyanas. Discussions of pilot applications activities were held in separate working groups focused on agriculture, water resources, civil defense and natural disaster management, and human health. Participants in the working groups included climate scientists, policy-makers, agricultural scientists, hydrologists, and natural hazard and human health specialists. Major themes emerged throughout many of the discussions, including:

- Effective application of climate forecasts will be aided by clarifying specific user groups, stakeholders, and institutional clients;
- Vulnerability to climate extremes varies with socio-economic situation;
- Continued communication between forecasters and user groups will aid in building credibility of the forecasts;
- Continued research that considers the role of the Atlantic in climate in this region will help enhance the ability to forecast climate in this part of the world;
- Mechanisms for providing regional detail - for example, by down-scaling, use of agro-climatic zones, etc., will greatly enhance the utility of forecasts; and
- An ongoing series of seasonal forecasts will allow for their improved understanding and effectiveness.

Working group recommendations

The agriculture working group specifically recommended a pilot effort to regularly evaluate the use of climatic information during critical production cycles. The process would serve as an outreach mechanism to create linkages between forecast producers and users, to educate local groups on the use of forecast information, and to orient programs of drought mitigation. An assessment program is necessary to 1) evaluate the potential of local user groups (farmers, fishermen, government officers, state agencies, merchants, etc.) to respond to climate forecasts and 2) to assist in preparation of comprehensive mitigation plans.

The water resources group proposed the creation of an experimental project to model hydrologic conditions in river basins of northern South America with the objective of incorporating

[31] The Northeastern South America Climate Outlook Forum in some cases has been referred to as the Northern South America Climate Outlook Forum.

climate forecast information into the management of drinking water, irrigation, and hydroelectric power generation systems. It was suggested that the project should be implemented in three stages, beginning with compilation and analysis of existing information (for availability and consistency), then development and verification of a hydro-climatic model, and finally meeting with users to facilitate real time application of the model. The methodology developed and refined during the project could be applied to other river basins in northern South America and elsewhere.

Recommendations of the civil defense and natural disaster working group included the creation of two pilot application projects. The objective of the first would be to analyze the effectiveness of the Ceara waterworks program in years with and without El Niño's effect on climate. Focus sectors would include agriculture, forestry, water resources, and the environmental sector, and would range from semi-arid regions and watersheds (starting from second-order streams) to areas of greater topographic relief. The primary objective of the second pilot project would be to use climate forecasts in the development of an early warning system for forest fires. Increased lead-time on the potential for forest fires would benefit biodiversity conservation efforts, civil defense, forestry and agriculture sectors.

The human health working group recommended that available historical records on the incidence of specific health conditions be analyzed to determine potential correlations to climate patterns associated with ENSO. Once correlations are established, more detailed studies should be completed to control for confounding factors that may influence the occurrence of a given disease. The working group recommended that climate forecasts would be useful in mitigating climate-associated diseases by reducing vulnerability of at-risk populations, through construction of water reservoirs, food aid, etc., and by taking specific preventative actions such as vaccination, vector control, targeted epidemiological surveillance, and health education.

Outlook evaluation[32]

The Northeast South America Outlook indicated there would likely be drier-than normal conditions in northern Brazil from February to May, 1998, particularly in the northeast. Observed precipitation amounts in this area were consistent with the Climate Outlook, although rainfall in northwestern Brazil was generally greater than 75% of average. The area of increased likelihood

[32]For a description of the qualitative method used to evaluate the Outlook, see Comparison of Climate Outlooks and Observations in the Methodology section.

of near-normal rainfall in extreme eastern Brazil was not reflected in the below-normal precipitation observed for this region (although below-normal was forecast at 30% probability). The band of expected drier than normal rainfall running through eastern Peru, southeastern Columbia, and most of Venezuela was inconsistent with observations which indicated rainfall amounts near to above normal. Similarly, most of northern Columbia had near- to above-normal rainfall, even though below-normal amounts were projected (a 75% likelihood). Although rainfall amounts 300% of average observed in northern Ecuador appear to be in agreement with the Outlook, the observational data lacks the detail necessary to resolve the forecast in this region.[33]

Climate Outlook - Rainfall

Statement from the Northeastern South America Regional Climate Outlook Forum
January 20, 1998, Fortaleza, Brazil

THE CLIMATE OUTLOOK FORUM

A Climate Outlook Forum was convened on January 19, 1998 to formulate a consensus precipitation forecast in northern and northeastern South America for the period February - May 1998. The Forum was comprised of climate researchers and representatives of meteorological services from Brazil, Colombia, French Guyana, Suriname, Venezuela, and the USA. Participating institutions included INPE, FUNCEME, the Instituto Nacional de Meteorologia (INMET), the Universidad Simon Bolivar (USB), the Universidad Nacional de Colombia, NOAA-OGP, IRI, WMO, and IAI. The participants reviewed the state of the global climate system and its implication for northern and northeastern South America.

METHODOLOGY

Sea surface temperature (SST) anomalies in the tropical Pacific and Atlantic oceans are among the most important predictors of rainfall anomalies in northern South America. The present SST anomalies in the central and eastern Pacific are among the largest ever recorded, with positive anomalies in some locations exceeding 5° C. Predictions call for warm conditions to continue for at least 3 months. Anomalously warm SST's, referred to as El Niño, have been historically associated with dry conditions over most (but not all) of northern and northeastern South America. By contrast, prediction of rainfall anomalies based on present SST anomalies in the Atlantic is more ambiguous, with a weak dipole pattern favorable for enhanced rainfall in parts of northern South America (i.e. opposing the effect of El Niño).

This regional climate outlook began with consensus that the current El Niño event is the strongest recorded in this century. The sea surface temperature (SST) forecast and other factors affecting the climate of northern and northeastern South America were based on atmospheric general circulation models, coupled ocean/atmosphere models, physically-based statistical models and expert interpretation. The Forum endorsed the use of the NOAA National Centers for Environmental Prediction (NCEP) coupled model as the most reliable indicator of the evolution of this El Niño event in terms of sea surface temperature for the next three months.

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[33]The estimated percent normal precipitation maps used for the Outlook evaluation have a spatial resolution of approximately 2.5° longitude by 2.5° latitude. Since the forecast area in northern Ecuador is smaller than 2.5° by 2.5°, a higher resolution map of rainfall observations is necessary to evaluate the Outlook.

In the discussions, experimental seasonal forecasts from the CPTEC/COLA, IRI/MPI ECHAM, NCEP, ECMWF, ARPEGE-CLIMAT climate models, and statistical models for north eastern Brazil and Venezuela have been considered. The forecast area in the present exercise is limited from 15°S to the northern coast of South America, excluding Peru, Ecuador, and Bolivia. It is necessary to remember that the end of the period February-May is arbitrary, and cuts through different climatic seasons in different sub-regions.

OUTLOOK

The Climate Outlook addresses the February-April, 1998 period for northern and northeastern South America. The experts provided probability distributions to indicate the likelihood of below-, near-, or above-normal rainfall for each sub-region (see attached map). Users are strongly advised to contact participating institutions and other climate information sources for interpretation of this Outlook and for additional guidance. It is emphasized that the locations of the boundaries between the subregions are only qualitatively correct, and should be considered as transition zones rather than sharp boundaries.

All regions have enhanced probability of drier than normal except the southern parts of Northeast Brazil (Bahia) and the southwestern coastal region of Colombia. In particular, the northern parts of Northeast Brazil (eastern Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba and Pernambuco and parts of northern Bahia) have particularly high probabilities of a drier than normal period.

The ocean-atmosphere system is changing at this time, and should the situation in the tropical oceans be altered significantly in the three-to-four weeks to follow, the climate outlook for the upcoming rainy season in northern Northeast Brazil (March-May) may require modification. In particular, the meteorological community should keep watch on the developments in the Atlantic.

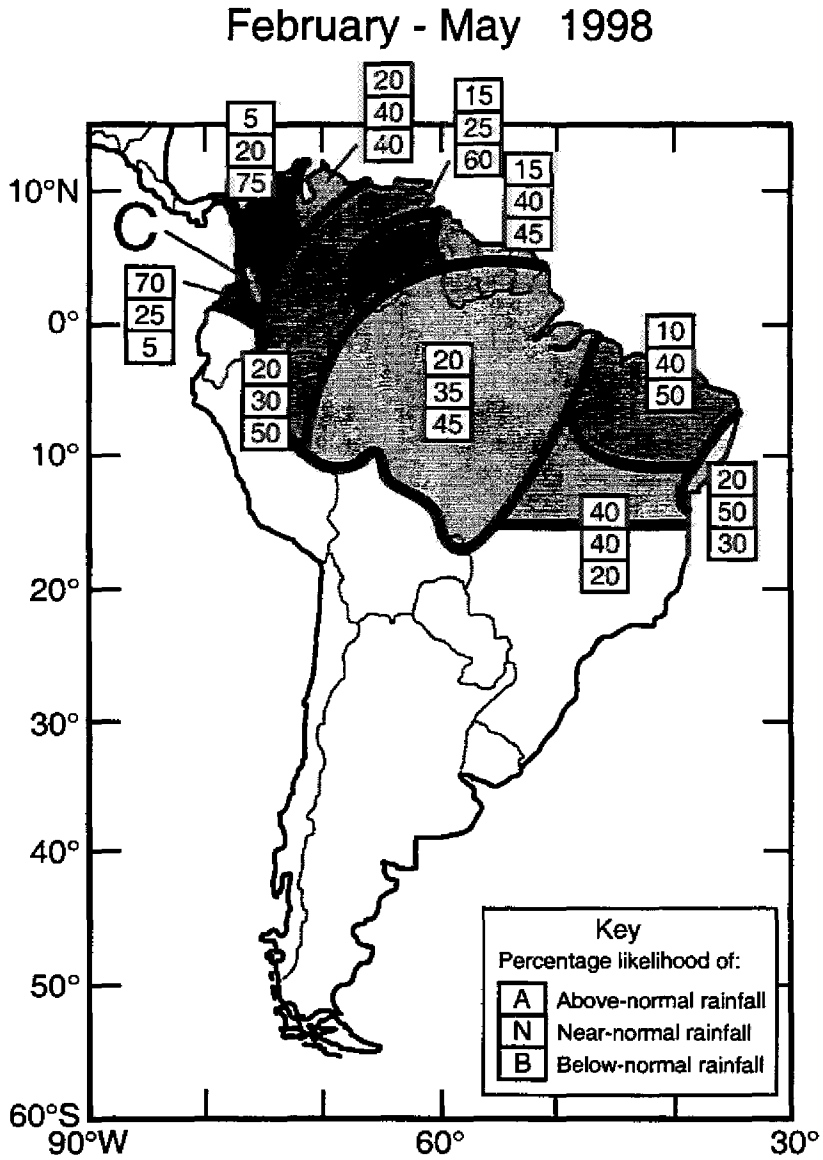
Recent studies have indicated an inverse relation in which dryness in northern coastal regions of Northeast Brazil is accompanied by enhanced rainfall along the coast of Guyanas. The present outlook does not reflect this, as in the Guyanas and northern Venezuela, February-April is a dry season.

Consensus Climate Guidance

Northeastern South America Regional Climate Outlook Forum

20 January 1998 *Fortaleza, Brazil*

(for list of participants and explanatory text see associated discussion)



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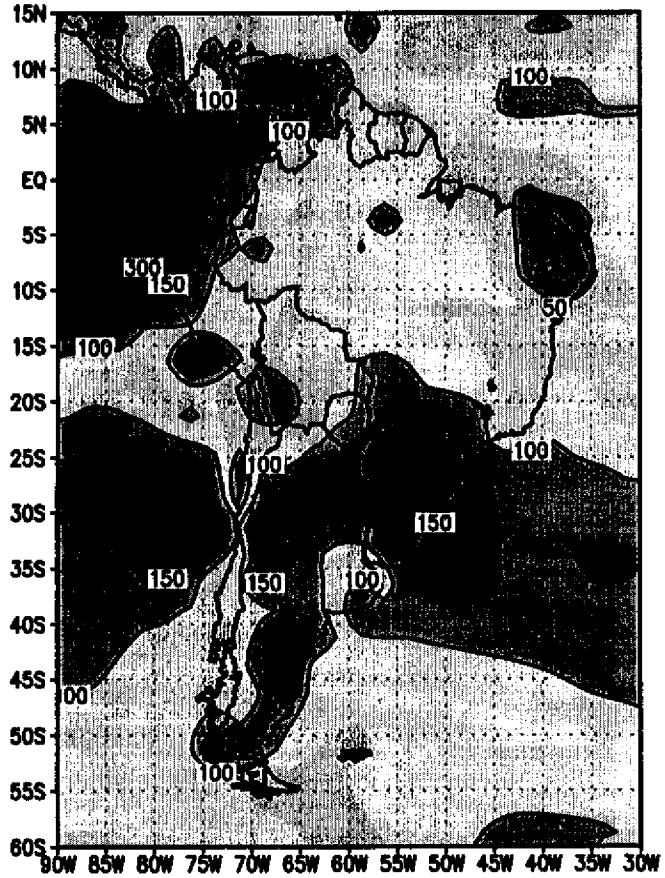

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Mesoamerica - May 1998

The Mesoamerica Climate Outlook Forum, which took place in Panama City, Panama, on May 1998, was organized by the Water Center for the Humid Tropics of Latin America and the Caribbean (CATHALAC). The Forum consisted of the two main activities, including the creation of a consensus precipitation forecast for Mesoamerica (all of Central America, Columbia and Venezuela) for June-August, 1998, and a press conference to release the forecast results to members of both the televised and published media. Similar to the preceding Fora, the meeting involved both climate modelers and representatives of National Meteorological and Hydrological Services from throughout the region. The press briefing included members of local and regional news media organizations. A brief meeting between Outlook Forum participants and the Panamanian ENSO Commission also occurred, to inform the Commission of Forum results and the general assumptions on which the forecast was based, and to address questions related to application of climate forecast information.

Outlook evaluation[34]

The Climate Outlooks for Mesoamerica and the Caribbean were created with the assumption that unusually warm sea-surface temperatures (SSTs) in the equatorial Pacific associated with El Niño would decay slowly over the forecast period (see Outlook descriptions). In reality, however, temperatures decayed very quickly, with large portions of the central equatorial Pacific showing negative SST anomalies by early June.[35] Given this discrepancy, the following forecast evaluation, as well as that for the Caribbean, should be viewed as an example of how climate forecasts fare when the SSTs on which they are based change more rapidly than anticipated.

The Outlook for Mesoamerica indicated an increased likelihood of drier than normal conditions in central and northern Mexico from June to August 1998. While much of this region experienced below-normal rainfall during this time, there were also areas with near- to above-

[34]For a description of the qualitative method used to evaluate the Outlook, see Comparison of Climate Outlooks and Observations in the Methodology section.

[35]The region between 5°N and 5°S latitude and 170°W and 120°W longitude in the equatorial Pacific (the Niño 3.4 region) showed negative anomaly values by early June and decreased through late August 1998. Niño 3.4 is expressed relative to a long-term SST average, and therefore can be either positive or negative. During November 1997, in the midst of the El Niño event, the Niño 3.4 value reached almost 3.0°C, whereas by the end of June 1998, it had fallen to nearly -1.0°C.

normal rainfall. Southern Mexico, on the other hand, was forecast to have wetter than normal conditions, while the rainfall it received was in the near-normal range. The narrow strip of below normal precipitation forecast for eastern Guatemala, western Honduras, western Nicaragua, western Costa Rica, and Panama was generally consistent with observed near- to below-normal rainfall in these areas. Three areas forecast for wetter than normal conditions, one in western Guatemala, one in southeastern Nicaragua, and one in northern Ecuador, are too small to be resolved with available observational data.[36] Rainfall at near- to below-normal levels in the Yucatan peninsula, Baja California, Belize, eastern Honduras, and eastern Nicaragua were generally inconsistent with the forecast for climatology in these areas. Most of Venezuela and Columbia experienced precipitation in the near-normal range from July to August, matching the forecast for this region.

Climate Outlook - Rainfall

Statement from the Mesoamerica Climate Outlook Forum
18-19 May 1998, Panama City, Panama

THE CLIMATE OUTLOOK FORUM

A Climate Outlook Forum was convened on May 18-19, 1998 to analyze the current state of the global and regional climate and formulate a consensus precipitation forecast for Mesoamerica for the period of June-July-August 1998. The Forum consisted of researchers and representatives of meteorological services from Mexico, Belize, El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Panama, Columbia and Venezuela. The event was organized and sponsored by the following organizations: INRENARE, CATHALAC, NOAA-OGP, IRI, IAI, USAID-OFDA, and WMO.

METHODOLOGY

Sea-surface temperatures (SSTs) in the tropical Pacific Ocean are a significant factor influencing regional atmospheric dynamics and rainfall in the Mesoamerican region. Historical climate records, present climatic conditions, and SST predictions for the central and eastern equatorial Pacific from NCEP were used to produce a climate outlook for Mesoamerica. It was agreed that anomalously warm SSTs associated with 1997-98 El Niño are starting to weaken and would continue to do so through the forecast period.

The outlook applies to precipitation for the period June-August 1998, as a longer time frame would increase uncertainty in the outlook. The activity of the Inter-Tropical Convergence Zone, the westerly waves, and hurricanes in the Pacific and the Caribbean will likely influence the amount of rainfall in the Mesoamerican region.

Projected precipitation anomalies are shown using a probabilistic approach. The predictions consider the likelihood that the total amount of rainfall will be near-normal, above normal or below normal (Fig. 1). The map indicates the

[36]The estimated percent normal precipitation maps have a spatial resolution of approximately 2.5° longitude by 2.5° latitude. The forecast areas in western Guatemala, southeastern Nicaragua, and northern Ecuador are smaller than 2.5° by 2.5°, indicating higher resolution observational data is necessary for Outlook evaluation.

probability that precipitation during the period June-July-August will be amongst the wettest (upper block), amongst the normal (middle block) or the driest (lower block) years in the historical record.

OUTLOOK

The Inter-Tropical Convergence Zone (ITCZ) is the band of clouds and intense tropical rains that is located north of the geographic equator during the period of June-August. During El Niño years, the ITCZ tends to migrate more slowly to northern latitudes. Therefore, a delay for the onset of the rainy season is expected. At the same time, anomalously strong easterly winds over Central America generally cause strong orographic rainfall in the Caribbean coastal region of Central America, while rainfall is generally reduced in the Pacific coastal regions.

The precipitation Outlook for the period June-July-August of 1998 for the Mesoamerican region is given in the ac. The boundaries between the subregions should be considered as transition zones rather than sharp boundaries.

Over Mexico, a delay of the onset of the rainy season is predicted, hence, most of the country will have a deficit in accumulated rainfall for the forecast period. Only in the Gulf of Mexico region will rainfall likely be above normal. It is expected that precipitation in the peninsula of Baja California and in Yucatan will be close to normal.

In most of the countries of Central America the rainy season will begin later than May, the usual onset of the rainy season. It is probable that the rainfall anomalies will continue to occur over a major part of the Isthmus during the forecast period. It is expected that below normal precipitation will occur on the Pacific coast of Central America, from the south of Guatemala to Panama. Rainfall deficits are also expected in the north of Guatemala and central Honduras. Zones that will likely register rainfall quantities above normal include the western coast of Guatemala, the northeastern part of Costa Rica, and the southeastern part of Nicaragua. The remaining Caribbean coastal region will likely have precipitation close to normal.

In the southeastern part of Mesoamerica, Colombia and Venezuela, it is probable that conditions will be close to normal with slight deficits in precipitation.

Although the 1997-98 El Niño is weakening, it will continue to affect the region during the outlook period. The disappearance of El Niño's climatological effects will depend on the rate at which SSTs in the equatorial Pacific decrease.

WARNING

The forecast is a general vision of the most probable behavior of the regional climate. Due to the large scale nature of the forecast, there are likely to be local rainfall patterns that vary significantly from the outlook. Decision making at the national or local level should take this into account. Users of climate data are invited to contact their national organizations that are tasked with making national climate predictions to receive more specific guidance on how to interpret the available information.

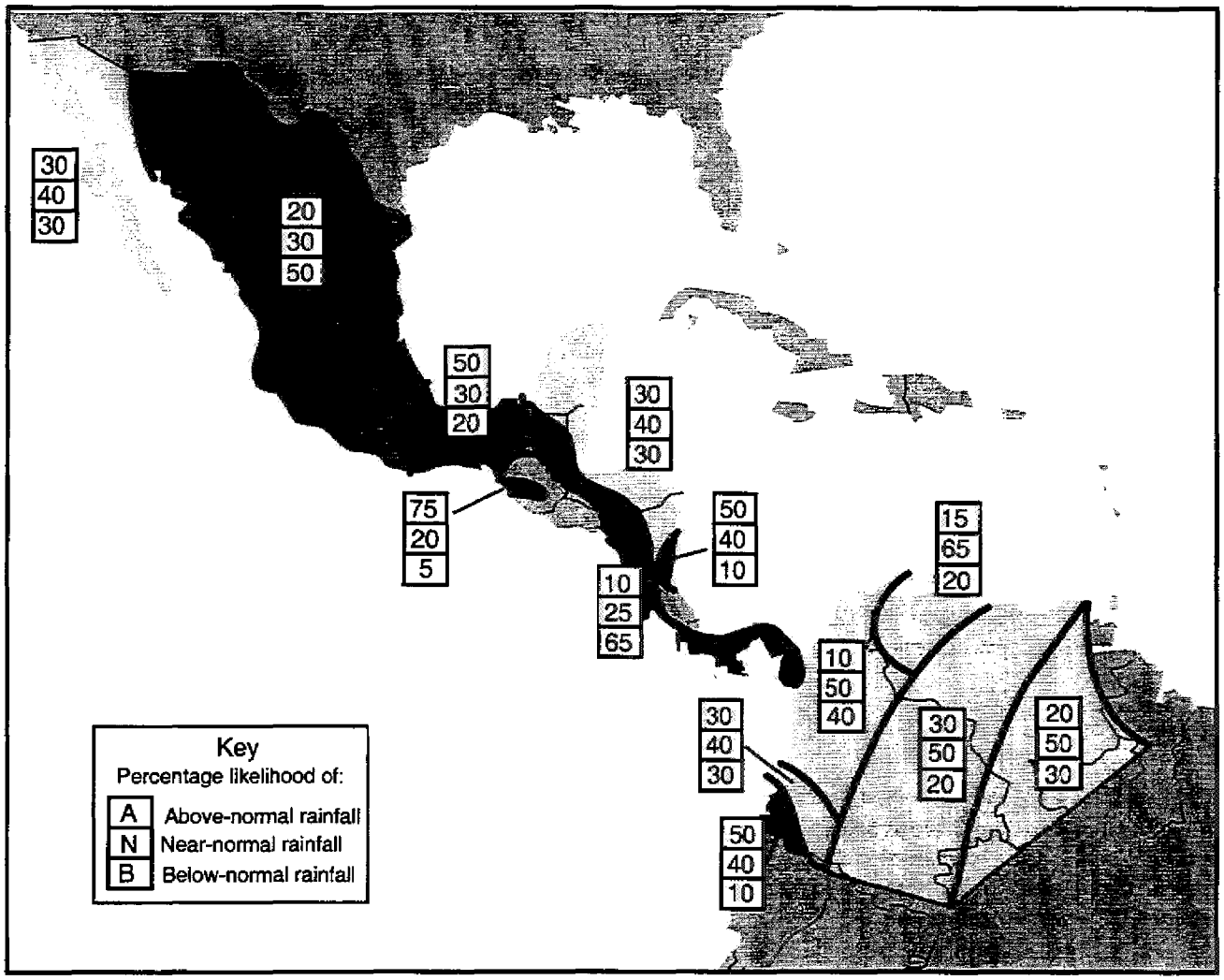
Consensus Climate Guidance

Mesoamerica Climate Outlook Forum

18-19 May 1998 *Panama City, Panama*

(for list of participants and explanatory text see associated discussion)

June - August 1998



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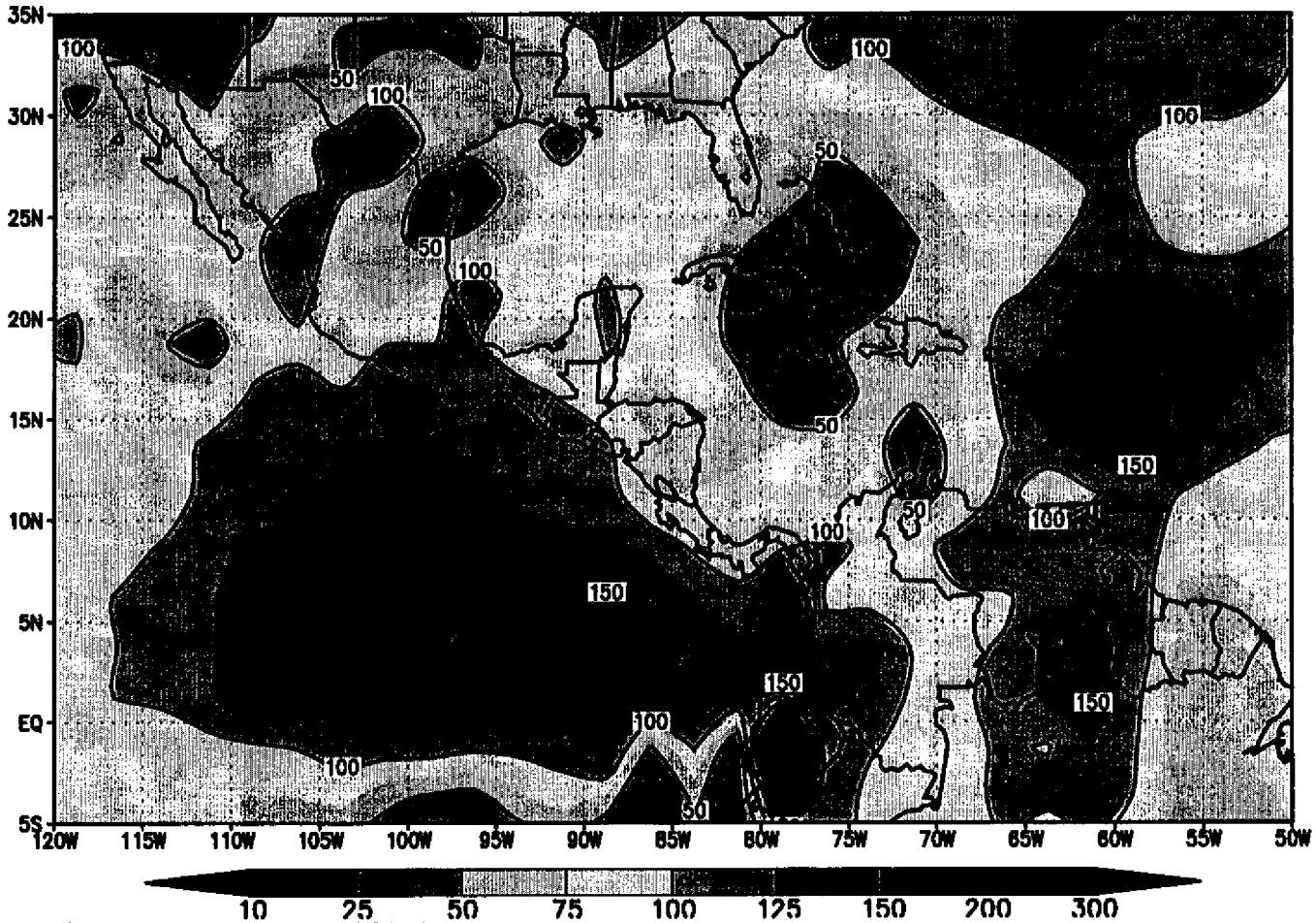

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Caribbean - May 1998

The Caribbean Climate Outlook Forum was held in Kingston, Jamaica, May 1998, and was locally organized by the University of the West Indies and the Office of Disaster Preparedness and Emergency Management. While the main purpose of the Forum was to create a consensus precipitation forecast for June to August 1998 for the Caribbean region, it also included a natural disaster preparedness discussion to allow forecast producers and users (in this case natural disaster managers) to exchange views on the application of forecast information.

Working group recommendations

The natural disaster preparedness discussion consisted of two working groups. One focused on scientific issues related to forecast creation, the other on the needs of natural disaster preparedness managers vis-a-vis climate forecasts. Some agreement emerged from the working groups, including:

- Forecasts issued by the IRI, the Center for Ocean-Land-Atmosphere (COLA), or NOAA-CPC should be modified by local meteorological offices to suit user needs;
- The 3-month Outlook produced at the May, 1998 meeting will be updated on a monthly basis by participants throughout the region -- the Caribbean Meteorological Institute (CMI) volunteered to coordinate these forecast updates;
- Enhanced utility of the Outlook will occur if resolution increases to sub-regional level, if forecast type is linked to particular situations, and the forecast is updated on at least a quarterly basis; and
- Establishment of a group of critical stakeholders in the region, including those involved in monitoring, resource users, and policy makers will ensure that a structured environment and direction for exists for creating and sustaining a regional capability for applying climate forecast information.

Outlook evaluation[37]

The Climate Outlook for the Caribbean region, which covered June to August, 1998, indicated drier than normal conditions for the Northern Leeward Islands and the Netherlands Antilles. While observations for the Netherlands Antilles matched the forecast, those for the Northern Leeward Islands did not (see estimated precipitation map for Mesoamerica). Puerto Rico, the Virgin Islands, and the southern Windward Islands experienced near-normal rainfall,

[37]For a description of the qualitative method used to evaluate the Outlook, see Comparison of Climate Outlooks and Observations in the Methodology section. See also the Outlook evaluation for Mesoamerica for further information regarding the Caribbean Outlook.

consistent with the Outlook for increased probability of near-normal conditions. The Southern Leeward Islands and northern Windward Islands were wetter than normal during June to August, despite a forecast for increased likelihood of near-normal rainfall. The Outlook for the Bahamas and Jamaica was for near to below normal rainfall, generally matching observations. Cuba, Haiti, and the Dominican Republic all experienced rainfall in the below-normal range from June to August, despite the Outlook for near- to above-normal conditions.

Climate Outlook - Rainfall

Statement from the Caribbean Regional Climate Outlook Forum
21-22 May 1998, Kingston, Jamaica

THE CLIMATE OUTLOOK FORUM

A Climate Outlook Forum was convened on May 21-22, 1998 to formulate and communicate a consensus precipitation forecast for the Caribbean for the period of June-July-August 1998. In addition, the Forum intended to identify gaps in information and technical capability; facilitate research cooperation and data exchange within and between regions, and improve coordination within the climate forecasting community.

The Forum was comprised of climate researchers and representatives of meteorological and hydrological services and disaster preparedness officials from the Bahamas, the British Virgin Islands, Barbados, Puerto Rico, Antigua, Dominican Republic, Haiti, Cuba. Saint Lucia, Trinidad and Tobago, Netherlands Antilles, and Jamaica. Additional participating institutions included the Florida State University, the University of Maryland, the Hurricane Research Division of NOAA, COLA, NOAA-CDC, IRI, NOAA-CPC, Service National des Ressources Naturaelles et Ressources en Eau, the Caribbean Meteorological Institute, the University of the West Indies, the Office of Disaster Preparedness and Emergency Management (ODPEM), USAID-OFDA, NOAA-OGP, IAI, WMO, and the Caribbean Disaster Emergency Response Agency.

The Climate Outlook Forum was co-sponsored by the University of the West Indies, ODPEM, IAI, NOAA-OGP, WMO, and USAID-OFDA.

METHODOLOGY

Sea surface temperature (SST) anomalies in the Pacific and Atlantic Oceans and Caribbean Sea are among the most important predictors of rainfall anomalies in the Caribbean region. The present SST anomalies in the central and eastern Pacific are among the largest ever recorded, with positive anomalies exceeding 4° C. Current predictions call for diminishing SST anomalies over the next few months in the equatorial Pacific; however, it is felt that this El Niño episode will continue to affect the Caribbean region during the period of June-August, 1998. Therefore, this Climate Outlook takes into consideration the lingering effects of the current El Niño event and the local topography of this region. The Climate Outlook was generated through analysis of historical climate records throughout the region, data available from the global climate monitoring system, and computer models of the evolution of the global SST field.

The Caribbean region has diverse topography and high regional variability in precipitation regimes. The wet seasons in the region are primarily of a bi-modal distribution with an early and late season peak, the exception being the Northern Leeward islands. This is reflected in the range of probabilities that were arrived at in the consensus. The forecast area was divided into 8 regions, with Cuba further subdivided into 2 regions. Due to this large scale nature of

the forecast, there are likely to be local rainfall patterns that vary significantly from the outlook, particularly in mountainous regions.

Seasonal climate forecasting is still a relatively new science and future forecasts can be improved through increased local and regional exchange of data and knowledge. This is of particular importance in the Caribbean region, where there is high spatial and temporal variability. Because of the relatively small spatial scale of most of the islands in the region, there is a need to explore the use of mesoscale models in climate prediction.

OUTLOOK

The Climate Outlook addresses the June to August 1998 period for the Caribbean region. The experts provided probability distributions to indicate the likelihood of below-, near-, or above normal rainfall for each sub-region (see attached map). For this purpose, "normal" is defined as the climatological mean. Users of this Outlook are strongly advised to contact participating institutions and other climate information sources for interpretation of this Outlook and for additional guidance. It is emphasized that the locations of the boundaries between the subregions are only qualitatively defined, and should be considered as transition zones rather than sharp boundaries.

Wetter than normal conditions are expected in the Western two-thirds of Cuba, while near normal conditions are expected in the eastern part of the island. Near normal conditions are also expected for Haiti and the Dominican Republic. For the Bahamas and Jamaica, a moderate tendency toward drier conditions is anticipated, while conditions in Puerto Rico and the Virgin Islands are expected to be normal to slightly above normal. The northernmost Leeward Islands are expected to be affected by the lingering effects of El Niño with lower than normal rainfall projected. This is thought to be in part due to the persistent strength of the North Atlantic high-pressure ridge. The southern Leeward Islands and the Windward Islands may experience rather normal conditions due to the possibility of more normal activity in the Inter-Tropical Convergence Zone (ITCZ). Rainfall from ITCZ disturbances have already started to affect Trinidad and Tobago by mid-May. Rainfall in the dry zone off the coast of South America has been well below normal since March 1997. Tercile analysis for the island of Curacao shows that the driest third of historical years include all strong El Niño events in the last 60 years. Consequently, continuing drier conditions are anticipated for the Outlook period.

The best educated consensus is that the effects of the current El Niño event on the Atlantic basin tropical cyclone activity will persist at least through the month of August. We expect the strong vertical shear over the Atlantic tropics associated with El Niño will inhibit tropical cyclone development. This effect is most pronounced over the Caribbean region and therefore, we would expect minimal hurricane activity in the region at least through the month of August. Although an occasional system might develop and even reach tropical storm strength, there is a low probability of any system reaching hurricane strength. However, it must be recognized that even inactive years can produce disasters. Firstly, enhanced precipitation from a weaker system can still cause flooding. Also, there can still be an occasional exception (i.e. a hurricane affecting the Caribbean region even during an overall inactive period). Although the exceptions are rare, normal hurricane preparedness efforts should still be maintained.