RCOF Review 2017

[Regional Climate Outlook Forum]

Status Report (Survey)

Annotated Outline

Specific Climate features of concerned region

West Coast of South America COF (WCSA-RCOF) *and the related national forums are primarily focused on forecasts for rainfall and air temperature. Particular attention is paid to the El Niño-Southern Oscillation (ENSO), which has a major impact on the region.*

In tropical regions of South America, hydro-climatic hazards cause large social and economic impacts (Stillwell 1992; Hamilton et al. 2002, 2004). Intense precipitation events and floods have usually devoted the highest attention in the scientific literature given their adverse and drastic impacts on human causalities, infrastructure damaging and health epidemics (Lyon 2003; Mosquera-Machado and Ahmad 2007; Bourma and Dye 1997; Gagnon et al. 2002; Künzler et al. 2012). Nonetheless, droughts have received a relatively less attention in Northern South America, possibly due to high precipitation amounts experiencing little inter-annual variations and high soil water availability in the region. However, in past decades, these areas were also affected by strong drought events as a consequence of severe precipitation shortages (see for example, Marengo et al. 2008; Phillips et al.2009; Lewis et al. 2011; Mo and Berbery 2011; Paredes and Guevara 2013). In this region, global warming processes may also induce an increase in the atmospheric evaporative demand, and thus increasing soil water stress and reducing the availability of water resources (Dai 2011, 2013). Over humid forests of South America, this mechanism has already been hypothesized as one of the causes of recent episodes of forest decay and increased tree-mortality (Jiménez-Muñoz et al. 2013; Vourlitis et al. 2014; Olivares et al. 2015) and forest fire (Román-Cuesta et al. 2014). All these features stresses the need for assessing the spatial and temporal behavior of droughts and floods in these regions and improving the knowledge of the influence of different atmospheric mechanisms on this phenomenon.

Studies suggest recent changes in the frequency of the different ENSO flavors, showing a higher frequency of the central El Niño events and a lower frequency of the Eastern El Niño phases in the last three decades (Lee and McPhaden 2010; Takahashi et al. 2011; Dewitte et al. 2012). These observed changes reinforce the need for knowing the response of floods and droughts to different ENSO conditions in order to assess the possible impacts associated with the projected changes in the spatial configurations (Yeh et al. 2014), as well as the frequency and severity of cold and warm phases (Borlace et al. 2013; Taschetto et al. 2014). (Vicente-Serrano, S. 2017).

The RCOF background

In 2003, the National Meteorological and Hydrological Services (NMHSs) of Bolivia, Chile, Colombia, Ecuador, Peru and Venezuela undertook the implementation of the Western Coast of South America Climate Outlook Forum (WCSA-RCOF), under the auspices of the World Meteorological Organization (WMO) and with the participation of the International Center for Research on El Niño (CIIFEN). Under the coordination of the WMO Regional Climate Centre Western South America (RCC-WSA) hosted by CIIFEN, WCSA-RCOF sessions are organized on an annual basis, generally at the end of the year, to assess work, discuss challenges and set future priorities. The rotation principle to host WCSA-RCOF sessions is applied, and so far,

forums have been held in the different participating countries: in Guayaquil, Ecuador (2003, 2004, 2012, 2014); Santiago, Chile (2005, 2011); Armenia, Colombia (2006); La Paz, Bolivia (2007, 2015); Caracas, Venezuela (2008); Cuzco, Lima Peru (2009, 2016); Quito, Ecuador (2010); Bogota, Colombia (2013) . The seasonal forecast is based on a statistical analysis of over 400 weather stations that are integrated based on the probabilities of precipitation and temperature.

The RCOF process

When CIIFEN first began to organize WCSA-RCOF, it identified participants by contacting organizations with potential interest in using climate forecasts. Participation has grown over the years, and others stakeholders have self-identified and joined the network.

The regional collaboration fostered by WCSA-RCOF is particularly important in South America, where there has been a lag in technical development for decades. CIIFEN is dedicated to putting an end to this trend through regional capacity building. CIIFEN supports technical training sessions and encourages publications led by local authors while simultaneously strengthening international collaboration that empowers regional leaders to train more of their colleagues and continue spreading new information.

WCSA-RCOF is made up of a network of meteorological services and climate information users in all six participating countries. National service scientists send their data to CIIFEN, which processes it to make regional maps and then publishes those maps on the CIIFEN website where anyone can access them. CIIFEN also sends forecasts out to a list of roughly 6,000 users in the form of a digital monthly bulletin. Collaborating on all of this work requires that forecasts be made using standardized methodology (Using IRI's Climate Predictability Tool-CPT), which was initially a challenge to coordinate, but was accomplished through technical workshops made available to scientists in each country.

Previous season forecast is evaluated using a simple skill score (yes/no approach). Other metrics, such as ROC curves are also used by NMHs to evaluate the skill for both, above and below normal forecasts.

Through the WSA-RCC coordinated by CIIFEN and the governance of the six NMHSs, regular updates on data products are provided to facilitate the process of forecasting. An annual meeting with the six NMHSs is used to train the people involved in the forecast, in some specific topic that to needs to be strengthened. Updates on the methodology, or the layout of the forecast is also performed during this annual meeting.

Capacity needs

<u>NMHSs</u>
Seasonal forecast (statistical and dynamical)
Validation of the forecast

<u>RCC</u>
More personnel
Computing processing and storage
Virtual communications systems, broadband

<u>Users</u>
Higher resolution
Specific sector indexes (agriculture, health, etc.)
Forecast interpretation

CIIFEN addresses these needs through projects and international cooperation.

User involvement

Many specialized training courses have been held in line with a strategy for strengthening capabilities for the provision of climate services. As a result, more than 200 experts in the region have been trained. The users of WCSA-RCOF are agricultural producers, private agricultural sectors, government risk management agencies, humanitarian non-profit organizations, water resource management officials and public health organizations. Climate information mainly targets government risk managers and the private agricultural sector for decision-making. Users are invited to provide feedback concerning the products with a view to improving the interpretation of forecasts. The Western Coast of South America is an extraordinarily diverse area, encompassing the Amazon Rainforest and the Andes Mountains, as well as high altitude plains and long, low coastlines. The needs and priorities of climate information users are similarly varied, and the regional climate forecasts are successful in large part because their universal, accessible format was designed with close attention paid to this diversity and to regular user feedback. They are in high demand because this design is dynamic enough to meet necessary regional expectations, and is rooted in an appropriate level of site-specificity. The format and design of climate forecasts has changed many times as a result of user feedback. For example, many people were confused about how to interpret the value of the scales used for rainfall projections. They weren't sure exactly what relative terms like "above average" or "below average" meant, so numbered scales are now included along with more detailed estimates of precipitation quantity. In general, the language in all information products has evolved to use as little jargon as possible in order to make the information more accessible.

SWOT analysis

Strengths
Common methodology for seasonal forecasting
High technical capacity

Weaknesses
Job instability
Lag of technical personnel in NHMS

Opportunities
Strong coordination structure
Consolidated network of NHMSs

Threats
Differences in technical capacities among countries
Lag of appropriate user feedback mechanisms

Sustainability of RCOF

WCSA-RCOF is coordinated by the WSA-RCC, which in a monthly basis coordinates the seasonal outlook of the region. WSA-RCC is also coordinating the annual RCOF meeting.

RCOF is supported by national governments trough the involvement of the ministries of environment and risk management offices.

WCSA-RCOF has a network of focal points in each NMHS. The network has a regular virtual meeting to evaluate climate conditions from a regional perspective. There is a group of experts integrating the regional group of seasonal forecast. The group participates in the trainings, virtual conferences, and the design of the annual meeting.

WCSA-RCOF is funded by the World Meteorological Organization (WMO) and CIIFEN. National climate forums are funded by the governments of the countries in which they take place, with

the exception of Chile, which receives substantial support from the private sector. The funding for WCSA-RCOF is very stable, and operations are relatively low cost since the national meteorological services already collect data, and most coordination is managed through the Internet. WCSA-RCOF has already expanded substantially since it first began, and is determined to continue growing.

Way forward

WCSA-RCOF and the national climate forums plan to continue growing by involving more stakeholders and reaching out to coordinate their work with more countries. WCSACOF and the national forums are determined to further tailor the information they produce to meet the specific needs of a wider variety of users. This will involve the expansion of agro-climatic risk maps to cover more crops, and continued data sharing between partnering countries.

WCSA-RCOF's biggest challenges are in maintaining the quality of forecasts, the commitments of diverse stakeholders, and the confidence of information users. All of this requires diligence and
clear communication between national, regional, and global players. Individuals do not get paid to be a part of the network; their belief in the value of collaboration and their devotion to this effort is therefore critical to its continuation.

CIIFEN, WSA-RCC and thus WCSA-RCOF will put more efforts in providing a seasonal forecast with higher resolution and tailored to regional and national user needs.