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Report, CCI-17 WMO Technical conference on climate services for policy and decision support

Pablo Fernández de Arróyabe

Introduction

Prof. Pablo Fernandez de Arroyabe (ISB President) attended the 17th WMO - Climate Commission meeting (CCI-17) that took place in Geneva from April 10th to 13th in representation of the International Society of Biometeorology (ISB) as observer. Delegates of different countries attended to the WMO-CCI-17. Delegates must be proposed by the national representative of each country. In this sense I would like to encourage each member of the ISB to contact in the future with the national representative of his/her country in this kind of meetings in order to be able to know the delegates of their countries in the future or event to join these kind of events as delegates.

The meeting was organized in two different sessions: on one hand, the CCI-17 on Tuesday and Friday where the main Guidelines and Recommendations by the CCI-17 were approved. These final Guidelines can be obtained in six



Delegates from different countries at the CCI-17 meeting

different languages at <http://meetings.wmo.int/CCI-17/SitePages/Session%20Information.aspx>.

Secondly, the Technical Conference (TECO) on **Climate Services for Policy and Decision Support** took place on Wednesday and Thursday with the following Agenda. http://meetings.wmo.int/CCI-17/PublishingImages/SitePages/TECO/TECO-2018_Agenda.pdf .

Expert teams from the WMO – OPACE’s groups discussed on different topics related to Climate Services. The initial presentation of TECO was focused on presenting the frame of the **Climate Services Information System (CSIS)** by Roger Pulwarty and Thomas C. Peterson. CSIS has global, regional and national entities within the framework of the GFCS and it is guided by the Commission of Climatology. The scale moves from short term predictions to long term projections. The final scope is to deliver operational services to users at different time scales. WMO is trying to cooperate also with the COPERNICUS initiative. There are different support mechanisms such as the Climate Services Toolkit. The “twining” between regional and global centres was also considered essential in the process. The different expert’s teams existing in the OPACEs discussed deeply on the different topics of the Agenda.

Observations and Climate Data Management

Some strategic aspects were considered. A first one was related to key issue of the climate data management will be to improve the sustainable capability of users and provide guidance including marine and hydrology data systems also. Secondly, implementing Data Rescue projects was proposed and maintaining links with other Data Rescue initiatives. Facilitating Data exchange is a third point to work on through collaboration with GCOS.

http://library.wmo.int/opac/index.php?lvl=notice_display&id=16300#.U8Yw9vmSxDA

- Climate Data base Management Systems (CDBMS)

- Data Rescue
- Rapporteurs on Climate Observational Issues
- Climate Data Modernization Programme
- Statement of Guidance on CCI Observational Needs
- Rapporteurs on the Volunteer Observing Networks

The example of Bahamas project based on a volunteer network to collect rainfall data in their own communities was presented. Denis Stuber and Bruce Bannerman presented the result of a survey related to operational issues of CDMS status in NNHS. 45% of the members of the CCI develop their own CDMS. It is difficult to say if the implementation of CDMS is real. Three open sources CDMS were used by 72 countries. For 190 countries there are approximately 96 different CDMS but many of them have been developed in the absence of formal specifications and 42 % of developing countries rely on an open source that is at risk of failure.

Climate Monitoring and Assessment

The group National Climate Monitoring Programme has generated different products (NCMPs) which summarize climatic conditions at national scale for a better monitoring of the world. More information can be found in a specific Users Manual (R-NCMPs User Manual). The software used in this process was developed by members of the Australian and Canadian Meteorological Services.

Providing methods and standards to catalogue and monitor atmospheric extreme events and guiding their monitoring were also mentioned as important points. A survey to define extreme events was answered by 53 countries and the main answer was that there were no clear criteria to define extreme events. Characterization of extreme events was proposed to be done based on four parameters: magnitude, Duration, Extent, Severity. An example for drought using the SPI was presented for the East Coast of Sumatra in 2014 where the four previous parameters were computed. A

standardization on reporting of extreme events and links with other WMO and international activities was also proposed.

CCL/WCRP/JCOM joint expert team on Climate Change Detection and Indices pointed out the complexity of the definition of global indicators of climate change, being necessary to develop further work on data homogenization. The work developed on data homogenization methods of time series has been important under a group of volunteers considering different observing systems such as manual and automatic systems what it introduces a *bias* that must be corrected. Moreover, Rapporteurs on World Weather and Climate Extreme Records and the use of Remote Sensing Data for Climate Monitoring were also referred as key issues.

Climate Prediction, Projection, and Delivery Mechanisms

The experts of this OPACE are focused on the development of Regional Climate Centres (RCCs) and the development of operational predictions from sub-seasonal to longer time scales. Global Seasonal Climate Update (GSCU) and Regional Climate Outlook Forums (RCOFs) are also important part of the OPACE.

A better engagement of user through the concepts of co-design and co-production is needed. Some caution about the understanding of the associated predictability, the skill and the use of information is also important. For annual to decadal outlook were mentioned three central goals such as (1) Climate Services for climate resilient development definition, (2) Enhance Earth system observations and prediction through data processing (3) Improve predictive capabilities.

Seasonal climate services development is a reality nowadays. The main weakness of the RCOF products is the lack of ability to demonstrate the value of the forecast and the low user engagement. The main strength of RCOFs is that they have been a catalyst for developing national climate services (not just seasonal forecasting) and have promoted coordination and networking on the climate communities. The use of Tailored Climate Information seems

to be very important for personal predictions. Recommendations on CSIS functionality of operational prediction and its integration with the GDPFS were given.

Climate Information for Adaptation and Risk Management

The aspects attended in the OPACE 4 were related to the importance of Climate Indexes development to improve decision making for planning, operations, risk management and adaptation to climate change and variability. It was insisted in the need of improving the use of climate information in decision making and in enhancing the use of sector specific climate indices related to agriculture, water, health at national and regional scales. There are three Expert Teams apart from the one in charge of Climate indexes development: the one looking at User Interface for Climate Adaptation and Risk Management, the team focused on Climate Risk Management (CRM) and the one related to Disasters Risk Reduction

An example of the standardized software ClimPACT2 was presented. A manual has been written to generate specific climate indexes with this software. More information on this tool can be found also <https://github.com/ARCCSS-extremes/climpact2>

Capacity Development

It was stated the need of addressing gender dimension in building capacity for climate services and the role of communications, including social media, in the development of climate services. It was also emphasized the need of ensuring quality management in climate services development.

Framing the strategy for CCI-17

The framing strategy from CCI-17 was mainly focused on the development of Climate services Information Systems (CSIS). The TECO meeting highlighted the strategic domains that deserve special attention during the next intersessional period considering Climate Services Information Services (CSIS) ([Technical document](#)) as a priority.

The Climate Service Toolkit (CST) was mentioned. It can be accessed through <https://www.wmo.int/cst/> and it has been set up under basic elements such as an on line portal and a technical reference catalogue (potential to use) considering that in some countries Internet connection can be a problem and the Climate Services Information Systems (CSIS) development under the GFCS.

CST categories should be user-defined in the future attending to specific aims. At present a few pre-categories has been defined. Guidance is needed and update them permanently is a must. There was an important discussion among panellists on the value chain of climate services development. It was made explicit the need to distinguish between Meteorological Services and other Climate Services at national groups and also at institutions that are producing climate services also but are not National Weather Services (NWS).

CCL should incorporate other experiences that are being developed in other projects and programme that are outside of the climate community. There are lesson to be learned to receive from people from other sector. It was also mentioned as an important point to have a look at the many different ways



Prof. Manola Brunet (left) and Dra. Barbara Tapia (right) as new president

of co-design and coproduction of climate services and pay attention to where real benefits from it go.

Final remarks

At the end of the CCI-17 meeting, Prof. Manola Brunet (Spain) was elected as new President of the Climatology Commission for the next four years. Dra. Barbara Tapia, from Chile will keep acting as Vice-president of the Commission.

The new President and Vice-president insisted during the conference in the need of developing links among the CCI and the Regional Centres (Regional Climate Centres, Regional Training Centres, Global Producing Centres). CLIMANDES was presented as an example of a project developed in Cuzco (Peru) in relation to Climate Services development and its socioeconomic impacts in relation to coffee production. CLIMANDES is part of the GFCS. It was mentioned as one of the main challenges, the need to implement in all Regional Associations (RAs) the resources needed to improve the climate services that implies socio-economic and environmental benefits.

The ISB expertise in these areas was presented by ISB President at the meeting in different public intervention. The long history of ISB and its Commission and Working Groups working on the study of the interactions between living organisms and atmospheric processes was made explicit in the Forum during the CCI-17 and in the TECO meeting several times.

ISB offered its members' expertise for future collaboration with WMO in the different Technical Commission and for the future development of Climate Services with the GFCS.

ISB president expressed the interest of ISB in joining the Partner Advisory Committee (PAC) of the GFCS and Mr. Filipe Domingos Freire s Lucio, the Director of the Global Framework for Climate Services has invited ISB to send a membership application to join the PAC of the GFCS and ISB has also considered to participate in the next meeting of the PAC which will be held at

FAO in Rome 22-23 as an observer, if by then the membership of ISB would not have been completed.

Report from the Regional Councilor for Asia

Junhu Dai

Introduction

This is the first time for me as councilor for Asia to report my work and organize Asian scientists for some events to integrate into the family of International Society of Biometeorology, and I will try to gain other similar chances. During the last three years, I have finished the following work to connect Asian scientists with the world and let the people in other continents know what happened in Asia in the field of biometeorology. 1) To provide information for ISB Bulletin telling activities related to biometeorology. 2) To co-chair Biometeorology Session in 33rd International Congress of Geography in Beijing in August with Pablo Fernandez de Arroyabe Hernaez, and many Asian Scientists joined the conference. 3) Based on the reports in the above session on 33rd ICG, I guest edited a special issue-Asian Biometeorology for International Journal of Biometeorology.

To organize the 3rd National Conference for Phenological Observation and Research and provide the information for ISB Bulletin

The 3rd Symposium on Chinese Phenological Observation and Research, under the auspices of China Phenological Observation Network (CPON), was held in Beijing from Oct. 16-17, 2014. More than one hundred researchers and CPON members from all over the country attended the conference, including three academicians of Chinese Academy of Sciences, namely Prof. Du Zheng, Prof. Dehe Qin, and Prof. Jingyun Fang.

On the opening ceremony, Professor Ge Quansheng, the president of Institute of Geographic Sciences and Natural Resources Research as well as the Chief Scientist of CPON, introduced the progress of observation and research for CPON in recent years. Subsequently, ten excellent observers were given awards for their special contribution to CPON.

On October 16, 17 reports and presentations were delivered given focusing on phenological research hotspots, such as plant phenological model, phenological changes in Tibetan Plateau, the application of remote sensing and cameras in phenological observations. Among these reports, four specially invited reports were given respectively by Professor Qin Dahe, former Administrator of China Meteorological Administration, (topic: Climate change and sustainable development), Fang Jingyun, President of Institute Of Botany, the Chinese Academy of Sciences (topic: Plant phenological changes--from species, communities to regions), Chen Xiaoqiu, Professor from Peking University, (topic: Forecast the leaf expansion in North China, based on the region continuum model), Zhang Yangjian, Professor of Institute of Geographic Sciences and Natural Resources, Chinese Academy of Sciences, (topic: The response of plant phenology to the climate change in Tibetan Plateau). In the end, Prof. Junhu Dai, the deputy director of CPON, also gave a lecture on recent advances in phenological studies based on data of CPON.

Members from 21 observation stations of CPON exchanged their observation experiences on the next day. Finally, Professor Junhu Dai summarized the achievements of observations CPON made in the past and arranged new tasks for the next few years.

To co-chair Biometeorology Session in 33rd International Geographical Congress in Beijing in August, 2016, with Pablo Fernandez de Arroyabe Hernaez

A special Session on Global Change and Biometeorology, included in the Key Topic Program "Climate Change and Global Understandings" of the 33rd International Geographical Congress (IGC) (organized by International

Geographical Union (IGU)), was held in Beijing, China, during 23-24 August 2016. Prof. Pablo Fernández de Arróyabe Hernáez from University of Cantabria, Spain, who is also President-Elect of the International Society of Biometeorology, and Prof. Junhu Dai from Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, also Asian Councilor of the ISB Executive Board co-chaired the meeting. This special session was joined simultaneously with the First ISB Regional Meeting for Asian Biometeorologists organized by Prof. Junhu Dai. Totally over 40 researchers from Africa, Asia and Europe took part in the biometeorological session with 11 oral communications and several poster presentations presented at the session.

In the afternoon of 23rd August, six scholars presented their wonderful work for the audience, mainly focusing on the impact of climate change on human beings, such as reports on the impact of climate change on human health, including the studies on the determination of Sources of Allergenic Airborne Pollen in Beijing Using Backward Trajectory Analysis, the development of a real-time monitoring software system for meteorological factors helping people to arrange life properly, as well as the study of changes on Lamb-Jenkinson circulation types and relationship with influenza outbreaks in East Asia.

Besides, works related to the estimation of the potential of energy saving and carbon emission mitigation of cassava-based fuel ethanol was also presented at this session. Next morning of 24 August, another five scholars presented their reports. They focused on the effects of climate change on biological system, including three reports deeply analyzed the effects of climate change on plant phenological changes in China and the driving factors of phenological sensitivity to temperature; one report studied the relationship between changes in the weather system and the outbreak of human influenza in Asian areas; and the other on palm oil yields in the Nigerian Niger Delta.



To guest edit Special Issue of International Journal of Biometeorology-Asian Biometeorology

Based on the above 33rd IGC conference, Prof Junhu Dai and Prof. Pablo Fernández de Arróyabe Hernáez encouraged the scientists who took part in the conference to finish their work on the conference and to submit these works to a Special Issue of International Journal of Biometeorology-Asian Biometeorology. As a result, a total of 19 abstracts were collected for our planned Special Issue of International Journal of Biometeorology. All the works were conducted on the topic of Asian Biometeorology. Three manuscripts cared about climate change facts and variation of key processes, such as the start of thermal growing season (Zhu et al.) and changes of thermal growing degree days (Yin et al.), as well as bioclimatic condition changes in winter in subtropical area in Southwest China (Liyange et al.). Several manuscripts studied phenological changes in East Asia, including China, Korea. Among these manuscripts, two of them (Wang et al, and Zhu et al.) focused their work on the Qinghai-Tibet Plateau, which of course would shed light on a deep understanding of the phenological changes on this special spot. And then two manuscripts studied the effects of climate change on plant growth, among which, one came from Xu et al., and the other were conducted by Roman telling plant adaptation strategies in central Asia. Two manuscripts discussed meteorological determinants of wintering and flowering patterns of five rubber clones in southwest China (Liyange et al.), and relationship between climatic variables and population dynamics in central Asia (Nuryshv et al.). Also, there were two manuscripts which studied climate changes and people's health. Pablo and colleagues told how circulation weather types in Hong Kong influenced seasonality of influenza virus; while Qin and Li studied source and transport of allergenic airborne pollen in Beijing. Besides, there were several other manuscripts which described how climate change affected animals (Dujsebayeva et al.) and ground ozone changes (Cherednichenko et al.).

These manuscripts covered almost all the important fields of biometeorology, but focused on a relatively limited spatial area, central and east Asia. We have reason to believe that these studies are the most deeply conducted work in this field in Asian area.

Parts of publications of Asian Scientists (Just including publication of Xiaoqiu Chen and Junhu Dai's research group):

- 1) Chen XQ. 2017. Spatiotemporal Processes of Plant Phenology: Simulation and Prediction. Springer Nature: Berlin.
- 2) Chen XQ, Tian YH, Xu L. 2015. Temperature and geographic attribution of change in the *Taraxacum mongolicum* growing season from 1990 to 2009 in eastern China's temperate zone. ***International Journal of Biometeorology***, 59(10): 1437-1452.
- 3) Chen XQ, An S, Inouye D, Schwartz MD. 2015. Temperature and snowfall trigger alpine vegetation green-up on the world's roof. ***Global Change Biology***, 21(10): 3635-3646.
- 4) Shen MG, Piao SL, Chen XQ, An S, Fu YSH, Wang SP, Cong N, Janssens IA. 2016. Strong impacts of daily minimum temperature on the green-up date and summer greenness of the Tibetan Plateau. ***Global Change Biology***, 22(9): 3057-2066. doi: 10.1111/gcb.13301.
- 5) Shen MG, Piao SL, Dorji T, Liu Q, Cong N, Chen XQ, An S, Wang SP, Wang T, Zhang GX. 2016. Plant phenological responses to climate change on the Tibetan Plateau: Research status and challenges. ***National Science Review***, 2(4): 454-467. doi: 10.1093/nsr/nwv058.
- 6) Cong N, Shen MG, Piao SL, Chen XQ, An S, Yang W, Fu YSH, Meng FD, Wang T. 2017. Little change in heat requirement for vegetation green-up on the Tibetan Plateau over the warming period of 1998–2012. ***Agricultural and Forest Meteorology***, 232, 650-658.
- 7) Ren SL, Chen XQ*, An S. 2017. Assessing plant senescence reflectance index-retrieved vegetation phenology and its spatiotemporal response to climate

- change in the Inner Mongolian Grassland. *International Journal of Biometeorology*, 61: 601–612. DOI 10.1007/s00484-016-1236-6.
- 8) Chen XQ, Wang LX and Inouye D. 2017. Delayed response of spring phenology to global warming in subtropics and tropics. *Agricultural and Forest Meteorology*, 234, 222-235.
 - 9) Chen XQ, Zhang WQ, Ren SL, Lang WG, Liang BY, Liu GH. 2017. Temporal coherence of phenological and climatic rhythmicity in Beijing. *International Journal of Biometeorology*, DOI 10.1007/s00484-017-1355-8.
 - 10) Tao Zexing, Wang Huanjiong, Liu Yachen, Xu Yunjia and Dai Junhu *. 2017. Phenological response of different vegetation types to temperature and precipitation variations in northern China during 1982–2012. *International Journal of Remote Sensing*. 38(11): 3236-3252
 - 11) Wang Huanjiong, This Rautishauser, Tao Zexing, Zhong Shuying, Ge Quansheng* and Dai Junhu*. 2016. Reply to Communications by Fu et al. *International Journal of Biometeorology*. DOI: 10.1007/s00484-016-1264-2
 - 12) Zheng Fengyi, Tao Zexing, Liu Yachen, Xu Yunjia, Dai Junhu *, and Ge Quansheng *. 2016. Variation of Main Phenophases in Phenological Calendar in East China and Their Response to Climate Change, *Advances in Meteorology*. Volume 2016, Article ID 9546380, 8 pages
 - 13) Liu Yachen, Dai Junhu*, Wang Huanjiong, Ye Yu, Liu Haolong. 2016. Phenological records in Guanzhong Area in central China between 600 and 902 AD as proxy for winter half-year temperature reconstruction. *SCIENCE CHINA Earth Sciences*. 10.1007/s11430-015-0251-8
 - 14) Ge, Q.; Dai, J.; Cui, H.; Wang, H. 2016. Spatiotemporal Variability in Start and End of Growing Season in China Related to Climate Variability. *Remote Sensing*. 2016(8): 433(16 pages).
 - 15) Wang H, Dai J, Zheng J, Ge Q. 2015. Temperature sensitivity of plant phenology in temperate and subtropical regions of China from 1850 to 2009. *International Journal of Climatology*. 35:913-922

- 16) Wang H, Ge Q, Dai J*, Tao Z. 2015. Geographical pattern in first bloom variability and its relation to temperature sensitivity in the USA and China. ***International Journal of Biometeorology***. 59:961-969
- 17) Wang H, Ge Q, Rutishauser T, Dai Y, Dai J*. 2015. Parameterization of temperature sensitivity of spring phenology and its application in explaining diverse phenological responses to temperature change. ***Scientific Reports***. 5: 8833 (6 pages)
- 18) Ge Q, Wang H, Rutishauser T, Dai J*. 2015. Phenological response to climate change in China: a meta-analysis. ***Global Change Biology***. 21:265-274
- 19) Tao Z, Ge Q, Wang H, Dai J*. 2015. Phenological basis of determining tourism seasons for ornamental plants in central and eastern China. ***Journal of Geographical Sciences***. 25(11) :1343-1356
- 20) Dai Junhu, Wang Huanjiong, and Ge Quansheng*. 2014. Characteristics of Spring Phenological Changes in China over the Past 50 Years. ***Advances in Meteorology***. Article ID 843568, 8 pages. doi:10.1155/2014/843568
- 21) Wang Huanjiong, Dai Junhu *, and Ge Quansheng *. 2014. Comparison of Satellite and Ground-Based Phenology in China's Temperate Monsoon Area. ***Advances in Meteorology***. Article ID 474876, 10 pages. doi:10.1155/2014/474876
- 22) Ge Quansheng, Wang Huanjiong*, Zheng Jingyun, This Rutishauser, and Dai Junhu*. 2014. A 170-year spring phenogy index of plants in eastern China. ***Journal of Geophysical Research (Biogeosciences)***. 119(4): 301-311.
- 23) Dai Junhu, Wang Huanjiong, and Ge Quansheng. 2014. The spatial pattern of leaf phenology and its response to climate change in China. ***International Journal of Biometeorology***. 58(4): 521-528.
- 24) Ge Quansheng, Wang Huanjiong, and Dai Junhu*. 2014. Simulating changes in the leaf unfolding time of 20 plant species in China over the twenty-first century. ***International Journal of Biometeorology***. 58(4): 473-484.

- 25) Guo Liang, Dai Junhu, Ranjitkar Sailesh, Yu Haiying, Xu Jianchu, and Luedeling Eike. 2014. Chilling and heat requirements for flowering in temperate fruit trees. *International Journal of Biometeorology*. 58(6): 1195-1206.
- 26) Guo Liang, Dai Junhu, Ranjitkar Sailesh, Xu Jianchu, Luedeling Eike. 2013. Response of chestnut phenology in China to climate variation and change. *Agricultural and Forest Meteorology*. 180: 164-172.
- 27) Ge Quansheng, Wang Huanjiong, Dai Junhu*. 2013. Shifts in spring phenophases, frost events and frost risks for woody plants in temperate China. *Climate Research*. 57: 249-258(DOI: 10.3354/cr01182.)
- 28) Dai Junhu, Wang Huanjiong, and Ge Quansheng. 2013. Multiple phenological responses to climate change among 42 plant species in Xi'an, China. *International Journal of Biometeorology*. 57: 749-758.
- 29) Dai Junhu, Wang Huanjiong and Ge Quansheng. 2013. The decreasing spring frost risks during the flowering period for woody plants in temperate area of eastern China over past 50 years. *Journal of Geographical Sciences*. 23(4): 641-652.
- 30) Zhang Xuezhen, Dai Junhu, Ge Quansheng. 2013. Variation in vegetation greenness in spring across eastern China during 1982–2006. *Journal of Geographical Sciences*. 2013, 23(1): 45-56.
- 31) Wang Huanjiong, Dai Junhu*, Ge Quansheng. 2012. The spatiotemporal characteristics of spring phenophase changes of *Fraxinus chinensis* in China from 1952 to 2007. *Science China Earth Sciences (Science in China: Series D Earth Sciences)*. 55(6): 991-1000.
- 32) Ge Quansheng, Dai Junhu, Liu Jun, and Zhong Shuying. 2013. The effect of climate change on the fall foliage vacation in China. *Tourism Management*. 38: 80-84
- 33) Luedeling Eike, Guo Liang, Dai Junhu, Leslie Charles & Blanke Michael M. 2013. Differential responses of trees to temperature variation during the

chilling and forcing phases. *Agricultural and Forest Meteorology*. 181: 33-42

Report from the Regional Councilor for Latin America and the Caribbean

Luis B. Lecha Estela

Background

Important initiatives and results were obtained in the region because of some countries has a novel and high-performance in biometeorological activities, including steady processes for capacity building through postgraduate education, development of researches and climate services in the fields of biometeorology.

National groups or institutions dedicated to biometeorological activities are working in Brazil, Cuba, Argentina, Mexico, Puerto Rico, Panama and Ecuador. Main universities into the region have included faculties or institutes with notable development in meteorology and biometeorology, especially in Brazil, Cuba, Mexico and Argentina. Six countries have national journals for scientific publications related with meteorology and other earth sciences, including biometeorology.

However, in contrast, most of the countries do not have adequate development of biometeorological activities. Frequent lack of financial resources or the weakness of their meteorological services are reasons to explain the big unbalance among countries present in the region. In this sense, important initiatives are moving forward in Ecuador, Mexico and Colombia trying to strengthen education and training processes in the fields of meteorology and biometeorology.

Main results by years

2014:

- Work plan organization and preliminary contacts with focal persons or institutions in different countries of the region.
- Participation in two international events held in Cuba, presenting results on biometeorological forecast services (years 2012-2014) and their impacts on national health institutions.
- Course on Basic Fundamentals of Biometeorology offered to medicine students at the International Latin American School of Medicine, Havana, Cuba.

2015:

A visit to Brazil since 21 September to 11 October of 2015 was organized. The objectives were:

- To strengthen ISB presence in Brazil and the interaction with the Brazilian Society of Biometeorology.
- To develop a regional biometeorological forecast service through a cooperated work with experts of the Center for Weather Forecast and Climate Studies (CPTEC) at the National Institute of Spatial Researches (INPE) in Cachoeira Paulista and San Jose dos Santos, respectively.
- To develop capacity building in Human Biometeorology issues through teaching cooperated activities at the Institute of Astronomy and Geophysics (IAG) and the Faculty of Public Health, both in the University of Sao Paulo.

At the end of 2015, the celebration of the first Expert Meeting on Biometeorological and Bioclimatic Forecasts was possible in Havana, Cuba, between 30 November and 2 December 2015, in the framework of the VIII Cuban Congress of Meteorology. The Workshop had joint auspices of International Society of Biometeorology, the WHO/PAHO Office in Cuba, the World Climate Services Program at WMO and the Cuban Meteorological Society. This was the first ISB regional meeting dedicated to the analysis of specific topics of regional interest, considering peculiarities and priorities of

ISB activities. This successful experience repeated in 2016 for the Asian region, when the second regional ISB meeting took place in China.

2016:

The regional councilor visited again Brazil since September 13 to October 9 of 2016 to continue activities started the year before. The main objectives were:

- To continue the implementation of biometeorological forecast services for South America, with special focus on the start of the validation stage in health institutions of the state of Sao Paulo.
- To continue academic activities at the Institute of Astronomy, Geophysics and Earth Sciences (IAG) at the University of Sao Paulo (USP) through the orientation of two young postgraduate students, developing master degree studies in biometeorological issues.
- To continue academic activities at the Faculty of Public Health (FSP) of the University of Sao Paulo through the orientation of one young postgraduate student, developing PhD degree studies in biometeorological issues.

The second Councilor task of the year was a visit to Ecuador during May of 2016. The objectives were:

- To strengthen the ISB presence in Ecuador through the incorporation of new ISB members,
- To support academic exchange activities and to develop capacity building at the Superior Polytechnic School of the Shore (ESPOL) in Guayaquil.
- To introduce national biometeorological forecast service through a cooperated work with experts of the National Institute of Meteorology and Hydrology (INAMHI).
- To design and promote new fundamental cooperated researches in the field of applied meteorology in order to strengthen climate services for main socioeconomic activities in the country, together with partners from INAMHI and ESPOL.

2017:

During this year, activities focused on the publication of next IJB special issue for Latin America and the Caribbean, the successful end of two theses for Master degree in Brazil, to follow the performance of two PhD students in Cuba and Brazil, respectively, the editorial process of two books in press at “Millennium” Publisher in Havana, Cuba, and the participation in the XXI ISB congress in Durham, UK.

Report on Aerobiology from the 21st ICB

Matt Smith

ICB2017 held in Durham in the North East of England, 3-7 September, 2017, was the International Society of Biometeorology’s 21st International Congress of Biometeorology. The theme for ICB2017 was Weather and Climate Information for Risk Management, and the purpose of the meeting was to reflect on the efficacy of knowledge production in biometeorology and cognate disciplines in relation to

information provision for managing weather and climate related risks. Session 5C 'Pollen' was held on Tuesday 5 September and was chaired by Paul Beggs (Macquarie University, Australia) and Tim Sparks (Coventry University, UK). The session included two interesting talks from the team representing the National Institute of Meteorological Sciences in the Republic of Korea. In addition, John Nairn (Bureau of Meteorology, Adelaide, Australia)



Paul Beggs and Thanos Damialis

presented a very good synopsis of the Melbourne Thunderstorm asthma epidemic that occurred in November 2016, and there were some excellent presentations from Helfried Scheifinger (ZAMG, Austria) and Anthanasios Damialis (Technical University of Munich & Helmholtz Zentrum München, Germany). The next meeting of the International Society of Biometeorology's Phenology Commission (ISB-PC) will be Phenology 2018, which is being held in Melbourne Australia later this year.

Upcoming Conferences

The 11th International Congress on Aerobiology

Advances in aerobiology for the preservation of human and environmental health: a multidisciplinary approach

Parma, Italy, 3-7 September 2018

Phenology 2018

Melbourne, Australia, 23-27 September 2018

Registrations for Phenology 2018 are now open:

<http://phenology2018.com.au/registration/>.

The overarching theme for the Conference is One Planet, Two Hemispheres, Many Regions.

Sessions include:

- Agricultural Phenology
- Aerobiology
- Phenology and Conservation Biology
- Phenology and Citizen Science
- Phenological Methods

- Remote Sensing
- Marine Phenology
- Traditional Ecological Knowledge
- Tropical Phenology
- Urban Phenology

Call for Abstracts closes 7 May 2018

American Meteorological Society Annual Meeting

Phoenix, USA, 6-10 January 2019

More information can be found at: <https://annual.ametsoc.org/2019/>

There will be many Environment and Health sessions that will be of interest to biometeorologists, including:

- Extreme Heat & Health (with Core Science Keynote)
- Hurricanes & Cascading Impacts to Health
- Wildfires & Health
- Phoenix Local Extremes & Partnerships
- Infectious Disease
- Health Impacts of 1.5 & 2.0°C
- NASA Observations for Health & Early Warning Systems
- Economic Impacts of Extremes
- Urban Climate & Water

Student presentation awards available. For more information contact Jenni Vanos (jkvanos@ucsd.edu), Hunter Jones (hunter.jones@noaa.gov), or visit <https://amsenvironmentandhealth.wordpress.com/about/>.