

# Klimapolis

## First Klimapolis Workshop Report

20 – 22 August 2018

Instituto de Astronomia, Geofísica e Ciências  
Atmosféricas (IAG-USP)  
São Paulo – SP – Brazil

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## 1. Welcome session and Klimapolis overview

The list of participants of the First Klimapolis workshop can be found in Annex A. The meeting agenda can be found in Annex B.

**Tercio Ambrizzi**, Klimapolis partner and workshop host, opened the workshop and introduced **Pedro Silva Dias**, Director of the Institute of Astronomy, Geophysics and Atmospheric Sciences (IAG) of the University of São Paulo (USP), who welcomed all participants. **Guy Brasseur**, Klimapolis coordinator, also welcomed participants and reminded all that the ultimate objective of Klimapolis is to setup a joint Brazilian-German institute on urbanization and climate change.

**Nico Caltabiano**, Klimapolis project manager, gave an overview of the project, highlighting that Klimapolis is part of the German Federal Ministry of Education and Research (BMBWF)'s cooperation with some Latin American countries (Argentina, Brazil, Chile, Colombia and Mexico). The objectives of these research cooperation are to develop a long-term networking with excellent scientific actors in the partner countries and the construction of long-term bilateral research structures.

## 2. Session: Air pollution and climate change in São Paulo - state of the art

**Tercio Ambrizzi** gave an overview on impacts and climate projections for Brazil and São Paulo. For quite a few years, extreme events in Brazil have become more intense and frequent. There is a great probability of the Southeast region of Brazil and also the Metropolitan Area of São Paulo (MASP) to continue to suffer oscillations of climatic extremes, where droughts or floods can occur. Also, in a 1.5°C warmer world, city residents and the critical urban infrastructure on which they depend will face more frequent flooding, droughts, heatwaves, and intense rain events along with other climate related hazards.

**Andrea Young**, from the Brazilian National Centre for Natural Disaster Monitoring and Alerts (CEMADEN) spoke on adaptation actions for integrated climate risk management into urban planning, with a focus on the MASP. In this area, changes in many extreme weather and climate events have been observed since 1933 and precipitation patterns are projected to change in the future (2030-2050), possibly resulting in floods caused storms or water scarcity caused by droughts. Due to the urban expansion, the vulnerability of this area to these impacts become higher, also with potential effects in other environmental aspects, like air quality.

**Maria de Fatima Andrade**, from IAG, presented the state-of-the-art information on air pollution in the MASP. The largest contributor of air pollution in the MASP is transportation. Concentrations of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> have all reduced since 2000. O<sub>3</sub> has slightly increased in concentration. The implementation of the Program to Control the Vehicular Emissions was effective in reducing the primary pollutants concentrations. There are however other sources that must be considered, like biomass burning, evaporative emissions and painting. The contribution from remote sources and regional sources has impact in the number concentration of the particles. Fátima also briefly talked about the project ASTRID (Accessibility, Social Justice and Transport emission impacts of Transit-Oriented Development Strategies, jointly supported by FAPESP, the Economic and Social Research Council (ESRC) from the UK and the Netherlands Organisation for Scientific Research (NWO). This project seeks to investigate the causal mechanisms underlying disparity and social injustice in job accessibility and air quality in metropolitan areas of London, São Paulo and Randstad South, and the potential of transit-oriented development to promote social justice.

**Camila Camara**, from HafenCity University Hamburg, gave a talk on climate change mitigation and adaptation for city scale, with a focus in Sao Paulo. In 2014 the IPCC report identified not only the vulnerabilities of cities for climate change, but also a likely correlation between urbanization growth and greenhouse gases emissions, with the larger urban incomes leading to more energy

consumption and consequently higher emissions. According to the World Bank, most of the world population already lives in urban areas since the late 2000's, and the same applies to Brazil since the early 1960's. Although this environmental problem affects the world as a whole, different places will not suffer the exact same consequences. It will depend on local circumstances such as location, climate, culture, economy, etc. Even within the same country, different cities are bound to have different characteristics, particularly in large countries like Brazil. Considering urban areas, some classic examples of the impacts of climate change are: the aggravation of urban heat island effect resulting from temperature rise, and flooding and water scarcity due to rainfall regime changes associated with low permeability and insufficient infrastructure. In terms of climate change policies, Brazil and some of its states and cities started to formulate new laws and strategies to deal with climate change and its impacts, following resolutions of the United Nations Framework Convention on Climate Change (UNFCCC). At the end of 2007, an Interministerial Committee on Climate Change was created to elaborate both the National Policy on Climate Change (drafted 2008 and enacted in 2009) and the National Plan on Climate Change. In 2016, a National Adaptation Plan for Climate Change was created and contains a specific chapter on Strategies for Cities, which aims to delineate a framework of public policies to reduce the vulnerability of cities and support their resiliency. The State of São Paulo's policy was published before the enactment of the national law in the same year, and commits to reducing its emissions by 20% by 2020, from the base year 2005. In 2009, the Municipality of São Paulo published its Policy of Climate Change. Even though this policy fits the framework set by the National and State's Legislations, it is significantly more precise and incisive in its goals and guidelines. At city level, many actions have taken place, with different approaches and different results. The most successful ones were those strategies that sought to reduce the commute using motorized individual vehicles.

**Maria Lúcia Guardani**, from State of São Paulo's Environmental Company (CETESB), gave an overview of the air monitoring network, which aims at measure the air quality in the MASP and contribute to control strategies. There are plans for the expansion of then network but no timeline for that. The network also provides support data for model validation studies, although datasets are not openly distributed. She also showed the evolution of emissions in the MASP, and the main sources of each pollutant.

### 3. Session: Initial Case Study

Following the considerations during the kick-off meeting, participants engaged in discussions to setup a case study in one or more single areas of MASP. **Ana Paula Koury**, from São Judas Tadeu University, and **Renato Anelli**, from USP-São Carlos, led this discussion. The selection criteria for the areas should consider several parameters: number of inhabitants, density of occupation, green areas and in situ data availability (particularly for air quality). However, from the perspective of urban planners, it is difficult to decouple climate, air pollution and hydrological aspects. All these have to be looked at together, including the current policies. The aim of São Paulo's Master Plan is to reduce the number of cars, with high verticalization near subway stations. From the modelling perspective, large eddy simulations would be needed to resolve buildings, depending on the selected area. In terms of climate models, some downscaling initiatives are producing datasets with a 25km-resolution. For air quality in urban areas, this is still coarse and models should be around 10km. Itaim Paulista seems to be an area that fulfil most of the criteria mentioned above. In addition to that, São Judas Tadeu University already has a project in development and this would help with local stakeholder contacts.

### 4. Session: Stakeholder Mapping

**Anita Engels**, from the University of Hamburg, presented the results of the survey about past experiences with stakeholder engagement, either in Brazil or in Germany. This survey was

circulated among Klimapolis and CityLab members. There have been 17 responses (8 from Germany and 9 from Brazil). From the Brazilian side, it seems that there has been more interaction with local government, and no links with religious groups. In Germany, there have been no links with political parties. German partners have had great engagement with stakeholders in many steps of the research process, while in Brazil, partners who responded to the survey had no experience with analysing data and publishing results of the engagement with stakeholders. Regarding some of the negative experiences, perhaps in Germany there is a perception that involvement of stakeholders can be a very bureaucratic process. However, this led to researchers to learn more about the administrative process and legal framework, and this has led to the establishment of a bottom-up framework. In Brazil, it seems that there is not much recognition from city officials to the academic approach, with initiatives following a top-down approach. However, it seems that some companies in the private sector are willing to be more involved in reducing their carbon footprint, with potential for some funding for research.

**Laura Ceneviva**, Executive Secretary of São Paulo's Municipal Committee on Climate Change and Ecoeconomy, gave a talk introducing the activities of the committee, which was created in 2009 as part of a municipal law that establishes the Municipal Policy on Climate Change. This committee is an advisory body that supports the implementation of the Climate Change Policy, with participation of representatives from local and regional governments, NGOs (environmentalists, business, urban issues, etc) and academy. Specifically regarding climate change, the committee's objectives are:

- To support the Municipal Climate Change Policy implementation
- To recommend, stimulate, control and follow the plans, programmes and actions which will make feasible the Municipal Climate Change Policy
- To support and encourage initiatives to mitigate emissions and to adapt to the impacts of climate change
- To support and to incentivize awareness campaigns on climate change matters, seminars, debates, etc.
- To identify technological solutions related to climate change
- To offer information basis to the legislation improvement

It is important to note that climate change, although with known impacts in urban areas, is not a "political product" for cities. In addition to that, the local administration in São Paulo is politically affected (and somehow transformed) every two years: first by municipal election, and two years later by federal and state elections that bring new forces among political parties and influence the city. The committee is the only formal "branch" in the municipal administration with competence on climate change but with no executive power. Some of those decisions are made by the Environmental Council, which has no links with the committee.

## 5. Session: Outlook

**Debora Sotto**, from São Paulo's city government, talked about the legal framework of air pollution control in São Paulo. In Brazil, there are environmental laws and regulations at every level: national, state and municipal. In the State of São Paulo, air pollution caused by industries has been a major environmental challenge for many decades, especially in the 1970s. Incidents due to air and water pollution at Cubatão in the 1970s gave cause to a significant civil society mobilization in the state. But today, vehicular emissions, not industrial emissions, are the major source of air pollution in the state. In the city of São Paulo, the Municipal Master Plan expressly acknowledges the need to protect the city's natural resources, and to adopt mitigation and adaptation strategies to tackle climate change, accordingly to the City's 2009 Climate Policy. It also considers air pollutant emissions as criteria to (a) classify uses and activities accordingly to their impact (b) be taken into account by the neighbourhood impact studies. Specifically, air pollution reduction is seen as a mobility goal. The Urban Mobility Plan, released in 2015, aims at integrating the public transport system, increase activity mobility with the use of rental bikes and exclusive cycle lanes, and promote the use of clean energy and technologies by the bus fleet.

**Gilvan Guedes** and **Alisson Barbieri**, from Federal University of Minas Gerais, and co-coordinators of the “Cities and Urbanization” sub-network of Rede Clima (Brazilian Research Network on Global Climate Change), presented the activities of this network. In general terms, Brazil is an ageing country, with large parts of the population affected by poverty. Therefore, it is becoming a more vulnerable country to the impacts of climate change. The sub-network has three main objectives: (i) mapping vulnerabilities and designing urban adaptation strategies; (ii) an integrative project on Socioenvironmental Security (PISSA); and, (iii) informing public policies for the Belo Horizonte Metropolitan Plan, for the Brazilian Plan of Adaptation to Climate Change, the Brazilian Communication to Climate Change, and Brazilian Panel on Climate Change. Objective 1 has several case studies in different areas of Brazil, with focus on health, drought, deforestation and energy.

**Marcos Buckeridge**, from the Advanced Studies Institute of USP, and coordinator of the Global Cities Project, gave a talk on the activities of the project. The Global Cities project aims at articulating the existing knowledge in the USP community and of collaborators from Brazil and abroad, to act in a transdisciplinary way towards the necessary knowledge to support the creation of a metropolis model that meets the aspirations for a better quality of life of its population. As a megacity, São Paulo suffers several impacts due to climate change. As there are large inequalities in quality of life, these impacts will be felt more by the poorer population. São Paulo also needs to adapt and one possible process is through the increase of green areas.

**Pedro Jacobi**, from the Institute of Energy and Environment of USP, and ICLEI South America Board President, gave an overview of ICLEI’s activities. ICLEI has five strategic pathways for the urban system: low emission development, nature-based development, circular development, resilient development, and equitable and people-centered development. The ICLEI Network in South America has more than 60 members, including municipal and regional governments, in the eight countries of the Region. Some example of projects that are being jointly developed among countries are “Áreas Protegidas Locais”, which will try to improve and conserve local biodiversity, and INTERCT-Bio, which will support metropolitan regions in ecosystem services.

## 6. Session: Klimapolis future

Guy Brasseur led the discussion on the future of the Klimapolis project. As mentioned at the beginning of the workshop, the objective of this cooperation is to develop a long-term networking with excellent scientific actors between Brazil and Germany and the construction of a long-term bilateral research structure. The initial phase of Klimapolis is funded for 2 years, with the second phase potentially funded for an extra 3 years depending on the plans for the institutionalization of the bilateral research structure. There are a good number of institutions, with a transdisciplinary approach, involved in Klimapolis but it is important to identify what is the niche for this project. It is also important to integrate a number of different stakeholders. In terms of the organisational structure, the new joint institute will need to define a management structure and their network with other institutions, including the legal framework reflecting the international aspects, with deliverables. Also, need to have a clear approach for financing its activities via proposals to funding agencies but also from the institutions involved.

There is a clear indication and willingness from the University of São Paulo to host the joint institute, particularly because there are already some good working relationships with some German groups part of Klimapolis. However, further discussion will need to take place with several groups within USP to decide the best for the long-term structure. One of the main focus would be on how to transfer climate change and environmental impacts into policy at municipal level. Also, with so many partners, with the potential to include others, it would be extremely important to develop an institutional mapping in order to strengthen collaboration and avoid duplication of efforts.

The second phase of Klimapolis will also involve other Brazilian cities so it will be important to involve stakeholders from other cities as soon as possible. Particularly for the project's second phase, it would be really good to involve Rede Clima in some activities as they already have information and possibly contacts. In the same way, it is important to identify activities already in place and co-develop new ambitious and concrete ideas with city officials.

Science topics that Klimapolis addresses show good links between climate change and the Sustainable Development Goals. It would be interesting for Klimapolis to identify indicators, which could be used as the basis for policy recommendation. Services is also a niche in Brazil since there are not many institutions doing it. Tackling a single issue, identify the necessary tools and look, for instance, at adaptation strategies, could be a good way to start activities in the project. GERICS has a toolkit that has been applied for many cities; just need to identify which modules of the toolkit would be necessary. On a more strategic approach, the project needs to identify a framework for a more sustainable society, not only looking at aspects related to air pollution, but also climate and sustainability, and the essential aspects for governance. Participatory learning also needs to be a tool used in activities of the project. This can lead to research questions being created by involving the population, showing those that are interested for them as well, not only interesting for academics. The joint institute would make this link between the local population and researchers involved in the project. Developing new communication approaches will also be essential, including scientific journalism. Rede Clima could also be involved in these activities. Visibility of the new joint institute will also be important for the continuation of the project. One idea would be to start a webinar series.

## ANNEX A – Meeting participants

<b>Name</b>	<b>Institution</b>
Rachel Albrecht	USP (Brazil)
Tercio Ambrizzi	USP (Brazil)
Maria de Fatima Andrade	USP (Brazil)
Renato Anelli	USP (Brazil)
Alisson Barbieri	UFMG (Brazil)
Ana Bedran	USP (Brazil)
Guy Brasseur	MPI-M (Germany)
Marcos Buckeridge	USP (Brazil)
Nico Caltabiano	MPI-M (Germany)
Camila Camara	HafenCity University (Germany)
Laura Ceneviva	Prefeitura São Paulo (Brazil)
Chou Sin Chan	INPE (Brazil)
Alexandre Delijaicov	USP (Brazil)
Anita Engels	University of Hamburg (Germany)
Marcel Fantin	USP (Brazil)
Philipp Franke	RIU (Germany)
Klaus Frey	UFABC (Brazil)
Maria Lucia Guardani	CETESB (Brazil)
Gilvan Guedes	UFMG (Brazil)
Judith Hoelzemann	UFRN (Brazil)
Ali Hoshyaripour	KIT (Germany)
Pedro Jacobi	USP (Brazil)
Priscila Kakazu	USP (Brazil)
Martin Koehler	HafenCity University (Germany)
Ana Paula Koury	Univ. São Judas Tadeu (Brazil)
Katja Lamich	GERICS (Germany)
Andrea Lampis	USP (Brazil)
Ana Lia Leonel	USP (Brazil)
Giuliano Locosselli	USP (Brazil)
Leila Martins	UTFPr (Brazil)
Carlos Martins	USP (Brazil)
Vinicius Lionel Mateus	CPTEC (Brazil)
Camille Nolasco	INPE (Brazil)
Amauri Pereira de Oliveira	USP (Brazil)
Jean Ometto	INPE (Brazil)

Felipe Rainho	USP (Brazil)
Armelle Remedio	GERICS (Germany)
Flavia Ribeiro	USP (Brazil)
Nilton Evora do Rosario	UNIFESP (Brazil)
Christoph Sauer	TUHH (Germany)
Paulo Sinisgalli	USP (Brazil)
Debora Sotto	Prefeitura São Paulo (Brazil)
Bettina Steuri	GERICS (Germany)
Jefferson Tavares	USP (Brazil)
Taciana Toledo	UFMG (Brazil)
Pedro Henrique Torres	USP (Brazil)
Pérola de Castro Vasconcellos	USP (Brazil)
Daniele Vieira	(Germany)
Andrea Young	CEMADEN (Brazil)
Cathrin Zengerling	HafenCity University (Germany)

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20-22 August 2018  
Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG)  
Universidade de São Paulo (USP)

FINAL agenda

**Day 1 – Monday**

**Session 1: Air pollution and climate change in São Paulo: state of the art**

09:00 – Welcome (Guy Brasseur - MPI-M, Tercio Ambrizzi – IAG/USP)

09:15 – Regional climate (Tercio Ambrizzi, IAG/USP)

09:45 – Vulnerabilities of the São Paulo Metropolitan Region to Climate Change (Andrea Young, CEMADEN)

**10:15 – Coffee break**

10:45 – What do we know about air pollution in São Paulo? (Maria Fatima Andrade, IAG/USP)

11:15 – Local Action for Climate Change Mitigation and Adaptation: São Paulo Case Study (Camila Camara, HafenCity University)

11:45 - CETESB activities on air quality (Maria Lúcia Guardani, CETESB)

**12:15 – Lunch**

**Session 2: Initial Case Study**

14:00 – Topics to be discussed

- Selection criteria
- Case study design
- Implementation
- Tools and services

**15:30 – Coffee break**

16:00 – Initial Case Study (continued)

**17:30 – End of day**

## **Day 2 – Tuesday**

### **Session 3: Stakeholder Mapping**

09:00 - Stakeholder mapping (Anita Engels, Pedro Jacobi, Renato Anelli, Ana Paula Koury)

10:00 – São Paulo’s Climate Change Committee activities (Laura Ceneviva, Executive Secretary, Municipal Climate Change Committee)

**10:30 – Coffee break**

11:00 – Stakeholder mapping (continued)

**12:30 – Lunch**

### **Session 4: Outlook**

14:00 – The legal framework of air pollution control in São Paulo (Debora Sotto, Prefeitura de São Paulo)

14:30 – Rede Clima – Cities and Urbanization sub-network (Gilvan Guedes/Alisson Barbieri)

14:50 – “Cidades Globais” Project (Marcos Buckeridge, IEA/USP)

15:10 – ICLEI (Pedro Jacobi, IEA/USP)

**15:30 – Coffee break**

16:00 – Planning a joint institute on urbanization and climate change

**17:30 – End of day**

**19:00 – Event dinner – *Restaurant of the Golden Tower São Paulo Hotel***

### **Day 3 – Wednesday**

09:00 – Planning joint projects/proposals

**10:30 – Coffee break**

11:00 – Planning joint publications

**12:30 – Lunch**

14:00 – Visit to Pico do Jaraguá monitoring station