

Towards International collaborations in Natural Disasters prevention: personal experiences and contacts

Jair Koiller

Senior voluntary researcher
INMETRO and PENT/Coppe



Imperial College
London



University of
Reading



UNIVERSIDAD
DE LA REPÚBLICA
URUGUAY



*International Workshop on Mathematics
of Climate Change and Natural Disasters*

29/Ago up to 02/Sep/ 2017
São José dos Campos (SP), Brazil



Recent disasters and ecological problems in Brazil

(Most of them caused by human activity)

- **Urban arbovirus diseases: dengue, zika, urban yellow fever**
- **Rainfall/floods, landslides : urban and rural housing bad quality/ locations**
- **LUCC(land use/land cover):**

Amazon region - deforestation/mining activities

Cerrado region: cattle / soy farming

- **Mining operations (Samarco/Vale in Minas Gerais/Espirito Santo)**

It would be important to build partnerships with economics/political science research groups working on sustainable development.

**Relations with policy makers, and the press (outreach)
CCST/INPE is a very good initiative.**

Defining scientific questions (for working groups)

- **Focus: human intervention consequences, sustainable development**

Land use/land cover (LUCC) impact on climate change

Surface-atmosphere interaction: global warming/extreme events

Natural Disasters Risk Reduction - statistical approaches

Economic cost: real options theory

Epidemiology: human, animals, plants diseases

- **Mathematical methods**

Data Checking/Verification & Time Series

Data Science & Machine Learning

Computer Architecture

Personal experiences/ contacts that may be useful

Math for Planet Earth

Cemaden

Universidad de la Republica

Institutions in Rio de Janeiro: Inmetro, IMPA, FGV, Fiocruz, UFRJ, IPRJ

PTI (Itaipu technological park)

International centers/societies

INRIA (France)

Caltech

American Statistical Association: Statistics Without Borders

Mathematics of Planet Earth 2014 : <http://mpecdt.org>

**Darryl Holm: “when you are a student,
the guideline is:
go where people are doing
something important.
MPE could be important” (understatement.)**



**Climate change, extreme events
Cleaner industry: eg., energy harvesting
impacts of natural hazards
epidemiology: human, animal, plants
advice for public policies**



And more...

My contacts with Cemaden <http://www.cemaden.gov.br>

- **Water quality: visit to Cemaden in 2012 together with Sandra Azevedo, from UFRJ Biophysics Institute, and Bojan Sedmak, from Slovenia, for a discussion discussions about cyanobacteria blooms control.**

Research opportunities ranging from data monitoring/ML to basic biology (eg. quorum sensing - when and how cyanobacteria become toxic?)

- **Ecology of lakes brings Fluid mechanics + Biology ecological and bio-geochemical aspects (Jorge Zubelli, IMPA and Chiara Mocceni, Siena)**
- **Floods/landslides/extreme events - discussions started in 2016 between Cemaden, IPRJ, and IMPA and lead to a discussion group within SBMAC (Leonardo will talk more about this)**

http://www.abc.org.br/article.php3?id_article=2167

<http://www.nib.si/eng/index.php/component/directory/?view=details&id=88>

<http://www.sciencedirect.com/science/article/pii/S0895717707002075>

Universidad de la Republica

My personal contacts: Roberto Markarian (current University president), Raul Donangelo (colleague from UFRJ physics department)

Contacts by email:

**Marcelo Barreiro, Madeleine Renom, Ciencias de la Atmosfera, UdelaR
Mario Bidegain (Direccion Nacional de Metereologia)**

Nicolás Wschebor, Carlos A. Negrera, Nicolas Benech (Physics)

Climate change (Barreiro, Renom)

Complex systems, networks (Rubido)

Neuro-economy, econophysics (Donangelo)

Related to another Newton Fund/Fapesp/ANII workshop related to Soft Matter applications in agrifood and other biotechnologies

Ultrasound/acoustics (Negrera)

Soft matter, surface physics (Nicolas)

Inmetro (Brazil's NPL or NIST)

I was a fellow there for two years in 2014-2015, in the Fluid Mechanics Division.

There I learned about imaging (e.g. particle velocimetry)

and made contact with two other research groups

Acoustics division: specially with the ultrasound group (medical applications)

Biology division, specially related to

water quality/ 'defensives' (pesticides) in agribusiness

nanoparticles in industrialized foods

non-animal testing for cosmetics

I can bring information in the modeling working groups if there is interest.



IPRJ (located in Friburgo, of Rio de Janeiro) <http://www.iprj.uerj.br>

In 2011 an extreme event occurred in the mountain area of Rio de Janeiro state.

Friburgo was the most affected

city.

The creation of Cemaden was one of the Federal government Actions after that event.

Cemaden and IPRJ are trying to team up for weather/soil sciences Partnerships.

With the help of SBMAC

Leonardo and Haroldo should talk more about it.



Parque Tecnológico de Itaipu (visited in 2011)

<https://www.pti.org.br/pt-br/pesquisa-e-desenvolvimento>

- Damage risk of dams and turbines

<https://www.pti.org.br/pt-br/ceasb>

- Extreme events affecting power lines

<https://www.pti.org.br/pt-br/lass>

- Water resources management

<https://www.pti.org.br/pt-br/cih>



FGV (Fundação Getulio Vargas)

I worked there from 2001 to 2014. When a severe dengue outbreak occurred in Rio in 2008, FGV's president asked a 'position paper' to show to the Governor and Mayor.

We joined two arbovirus projects led by FIOCRUZ, funded by the Pronex/CNPq programme (Claudia Codeço and Denise Valle). FGV, INPE, and several Universities participated.

In parallel, FGV led a collaboration with INRIA (France) funded by CAPES in Brazil and COFECUB in France

Mathematical Epidemiology is a VERY NICE THEME FOR YOUNG RESEARCHERS!

We had several workshops and participants published quite well.

<http://www.procc.fiocruz.br/procc/Members/claudia/>

<http://www.dengue.mat.br/stories/projetos.html>

<http://www.ioc.fiocruz.br/dengue/> <http://auladengue.ioc.fiocruz.br>

Contacts with authorities from Health Ministry

Eg. CIEVS <http://portalsaude.saude.gov.br/index.php/o-ministerio/principal/secretarias/svs/cievs>

UFRJ (Federal University of Rio de Janeiro)

I worked in the Math Department from 1975 to 2000.

Returning as voluntary researcher. I have contacts in:

Engineering (COPPE)

Civil/Mechanical

Nanotechnology (my current interest)

Biophysics Institute

Water quality

Toxicology (eg. of mercury in mining in the Amazon)

I have contacts also in the Economics and Political Science departments

Statistics without Borders (Dealing with disasters)

**SWB is working group from
the American Statistical Association**

<http://community.amstat.org/statisticswithoutborders/home>

https://en.wikipedia.org/wiki/Statistics_Without_Borders

Contact: Cathy Furlong cathy.furlong@cox.net

Statistics Without Borders (SWB) is an organization of volunteer statisticians that provides pro bono statistical consulting and assistance to organizations or governments.