Bioprecipitation: Rainfall feedback that links atmospheric processes, ecosystem dynamics and land use through biological ice nucleators

Vision of future goals and challenges that emerged from the MILAF workshop, Ste. Maxime, France (13-17 Oct. 2014)

Stakes

Food production | Water resources | Human health | Human demographics and migration | National security | Biodiversity | Sustainable economies | Energy

Public understanding of nature | Evidence-based policies | Transportation and commerce | Scientific culture and paradigms | Art and culture

2020

Procure stakeholder involvement and investment.

Co-construct means to manage the water cycle via natural processes, through education, policy and environmental engineering.

Engage the public in understanding the water cycle and its link to the stakes.

Science and society

C1.4. Engage representatives of "the public" to improve the presentations. Prepare for, lobby for, and obtain funding for high profile venues to engage public debate. An example of such a venue is: "Les Colloques de Menton" (http://www.menton.fr/-Penser-notre-temps-) that attracts 700 attendees for each seminar – free to the public. The organizers of this series are always looking for ideas. Here it could be a multilingual presentation. Other examples?

C1.3. Construct presentations for the public about the water cycle and the role of biology and the impacts of human activities on the cycle. Find venues where the presentations can be tested in view of improving them.

C1.2. Write simple summaries for the public of primary scientific papers. Post on Bioprecipitation web platform/Twitter. (Question: does this mean that we will do our own "journalism"?)

C1.1. Establish a common scientific vocabulary. Highlight links with other challenges such as water quality, etc.

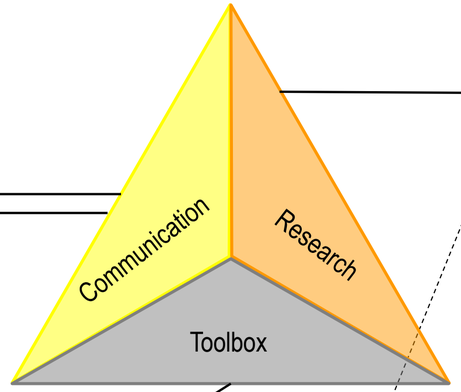
Goal 5: Determine who can lead this initiative

C1 Establish a language working group: for a common scientific vocabulary and for engaging the public.

C2.1. Create a Bioprecipitation web platform with the following headings: i) Tools, ii) People, iii) Resources: technical; information; teaching materials; iv) Funding sources; v) Stakeholders; vi) Legislation/Law; vii) Services [volunteer offers for modeling, laboratory analyses (chemical, physical, biological), mentoring; statistical analyses; council for experimental design], viii) Information for the public

C2. Improve the existing "bioice" website to include a "Bioprecipitation web platform" as a resource and to help visibility among on-going projects and initiatives.

Goal 3: Carr and Morris improve website by mid-2015



R5. Conceive means to stabilize or alter the magnitude of the bioprecipitation process to mitigate drought in regions where this is needed and where such mitigation is plausible.

how

R4. Organize comparative studies of sites where rainfall feedback occurs to elucidate and explicate component processes and limiting factors. Validate the role of biological ice nucleators and the pertinence of the name "bioprecipitation feedback"

Goal 9: Multiple coordinated field campaigns. Determine how to initiate, coordinate, fund.
Assure inter-visibility among campaigns via the Bioprecipitation web platform.

where

R3. Deploy the traits identified in §2 to identify other site of potential rainfall feedback outside of the network of weather stations.

Goal 4: Workshop in 2015 organized by Morris and Sands

R2. Characterize traits (land use, geography, climate, etc.) that typify regions identified in §1.

R2.1 Deploy competence in analysis of numerical land cover data, in historical resources describing land use, in geography, in meteorology

R1. Determine where rainfall feedback is occurring and where it has responded to land use change.

R1.2 Bring together the expertise (spatial statistician, atmos phycicists?, et al) to run FeedbackTS package and conduct Kriging analysis (Soubeyrand et al 2014) to identify regions of feedback.

R1.1 Assemble daily historical rainfall data from weather stations across as many continents as possible. Particular focus can be made on certain regions as a function of stakeholder interest.

Consolidate resources and compose users' guides to be made available on the Bioprecipitation web platform.

Users' guides for:
T1.1 Aerosol collection
T1.2 Characterization of microorganisms in the atmosphere (classical and molecular microbiology)
T1.3 Chemical and physical characterization of aerosols
T1.4 .....?
T1.5 .....?

T1. Assemble the pertinent bibliographic resources and write concise guides about the major technical tools for extra-disciplinary users.

Goal 6: Determine who can lead this initiative

T2. Organize a workshop on experimental design for estimating the origin and fate of aerosols.

T2.1 Summarize the experimental field set-ups, the equipment and the statistical analyses for the main approaches.

Goal 7: Determine who can organize and lead this workshop

T3. Develop a hub of information and resources about modeling.

T3.1 Consolidate information about existing tools and briefly describe their utility and strengths/weaknesses,
ii) Identify needs.

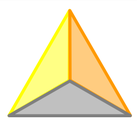
Goal 8: Determine who can coordinate this

Goal 2: Web conferences for network, every 6 months, rotating coordinator

2014 ***Science***

Goal 1: Carr and Morris identify optimal videoconferencing tool ASAP

2014



Foundational objectives

Communication. Establish a common and clear vocabulary to facilitate and expand interdisciplinary collaboration and in preparation for engaging the public.

Toolbox. Develop common tools and the means to share competence: i) Methods and equipment, ii) Experimental design, iii) Models and modeling resource platforms

Research. Estimate the magnitude of bioprecipitation's role in the hydrological cycle and in climate - globally and regionally