Lino Camprubí’s thinking, writings and projects give us a better understanding of the significance of the history of science and technology, and links these to more accurate understandings of political economies. He is a Research Scholar at the Max Planck Institute for the History of Science in Berlin and author of *Engineers and the Making of the Francoist Regime* (MIT Press, 2014). Camprubí earned his PhD at UCLA in history and then joined the project “The Earth Under Surveillance” (TEUS) where his interests turned more toward geoscience, geochemistry and issues surrounding the anthropocene.\(^1\) His work within the TEUS project centered on the importance and development of mineral phosphate exploration and extraction in the Western Sahara. Camprubí’s current projects continue to look at geopolitics of the global environment, and will increasingly focus on oceanography, acoustics and the aqueous earth.\(^2\)

cc.cc: How did you get here?
LC: I was invited by some people at the MPI that are involved in the Anthropocene Campus.\(^3\)

cc.cc: What technical systems are operating on us right now?
LC: We have been talking about the phosphorus apparatus. Phosphate rock that goes into fertilisers and then goes into agriculture to feed the world population. But there are of course many others, for example energy, uranium, coal, those are all things that have a long life in terms of the materials that form them and that have significant impact in our daily lives, and sometimes we are not fully aware of these. One of the good things about a conference like this one is that we can look at each of those elements and trace their development, even through millennia. Through that, we can understand our epoch better, in context.
cc.cc: What pieces of the technosphere do you have on you?
LC: There is lots of “technosphere” in my cellphone; I suppose in my clothes, in my hair.

We have just learned that that each of us transforms about 40 kilograms of ATP (Adenosine Triphosphate) per day. It doesn’t seem to make much sense, but our cells are constantly reproducing and using up the energy and leaving behind waste—constantly. We are changing organisms, changing systems. We use up a lot of the stuff around us.

cc.cc: Is there a specific reason that we emphasise the importance of phosphate?
LC: Phosphates are key to Agrobusiness. Not only the business— they are key to food production. We would not have 7 billion people on the planet without phosphates because it is one of the main fertilisers. And in contrast to other fertilisers, phosphates are non-renewable. It first came from guano, and then in the 20th century it came from phosphate rock extraction. This is something we are extracting from the Earth—as we are doing with oil or coal—and putting it into the fields, and this drains into the oceans, polluting quite a lot. We are also putting it into our bodies because we need it to function.

And Morocco, with the reserves in Western Sahara, has 75% of the world’s reserves of phosphorus. So there is a serious geopolitical challenge in the years to come. We are—depending on who you ask—about to get to a point of peak phosphorus, like what happens with oil. Arno Rosemarin told us that it will be phosphate, and not climate change, that could bring down modern civilisation as we know it in the near future. I do not know if that is the case, but it is more important than one would think.

cc.cc: The renewability issue is that there is no chemical synthesis process for making phosphates?
LC: Yes, and it gets diluted and it goes into rivers and oceans, but it needs to be concentrated to be useful. Now we dilute it, and everything has phosphate, but not enough to make it useable for food. One of the things we were talking about during the “Phosphorus: An Apparatus of the Technosphere” session is how to use human waste to grow things. How could this be managed in the societies in which we live?

cc.cc: What is the technosphere?
LC: I think I first read it in a text by Max Nicholson, who was one of the founders of the World Wildlife Fund, a very active person in the British Nature Conservancy, and also in the International Biological Programme. He was talking about it in the 1950s and 60s, as something opposed to the biosphere, but which would allow humans to manage the biosphere. So for him, technosphere had a positive meaning coming from a technocratic point of view. The technosphere will allow us humans to change the global ecosystem. Then, I was very surprised to see it in the title related to the Anthropocene—I like it, because it gives more agency to human groups than the Anthropocene, but I’m also curious whether it responds to a new kind of technocracy.

Every time we talk about a global environment in which we need to solve specific problems, my question is: who is the “we”? Decisions are always made by groups and there are always conflicts of interests, and when we talk about resources, there is competition unto death. In order to talk about the technosphere, I think we may be assuming one “we” or even one “techno”—but there are different apparatuses, and different connections. I understand what is being hinted at: that the biosphere does not exist by itself anymore, it is entangled with technology—but what do we get from that? It is also worth remembering that the conversation has not always been about a "global environment." That phrase has something to do with Cold War geopolitics, environmental monitoring of the entire Earth, and the ability to observe the Earth from the outside, from a satellite.

cc.cc: Please pick one image that resonates with your idea of the technosphere.
LC: This one of Bonaventura. He was thinking about ontologies—about reality, how nature and humanity relate to each other. We redefine these categories of nature and humanity. I don’t know what role the global environment is taking, or what to make of this idea of “we” as a global society.... I think it is important to bring these discussions about reality into this discussion.
EDITORS’ NOTE: “The Earth Under Surveillance” was a 1.3 million-euro, four-year European Research Council project with a mandate to explore the history of scientific studies of the earth and the environment. The project was particularly concerned with Cold War era research trajectories and how these shaped funding climates, geoscience research vectors and environmental science agendas. The project ran from 2009 until 2014 and looked to uncover the hidden, intertwined histories and practices of geosciences and intelligence programmes, particularly as regards field sites and in-situ field work.


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EDITORS’ NOTE: The International Biological Program (IBP) was a coordinated effort to attempt large-scale environmental studies of the earth. The programme ran between 1964 and 1974 and was organised coming out of the International Geophysical Year (1957). The programme was the initiative of Conrad Hal Waddington (1905–1975) a Marxist natural scientist and activist, with the intention of servicing and investigating problems in ecological and environmental terms, through the integrative potentials of ‘big science’ (a name historians of science give to our contemporary coordinated scientific efforts that link research groups across nations and disciplines, such as the Large Hadron Collider).

EDITORS’ NOTE: From the Greek τέχνη or tekhne, meaning a skill or cultivated practice, and θράτος or kratos, which means governmental power, or rule. Interestingly and incidentally, a largely forgotten but still somewhat active ‘technocracy movement’ arose in the early 1930s in both the U.S. and Canada, positing an integral rationalisation of work and leisure, production and consumption, automation and control that would eventually make nation states redundant, and fuse the nations of North America into something card-carrying Technocrats of this era called the “North American Technate”.

EDITORS’ NOTE: In Camprubí’s 2015 paper “Resource Geopolitics: Cold War Technologies, Global Fertilizers, and the Fate of Western Sahara,” he charts wartime technocratic impulse: “Information on minerals and their availability made these sciences a strategic priority, as emerging literature on earth and environmental sciences during the cold war confirms. The technification of these sciences, in the two senses of becoming more specialized and more dependent on apparatuses, was related to unprecedented sources of funding often linked to military and security priorities.” Op. cit., 676-703.

EDITORS’ NOTE: During the discussions, interviewees were asked to pick from a set of somewhat random images. This collection of different phenomena served as a prompt for thought on the forms of appearance and the visuality of the technosphere. You can view the set here www.flickr.com/photos/57221817@N07/2541131686/in/photostream. The discussion here refers to www.flickr.com/photos/57221817@N07/25344200011/in/photostream.

EDITORS’ NOTE: Saint Bonaventura (1221–1274), baptised Giovanni di Fidanza, was a medieval scholar who, amongst many other writings, attempted what we might today call a “natural science” theology. He was concerned to address the creatures of the world as “shadows” of God. For Bonaventura the panoply of nonhuman beings on earth were a multiplicitous proof or reflection of divine potential—like a stained glass...
window filtering light in different ways, and exposing different properties of its origin or source.