

Climate Change, Artificial Intelligence and the un-foreseeability of the future

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Abstract: If we continue to act like we did since about 100 years, we will most probably end up in an overheated Earth where living conditions for human beings are everything but comfortable. We know that survival would be hard or impossible for many species living today. Most scholars in the independent scientific community agree on that. Thus the question is what to do about it. I would like to put this question before our group of IFAC participants during our joint Open Track session on *Past, present and future*.

Keywords: Climate change, Ethics, Value systems, Knowledge Society

1. INTRODUCTION

Some say that we have already passed the point where we could change things in time in order to fight *Climate Change*. Others say that there is still some, if little room to maneuver; but we would need to change the course of our actions right now in order to avoid some world system *collapse*. We have the power, but also the duty to decide where we are heading. The power and the duty have been there since many, many years. But right now, the urgency is as important as never before.

I am the mother of a three years old boy and I am presently going for a PhD on the theme of this abstract. On a personal note, I admit that presently I do the same thing as most parents of little children do: I am staying optimistic and maybe even seeing possibilities or options where there may be none. I am personally attracted by the idea to be prepared for a *post-collapse society*. Thus I have been preparing myself mentally and in some practical ways for living conditions beyond such collapse. And I am regularly surprised about how many people do so where ever I go. I would very much like, however, to see other, less conflictual and less violent pathways emerge.

2. ENLIGHTENMENT

And these pathways, this *course of our actions*: that is where the problems are becoming visible, at least in Western societies. We are living in a dangerous mixture of democracy, capitalism and individualism. Our masses of people are neither well enough informed nor able to oversee the complexities of the current global interactions – they are asked, however, to take the decisions in a democratic way about what course to choose. Is that reasonable?

We are the ‘children of enlightenment’ – the offspring of all these liberating ideas and concepts which have developed during the past centuries (refer to the text “Enlightenment, Artificial Intelligence and Society” discussed at the IFAC

2020 Conference in Berlin). This enlightenment tradition has been very much about putting into question deep-rooted, but not necessarily beneficial values of human societies. Since then we all are questioning everything, via science, research and rational thinking. But today, the purely rational way of thinking has lost itself once again.

3. THE TIPPING POINT AND PLANET EARTH

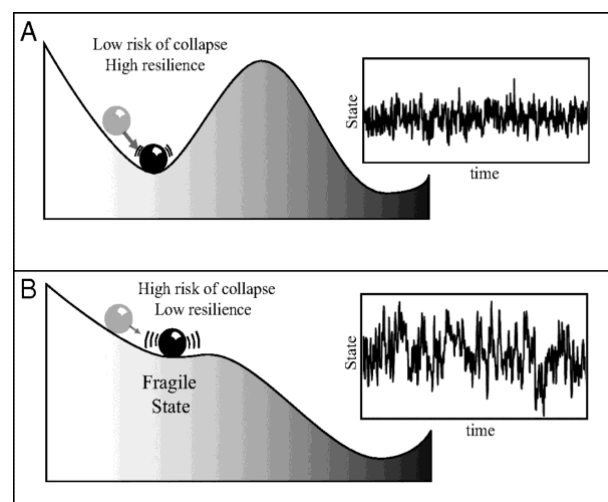


Fig. 1: Tipping points and resilience (Scheffer 2016)

The concept of the *tipping point* is rather interesting in this context (Fig. 1). Tipping points seem to be relevant in many disciplines and the following quotation shows why this is also the case in this context. The Fifth Assessment Report of the IPCC says: “The precise levels of climate change sufficient to trigger tipping points (thresholds for abrupt and irreversible change) remain uncertain, but the risk associated with crossing multiple tipping points in the earth system or in interlinked human and natural systems increases with rising temperature (medium confidence)” (IPCC 2014:14). Thus we know that once the ball in Fig. 1 is going down the hill, the

chances are rather small to still change course. Therefore it has become so important to avoid coming near to the tipping point.

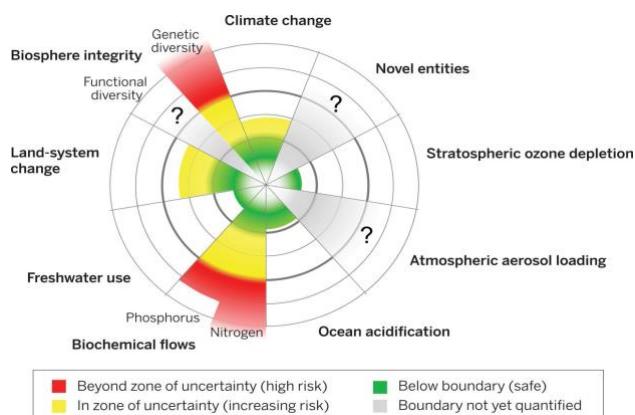


Fig. 2: Boundaries of Planet Earth (Steffen et al. 2015)

Instead of talking about coming near to the tipping point, we could say that we have to avoid to stretch the *planetary boundaries*. Steffen et al. (2015) have defined nine such planetary boundaries which are crucial for assessing the health or stability of our ecosystem. Going beyond the boundaries increases the risks of reaching ‘tipping points’. The following Fig. 2 shows this systemic framework which is increasingly used within the academic discussion:

We are currently not yet going beyond the boundaries of all of these nine areas. But it might be possible that the stretching of merely one area beyond those boundaries may lead to the stretching of the second and the third and the fourth area in sequence (Servigne 2018). As an example: the amount of CO₂ in the atmosphere might have caused a rise in temperature that might have caused too much ice melting; in sequence it might be causing the emission of too much methane from, e.g., the Russian Tundra; leading to even more rises in temperatures; causing too much other changes etc.

Global annual temperature and CO₂ levels, 1959–2016

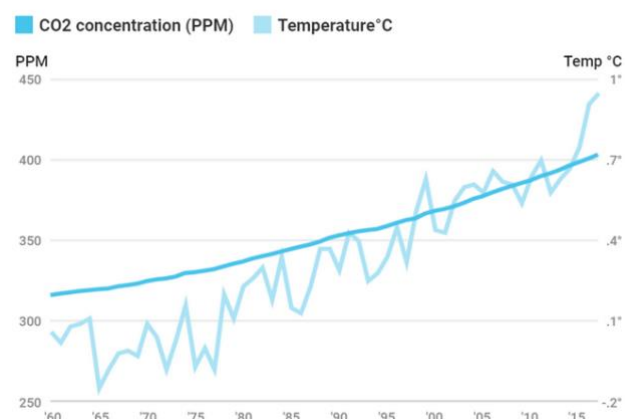


Fig. 3: CO₂ Levels (World Economic Forum 2018)

Fig. 3 above gives an indication of the CO₂ levels within the last decades.

4. DEMOCRACY AND POLITICAL MOVEMENTS

Let us subsume: The democratic masses of the Western world do neither want to give up their decision-making power to people understanding a bit more of the current complexities, nor are they able to see the difficulties themselves very clearly.

Thus there seems to be no way out in sight. And our time is running short!

Many scholars are getting increasingly pessimistic on that there is so little movement forward in a setting where we would need so much commitment. Many older people have several times in their lives experienced that nothing changed although the decisions to be performed appeared quite obvious. As an example, let us take the *climate goals* of Germany in autumn 2019: There was only very little political commitment contained in the Government’s initial set of goals, and not even two months later, when this policy should have become ratified by the Parliament, these fairly poor climate goals had been weakened even further.

Consequently, there are quite some people preparing themselves for changing living conditions - not only climate-wise, but also society-wise - as I have described in my parallel paper for IFAC 2020.

E.g., there are the prepper movements or survivalists; there are neo-survivalists; and in France (and other countries), there are the ‘*decroissants*’ – those who live and prepare for a world beyond the *Growth* ideology. Also in France, the new research field of *collapsologie* is presently developing (compare: Department 2018). And there are others who prepare themselves for a post-collapse society.

5. ARTIFICIAL INTELLIGENCE (AI)

But there might also be other options: our history of enlightenment, rational thinking and science might lead us the way out. Since the middle of the 20th century, we have developed quite some amazing technological devices allowing us to calculate and partly foresee things that were unforeseeable before. Exact measuring technologies, huge databases and constantly self-correcting computerized systems allow us today to forecast the weather fairly accurately and quite far ahead. And even if many of the other functions of computerized systems and algorithms in society are more hidden, they are in many senses even more amazing. The working of such computerized systems and algorithms, isn’t it *codified rationality*?

The *Club of Rome* first used computerized systems in the 1970’s to come up with scenarios that showed us how the world might develop within a specific context. And even if these computer systems were still rather simple compared to the systems available today, they have been amazingly correct in their forecasts (Meadows et al. 2004).

It might be the moment to really start using AI to help us getting things straight. It is a risk in that we do not know what exactly will happen if we put too much trust in AI. Who is able to control it and how much power would this group – this elite, these wise people – have within society? But on the other side, what is the alternative course? There seems to be none in sight – except continuing the paths taken so far which will most probably lead to an overheated Earth. We may be aware: a path without risks into the future is not any more viable.

Thus I wonder whether we should not go for a more active use of AI – as a tool. We could start to use the capabilities of computerized systems to start coordinated efforts to avoid the worst – climate-wise which also includes migration-wise, society-wise, catastrophe-wise etc.. Self-learning systems should not be left alone to save the world, but they should necessarily be controlled, followed – and understood – by human beings. Human societies need more than codified decision-making, they also require human emotions, human rationality and empathy. *Computerized* rationality and *human* rationality are not the same even if taking into account that it depends on the definition of *rationality* used. Humans need to incorporate a whole set of real life weightings in their decision-making. Computerized systems should not be given control, but they should help human societies.

AI should mainly be used as a tool *to buy time* to restructure society. We do not know what implications it would have for human societies if computerized systems get an even more important role in structuring society. Today already they have strong influence on political (democratic), economic and societal systems. They might also change the very way we understand the core of being human, they may even suggest who is worth living and who is not – especially in potentially difficult times. But should machines be given the power to decide what kind of human beings are worth being protected or saved: firstly the women and children - or rather the intellectuals or the IT specialists? We should not give machines such power blindly, nor without care. But nevertheless, society needs to be restructured. It would have been best to do so when we still had more time to maneuver. Now, we have to take risky paths. And we need to be aware of the perceived dangers on the way and to be cautious regarding the still unknown risks.

6. GEO-ENGINEERING

In parallel to AI, *geo-engineering* may be another tool that our societies might want to use in order to buy time to fight Climate Change. Our engineers world-wide have already done some research on it.

One example would be to put enormous *solar sails* into the outer space - they should protect the earth from too much solar radiation. Another example would be the extraction and storage of CO₂ underground. Furthermore it has been proposed to let algae in the ocean grow and to let them in a natural way extract CO₂ from the atmosphere. Another example would be the capture of CO₂ within industrial processes which are producing much of it. This CO₂ could be transported into the deserts of the world where H₂ gets

produced by using solar energy. CO₂ and H₂ then form Methane (CH₃OH). This latter material can replace fossil fuels. The resulting CO₂ can consequently be fed back into the circle just described. This process may be repeated four times before the originally captured CO₂ would be ‘consumed’ (Radermacher 2019). Another idea is to distribute sulfur into the stratosphere. This should be causing chemical reactions reflecting sun light back into the universe (Matthes et al., 2011). Some of these examples are not entirely a ‘dream’ of the future. China, e.g., already started using some of them on a tentative basis and other countries make tests as well. One of the most well-known examples being used by now is to inject silver iodide to ‘harvest’ rain (Stanway 2015) or to avoid hail.

7. CLOSING REMARK

There are many ideas about how to save us from climate catastrophe. And some of them might be working. But some or all of them might not work as well as expected or hoped for. As we have seen above, there is the concept of the *tipping point*: we cannot know exactly when and how the ecological balance of oceans or the atmosphere would react to the injection of iron, sulfur, silver etc. or to any other fundamental technical impact on the environment through geo-engineering. We need to be aware of such potential risks. Geo-engineering might hopefully only be a last resort or a means to buy time if possible at all, but never as a self-sufficient solution. As long as other attempts are still feasible, they should be given priority.

It is highest time to start making investments which may not deliver any direct return but will hopefully make a little bit better the world which our children are going to live in. And it is time to give rational thinking a chance, perhaps by putting not growth, money or anything similar into the center, but ourselves as the human beings who are only existing through and within the Earth’s ecosystem. And even if collapse would be unavoidable, let us be prepared so that we can be saved from lots of harm. Let us start immediately for all these options so that we are still able to get things straight by restructuring society - even if in the end we will not be able to avoid the *collapse*.

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