

PROF. DR. IR. DEMETRIS KOUTSOYIANNIS BATTLES FOR A PARADIGM SHIFT

INTERVIEW

‘Climate change is not remarkable’

There is nothing unusual happening with our current climate. Local trends, like more extreme precipitation in the Netherlands, have occurred in all times and there are no indications of unnatural climate change. Climate is much more erratic than most climate researchers think, says the Greek hydrologist Professor Demetris Koutsoyiannis. ‘Change is the norm’.



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Streets flooded with water, cellars that must be pumped out, those are the images that are frequently broadcasted on television. Extreme precipitation increases and this is related to climate change—this is what most researchers think. And indeed, data from KNMI suggest that since 1950 there has been a slight increase in extreme precipitation along the Dutch coastline. According to the Greek hydrologist Demetris Koutsoyiannis this provides little information about climate. ‘Everywhere in the world there are local trends, but if you look at the world as a whole there are no systematic changes in extreme precipitation’, pronounces Koutsoyiannis in the bar of the Hampshire hotel in Delft, where he is staying to participate in a PhD defence at the TU Delft.

This is not just an empty bag. Koutsoyiannis and colleagues have been analyzing more than 3000 time series of precipitation and presented their results in April this year during the annual congress of the European Geophysical Union in Vienna. According to their analysis there has been a very small increase in extreme heavy showers, but during the last forty years, the period where, according to the Intergovernmental Panel on Climate Change (IPCC), human caused warming of the earth manifested itself more dominantly, almost as many stations showed an increase in extreme precipitation as there were stations showing a decrease.

PLEONASM

Koutsoyiannis has developed a statistical method that takes into account the fact that natural processes are changing continuously. It is an abstract topic that is hard to digest, but it leads to a spectacularly different point of view on climate change. ‘Change is the norm. The expression “climate change” is in my eyes a pleonasm. The extension “change” is surely completely superfluous.’

The trap that almost all climate researchers have fallen into is that of determinism, according to Koutsoyiannis. ‘Researchers do acknowledge that climate is always changing. But they think that this time it is “different”.

They look at the warming from 1970 to 2000 like a deterministic trend that is caused by CO₂. Variations around that trend are just noise, they claim, caused by “weather” including the El Niño and La Niña phenomena. Researchers have started to believe that they can predict the future, because the CO₂ emissions will continue to rise. But that is a gross underestimation of the nature’s erratic behaviour

In Koutsoyiannis’ view the erratic behaviour of nature is as big that the current change in climate is unremarkable. His criticism is that researchers use “classical” statistics that assume that climate is some sort of “roulette climate”. ‘In a roulette climate what happens in one year is independent of what happens in another year. If one plays roulette for a long time one will approach an average score of 18. The mean is static and around it there is noise. However, in real climate the mean is dynamic, always changing, at all time scales. With classical statistics having eight warmest years on record during the last decade happening by chance is almost impossible. However, by taking the dynamical nature of climate into account, this chance becomes almost 10%. Then it suddenly becomes quite possible that something like that can happen during a period of 150 years.

Koutsoyiannis’ life has been associated with water from an early age on. He was raised in a small village in a mountainous region in the northwestern part of Greece where the annual rainfall is larger than in the Netherlands! His parents had a water mill and the young Demetris had to daily walk a kilometre to fetch drinking water. There was no electricity in the area. From his fifteenth onwards he was on his own legs in Athens, where he had to fight the establishment his entire life. Just when he entered the university there was an uprising against the Greek dictatorship during which at some point he literally had been facing a tank. Later he had to find his place in Greek academics, where young researchers are not welcome to disagree with professors. But also

internationally he has been debating against some existing paradigms.

In the 1990's Koutsoyiannis got involved in research of a drought that afflicted Athens. The Greeks were worried about the water supply with the Olympic Games of 2004 in the back of their mind. Especially when, during seven consecutive years, the discharge of rivers was less than 50% of the long term mean. The meteorological records close to Athens were showing a steady decline in precipitation from the 1920's onwards. Was this a sign of a warming world?

Koutsoyiannis attacked the problem originally with "classical" statistics but got displeased with it. 'I discovered other time series of precipitation with similar patterns. Such patterns occur more often than classical statistics suggests.' A quest for an answer in scientific literature got him in contact with the works of the British engineer Hurst, who had been working at the Aswan dam in Egypt. 'Hurst examined an old time series of water levels of the Nile, from the 7th to the 15th century AD. In that old series one can identify trends lasting for many decades. Trends are the rule, not the exception. Hurst showed in a paper already in 1951 that many time series in nature show the same behaviour. There is no fixed mean, there is a mean that is going up and down. Hurst realized that this behaviour had large consequences for the design of dams.

Koutsoyiannis subsequently discovered that the Russian mathematician Andrey Kolmogorov had described this behaviour mathematically already in the 1940's. His inspiration was turbulence. Koutsoyiannis has been trying to draw his colleagues' attention to the ideas of Hurst and Kolmogorov ever since.

Another term for the Hurst-Kolmogorov behaviour is long term persistence. That there is persistence in climate makes intuitively some sense, certainly when we're dealing with temperature. After a warm year the chance is larger that the next year will also be warm. But for precipitation, where this phenomenon is also present, it becomes more

weird: chances of a wet year are larger when the previous year was also wet. 'The Hurst-phenomenon leads in the near future to a slightly better predictability, but on long time scales uncertainties increase spectacularly, much more than IPCC thinks.'

HYDROLOGICAL BASINS

It becomes completely weird when this behaviour is also visible in extremes, which nevertheless is the case. 'The extremes tend to cluster. If there is an enormous flood this year, then having an enormous flood the next year becomes suddenly more likely. This goes against the expectation of many people and researchers. They think: we have had the once-in-100-years event, so we must be safer for some time. Clearly an incorrect interpretation.

Koutsoyiannis used his knowledge about the Hurst phenomenon of natural processes for the water supply of Athens. 'This has led to a totally different operation of the four water reservoirs around Athens, which can store 1400 million cubic metres of water, three times the annual water supply of Athens', according to Koutsoyiannis.

However, environmental organizations blocked a similar project in mainland Greece. 'It is a Greek tragedy', according to Koutsoyiannis. 'A dam in the upper course of the Acheloos river, total cost around 500 million euro, has been completed in 2001 but under the pressure of environmental groups it has never been put into operation, an enormous waste of money. Moreover, the environmental movement does not allow that water from the Acheloos basin is being used for agriculture.

Certainly he sees a relationship with the Green economical crisis. 'It shows the decadence of the Green society, which in part has led to the crisis. Agriculture was historically the driving force of our economy. Blocking the Acheloos project shows the current dislike for agriculture. Transporting water from the Acheloos is not allowed by the protectors of nature because it is not sustainable, but in the mean time we import

more and more “virtual water” via the import of agricultural products from abroad. And that is sustainable?’

For Koutsoyiannis CO₂ is just a symptom of the real problems of the world: a growing population with a growing demand of water, food and energy. ‘Unfortunately ideological and political motives obscure these big questions of our time. Take for example the aversion against large dams, which in my view is totally unfair. Hydropower from large dams has an efficiency of 95%, much higher than coal plants or wind and solar energy. Furthermore, artificial lakes can be used to store energy in times of surplus. The water

that is used is one hundred percent renewable. Obviously there is an impact on the environment, but you also have that with large wind farms. Nevertheless, several countries, among them the Netherlands, have decided – even by law – that energy from dams is not sustainable.’

‘Many people are of the opinion that reducing greenhouse gases is a good thing, no matter whether the climate predictions of the IPCC come true or not. I, on the other hand, think that science should strive towards finding the truth and not be led astray by other goals. History suggests that such reasoning in the end is disastrous for science.’