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Causality in climate and hydrology

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We often see statements such as "90% of climate change is caused by X" and debates on whether the dominant cause of climate change is human activity, or the sun, or something else. However, in chaotic systems, it can be difficult to defend the meaning of such assertions, because if the "effect" occurs sufficiently later than the supposed "cause", the relationship between the two is effectively lost because of the sensitivity of the "effect" to the initial conditions. In fact, although "A causes B" initially seems clear, closer examination of what it actually means reveals problems that have tortured philosophers for centuries. We review the meaning of causation in the context of hydroclimatology as well as its possible reformulation in probabilistic terms.