Extreme phenomena: social implications and mathematical approaches

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Extreme phenomena (such as earthquakes, flooding, hurricanes, volcanoes, and so on) are constant in human history, but at the same time, constantly forgotten. Mankind seems to be unable to remember (or register) phenomena which occur less than once in a generation. There has been, in Fukushima, a tsunami of same magnitude in the past, and the city of Naples (Italy) is built between two active volcanoes, with eruptions less than 50 years ago. Mathematically speaking, things are no better. The most commonly used laws, in order to represent such phenomena, are the so-called "Gumbel distributions", which are widely used, for instance in meteorology. They have no theoretical justification at all; their only advantage is that they depend on few parameters, so they are easily tuned with few data. The fact they have any connection at all with real life phenomena is doubtful. We will present a theoretical work we did recently, in the framework of contracts with the "Caisse Centrale de Réassurance" (Paris). It allows an evaluation of the probability of extreme events (even those which have never been recorded), with only very few observations and no fictitious assumptions. There is considerable room for future work on such subjects, which are of fundamental importance (risk analysis for industrial companies and insurance sector in general).

About the speaker:
The speaker has been University Professor (University of Lyon) for 16 years (1979-1995). Since 1995, he has been Chairman and Chief Executive Officer of SCM SA, a Paris based company which provides mathematical models.