How to estimate future high temperature return levels?

Sylvie Parey (1), Thi Thu Huong Hoang (1,2), and Didier Dacunha-Castelle (2)

(1) EDF, R&D, CHATOU, France (sylvie.parey@edf.fr), (2) Laboratoire de mathématiques, Université Paris-Sud, Orsay, France

Climate change will induce more frequent heat waves in summer and the summer temperatures are likely to increase. High extreme temperatures are thus expected in the future. An estimation of such extremely high summer temperatures is needed at different time scales: for the next decades, in order to verify and eventually adapt currently running installations and for the end of the century to design future long lasting installations. In this presentation, different approaches to compute high temperature return levels in the future, taking climate change into account, will be described, compared and illustrated using a long observation series in Europe. These approaches involve the statistical extreme value theory, either in a non stationary context, or in the stationary context. The link between the evolutions of mean, variance and extremes has been studied and can be used to derive future return levels from the stationary extremes of the centred and normalised temperature and the future evolutions of the mean and variance.