



FLORIN DIACU is a Professor of Mathematics and former director of the Pacific Institute of the Mathematical Sciences at the University of Victoria. He is the author of the award-winning book *Celestial Encounters*, a history of ideas in the field of chaos theory. He lives in Victoria, British Columbia.

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A young girl playing on the beach in Phuket in December 2004 saw the sea frothing and bubbling, and drawing back from the shore. Her alertness to the signs of an impending tsunami were to save about a hundred people, though many others were not so lucky. How many could have been saved with a warning of even a few hours?

Megadisasters such as tsunamis, hurricanes, and earthquakes kill thousands across the world. Striving to understand and predict them has been the life work of scientists and mathematicians worldwide for centuries. In this lively account, Florin Diacu describes their efforts to model these and related catastrophes, such as economic crashes or the risk of collision with a massive asteroid. As examples of chaotic phenomena, they pose some of the biggest challenges for mathematical modelling. Have we made any real progress in long-term prediction?

Can we ever hope to succeed?

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MEGADISASTERS

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PREDICTING THE NEXT CATASTROPHE

FLORIN DIACU

Hurricanes, earthquakes, tsunamis—we often hear of major disasters, and the tragic human stories of loss and suffering are carried by the media across the world within minutes. We have built rapid global communications systems and sent probes to Mars, but why do we seem no nearer to predicting such megadisasters?

The answer, Florin Diacu explains, is that these natural hazards, along with other sudden and potentially catastrophic phenomena such as pandemics and stock market crashes, arise in highly unstable complex systems. They are examples of chaos. In chaotic systems, the tiniest difference in initial conditions can ramify into huge differences in the way a phenomenon unfolds. That is why, even with our excellent modern satellite imaging and measurement ability, it is so difficult to predict the track of a hurricane accurately, or when the next earthquake will occur.

In this highly readable account, Diacu looks at a variety of “megadisasters”, bringing home their human impact with vivid real-life stories. He describes how scientists and mathematicians have struggled to understand and predict them over the centuries. Through their work we have learnt much of the science behind these phenomena, and developed better, more sophisticated mathematical models. Will we ever fully succeed in predicting major disasters produced by chaotic systems? Some say not. But progress makes a real difference in human cost, says Diacu. There is every reason not to give up.