

WEDNESDAY, 19 OCTOBER 2016

THE UNIVERSITY OF SHEFFIELD

4 PM – SIR FREDERICK MAPPIN BUILDING - LECTURE THEATRE 9

"Geoengineering – The SPICE Project"

Professor Chris Burgoyne

Chris Burgoyne is Professor of Structural Engineering at the University of Cambridge. His work has specialised on the use of new materials for structural engineering applications, especially in prestressed concrete, and he has published extensively on the long-term properties of aramid fibres and the use of fracture mechanics to predict the debonding of CFRP from concrete substrates.

Abstract

The SPICE (Stratospheric Particle Injection for Climate Engineering) project considered whether it would be possible to mimic the effects of large volcanoes that inject particles into the stratosphere. These particles reflect sunlight and have the effect of cooling the atmosphere. If we fail to limit CO₂ production, as seems likely, this seems to be the only way to prevent rapid temperature increase that would have a very bad effect on food production. This talk will concentrate on the engineering aspects of how one can deliver 10 million tonnes per year of particles to the stratosphere at a height of 20 km. Various technologies will be considered, including a tower and a balloon supporting a pipe. The tower will be in compression, so will be limited by buckling, whereas the pipe will be in tension and limited by strength. What materials are available - are any suitable? What is the effect of wind - what if the pipe gets caught in the jetstream or a tropical storm? What shape should the pipe be? Are there any constraints on what can be pumped? Where should the balloon be placed? The engineering problems are challenging but the conclusion is that it may be possible, although there are many engineering challenges before we would be ready to attempt. Cutting back on our CO₂ emission is a much better option.