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Industrial projects enabling student futures in Environmental Physics

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Oxford University's Department of Physics has been running an industrial group project scheme for our teams of 4-5 third-year undergraduate students for the last five years. This scheme, offering real life industrial problems to solve, provides an effective introduction to project management and relevant technical skills. It has received consistently positive feedback from both students and industrial collaborators. The projects cover the whole of Physics, but one of the most effective and long-established collaborations has been with Biral, a small meteorological instrumentation company, which has offered two projects every year. The team are usually tasked with a problem involving basic instrumentation development, essentially industrial research for Biral. For most of our students, this is their first experience of environmental physics, and they have to quickly learn relevant technical skills and theoretical background in geophysics and engineering, as well as transferable skills such as making a case to buy equipment, scheduling meetings and visits, allocating tasks and preparing presentations. The students have made several credible prototype instruments, ranging from an infra-red sky camera to a snow detector.

One of the most effective Biral projects required the students to research how freezing rain was produced, where rain drops become supercooled and freeze instantly on contact with a surface. This relatively rare meteorological phenomenon quickly coats surfaces with a layer of ice, causing severe transport disruption and damage to trees and power lines due to the mass of accumulated ice. The students researched the formation and climatology of freezing rain and the meteorological instrumentation currently used to detect it. Following this, they designed and tested their own simple prototypes, using both supercooled water and a room-temperature analogue, Sodium Acetate solution. The result was an informative and stimulating team presentation (including a live freezing rain simulation) and their final reports contained valuable background research on freezing-rain geographical distribution and the ice-detection market for Biral. Biral subsequently combined the student output with its own R&D to develop a new type of freezing rain detector, currently undergoing trials in freezing-rain prone regions. The investigation and design of new environmental instrumentation in conjunction with a company was especially useful for two students working with Biral, one from the freezing rain project, and one from the sky camera team, both of whom used their experience to find jobs as trainee Patent Attorneys after graduation. Several other students have gone on to further relevant training such as Masters' courses in Engineering and Science Journalism, and one student, who did a lightning simulation project with Biral, is now pursuing a doctorate in meteorology. Students are clearly enthused by these geoscience industrial projects, and continue with technical careers as a result. This presentation will describe the project scheme, its aims and objectives and describe the outcomes of some of the Biral-sponsored student projects in geosciences.