

Gilchrist Fieldwork Award Recipients

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Year: 2008

Principal Investigator: Dr Alun Hubbard, University of Wales Aberystwyth

Project Title: Monitoring and Modelling Basal Dynamics and Flow-Acceleration Across the Greenland Ice Sheet

Abstract: This project aims to critically assess, quantify and implement the 'dynamical processes related to ice flow not included in current models... (which) could increase the vulnerability of the ice sheets to warming, increasing future sea level rise.' (IPCC, Working Group 1 - Summary for Policymakers, 2007). The marine-calving outlet glaciers of the Greenland Ice-Sheet (GIS) have recently been accelerating, thinning and retreating at an alarming rate due to changes in ocean circulation and atmospheric temperature but also due to purported dynamic processes whereby surface originating meltwaters penetrate and lubricate the bed, accelerating flow. Despite much speculation, the true impact of this feedback remains undetermined and from observations and theoretical analysis it is thought to be limited to a ~50km marginal zone of the ice sheet. This project will attempt to isolate and quantify this effect through an integrated field, remote-sensing and modelling programme focussed on Russell Glacier Catchment, a grounded, land-terminating outlet of the GIS that is remote from any complicating marine-dynamical influence. Our specific objectives at Russell Glacier will be to collect critical glaciological, geophysical, geodetic and meteorological observations up and across ~200km of transects including the centreline that will fully characterise the processes and feedbacks linking surface climate forcing and basal dynamical response. These data, when analysed in conjunction with macro-scale remotely-sensed data will provide a robust framework for modelling and predicting the non-linear dynamic response of the GIS to future warming scenarios.

Year: 2006

Principal Investigator: Dr Neil Stuart, University of Edinburgh

Project Title: Radar Mapping of Tropical Savannas

Abstract: This project characterised the major vegetation assemblages found in the Rio Bravo savannas and determine the extent to which these may be reliably mapped and monitored using the latest advancements in radar and optical remote sensing. The fieldwork achieved the following objectives: 1) detailed measurements of the structure of the vegetation assemblages were obtained from a transect-line survey; 2) distribution of the vegetation assemblages were mapped by a wide-area survey using GPS and high resolution optical imagery; 3) permanent marker sites were established in areas of pine ridge and palmetto, for long-term monitoring of the growth and change in the ecosystem; 4) the most distinctive shrubs and plants were photographed *in situ* and duplicate 'voucher' specimens were collected for identification.

Year: 2004

Principal Investigator: Professor Andrew Warren, University of Oxford

Project Title: The Dustiest Place on Earth: Measurement and Modelling of Dust Production and Transport in Northern Chad

Abstract: Dust is known to be an important element in global climate, climatic change and nutrient budgets. Yet what is known about the Bodele as the most prolific global source of dust, comes only from satellite observations, modelling and observations of the dust many hundreds of kilometres from its source. There have been no ground measurements or observations in the Bodele itself. The team took measurements of the flux of dust and related this to the wind field and other controls (such as surface processes on the dry lake bed, and bombardment by saltating sand). They also investigated the subsurface of the dry lake bed and what remains of the deposits that have been

removed as they are preserved in yardangs. This information was used to build a model of dust production from its inception in the Bodele about 5000 years ago, through the present and on to the end of dust production, which will happen when all the ancient lake sediments have been eroded.

Year: 2002

Principal Investigator: Dr Nick Branch, Royal Holloway, University of London

Project Title: Investigating the Environmental History of the Machu Picchu Sanctuary, Peru

Abstract: This project aimed to examine the long-term environmental history of the Machu Picchu Sanctuary and, in particular, to assess the impact of cultural and natural processes on the landscape since the end of the last glaciation (10,000 years ago). The specific objectives of the project included conducting field investigations within the Sanctuary during the summer of 2003; providing a record of glacial history and geomorphological context of the Sanctuary; conducting surveys of archaeological sites within the Sanctuary and; obtaining samples from mire basins and lakes to reconstruct the environmental history of the Sanctuary using a range of scientific methods. Findings are placed within a precise geochronological framework using radiocarbon dating and tephrochronology. A series of time-sliced maps are also produced using GIS illustrating the evolution of the landscape.

Year: 2000

Principal Investigator: Professor Peter Smart, University of Bristol

Project Title: Hydrochemical Processes and Cave Development along the Caribbean Coast, Yucatan Peninsula, Mexico

Abstract: The aim of this research was to explore the nature and behaviour of the extensive underwater cave systems (and associated aquifer) which extends some 10 km inland from the Caribbean coast of the Yucatan Peninsula, Mexico. This inter-disciplinary project focussed mainly on interlinked studies of the hydrological, geochemical and microbiological function of the systems, but also completed studies of the aquatic ecology, geomorphology and Quaternary history of the caves. Also joint-winner of the 2001 Ralph Brown Expedition Award.

Year: 1998

Principal Investigator: Dr Piers Vitebsky, Scott Polar Institute, University of Cambridge

Project Title: Developments in the Sakha Republic, Siberia

Abstract: The aim of the expedition was to study recent social economic and environmental changes in the northern part of the Sakha Republic, north-eastern Siberia. The main focus was on isolated hunting and reindeer-herding communities in the Verkhoyansk mountain range; but the team also followed the various threads from these communities back to the regional capital, Yakutsk as well as on to Moscow. This enabled the team to develop an in-depth picture for the Republic as a whole and to show how the hard pressed economies of the indigenous peoples, based on renewable sources, relate to the Republic's dynamic and booming mineral economy. Migration, the disintegration of the Soviet Union, and the non-availability of local transport are all important factors. Through this picture the team clarified ways in which indigenous peoples can protect their own interests, as well as developing a more equitable blue print for the integration of the Republic's diverse ethnic and economic sub-sections. It is concluded that, in the great Soviet vision, space and distance were themselves the region's greatest resource. They have now become the region's greatest burden.

Year: 1997

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banded coral skeletons). The expedition studied past environmental variability over geological time scales through topographic survey and fossil coral sampling for radiometric dating; present sea-level trends, determined from detailed analysis of small coral 'micro-atolls'; and advised on possible impacts of future sea-level rise, through the acquisition of baseline data relating to present patterns of carbonate sedimentation and innovative computer simulations. From the results and understanding derived from past and present environments, management strategies were outlined to prevent the deterioration of contemporary reef and lagoon environments in the northern Cook Islands as well as realistic scenarios of future environmental change for the strategic planning needs of the Cook Islands Government.

Year: 1990

Principal Investigator: Dr J A Briggs, University of Glasgow

Project Title: Sustainable Agro-Ecological Development Potentials of Arid Environments Influenced by Groundwater Infiltration: A Study of the Wadi Allaqi Region, Southern Egypt

Abstract: Wadi Allaqi is the largest of the desert wadi systems draining the eastern desert of Egypt. Since the completion of the Aswan High dam in the 1960s, the lower part of the wadi (some 50km) has been inundated by the waters of Lake Nasser. The lake has pronounced seasonal and year-on-year patterns of water level fluctuation. Research into the soil, water and vegetation resources of Wadi Allaqi, and the responses of the local Bedouin population to these resource opportunities were used to study the suitability of the Lake Nasser shorelands for managed and sustainable agricultural development. It was found that, for most households, the central tenet is that of livestock-herding providing a degree of stability and reliability on which most households can depend. Cultivation, however, is a new activity for the vast majority of Allaqi residents. Given the limited experience of most people in agriculture, the as yet unknown long-term sustainability of the wadi's soils, and the still unpredictable movements of both surface and underground water, investments and development in cultivation agriculture should be introduced with the maximum of care. The conclusion gained is that the Lake Nasser shorelands do possess considerable potential for agricultural development.

Year: 1990

Principal Investigator: Dr Sarah Metcalfe, Universities of Hull and Sheffield

Project Title: Chihuahua Expedition, Mexico 1991

Abstract: This study was to elucidate the climatic history of the Chihuahuan desert, northern Mexico, over the period including the last global glacial maximum (c.18,000 years B.P.) by the analysis of continuous cores of lake sediments collected by the expedition at Ascencion, Victorio, and Encinillas. Samples of present day diatom assemblages were taken to provide modern analogues for fossil assemblages preserved in lake sediments. Water quality data, both physical and chemical, were gathered to provide more precise ecological information. Vegetation surveys, and where possible pollen sampling, were undertaken to provide information on the present day distribution of taxa.