Institution: Plymouth University

Unit of Assessment: C17 (Geography, Environmental Studies and Archaeology)

a. Overview

This submission outlines the main areas of research activity associated with the Plymouth University **CENTRE FOR RESEARCH ON ENVIRONMENT AND SOCIETY (CeRES)** which forms the basis of our submission to UoA 17 for the REF period 2008-2013. CeRES is the focus for an internationally recognised group of staff with common research interests at the interface of the Social and Natural Sciences. It includes the following five research clusters:

1. **ENVIRONMENT, SOCIETY AND GOVERNANCE (ESG)**; Human-environment interactions and resilience (***Wilson, Lavau***), environmental governance, climate policy and eco-cities (***Bailey***), multifunctional rural spaces and post-productivist land use (***Wilson, Yarwood***), migration, identity and place (***Tyrrell***) and culture-landscape-nature (***Brigstocke, Lavau, Simpson***). A major research strength is in transport, which ties directly to the Centre for Sustainable Transport (***Shaw***) and to the Devon and Cornwall Rail Partnership.

2. **GEOGRAPHIES OF INTERNATIONAL DEVELOPMENT (GID)**; including post-colonialism, critical geopolitics and trans-nationalism. This fosters productive interfaces between Human Geography, Area Studies, International Relations and cognate disciplines via the Plymouth International Studies Centre (PISC). The GID cluster is making critical contributions to understanding contemporary political and economic transitions in southern Africa (***Davies***), Middle East-North Africa (***Holden, Holliday***), South & East Asia (***Hodder, Rahman***) and British foreign policy (***Gaskarth***), including the shifting geographies of rural and urban economic development, and inter/national governance and power. Because of its multi-disciplinary nature, we have requested cross-referral of 6 publication outputs from this cluster to REF sub-panel 22 (Politics-International Studies).

3. **QUATERNARY ENVIRONMENTS AND GLOBAL CLIMATE CHANGE (QE)**; peatland ecosystems and natural carbon storage (***Daley***), sea- and lake-level change (*Gehrels, Marshall,* ***Roberts***), palaeoecology and environmental archaeology (***Fyfe, Roberts, Whitehouse***), the human genetic history of Europe (***Demaine***) and long-term landform evolution (***Mather, Telfer***). This cluster has been at the forefront of UK palaeoenvironmental research for the last three decades, using a wide range of analytical techniques that includes pollen, diatom, invertebrate, DNA, sedimentological and stable isotope analyses, along with optical and ^{14}C dating. These are often used in a multi-proxy framework, along with numerical calibration and chronological modelling, to investigate issues of past cultural and environmental change over a hierarchy of timescales from historic to Late Cenozoic.

4. **CATCHMENT AND COASTAL MANAGEMENT (CCM)**; hydro-geomorphological processes and management (***Downs, Gilvear***), land-use change and impacts of wildfire on catchment sediment dynamics (***Blake***), coastal zone management and marine policy-making (*Fletcher,* ***Glegg, Rodwell***), the latter linked to the Research Centre for Marine and Coastal Policy (MarCoPol). Staff from both CCM and QE clusters use and operate campus-wide, multi-disciplinary facilities and instrumentation such as CoRIF (Consolidated Radio-Isotope Facility).

5. **ELECTIONS CENTRE (EC)**(***Thrasher, Rallings, Borisyuk***); compiles, analyses and publishes electoral information and has built a substantial reputation in both the academic and applied fields. It is widely recognised as one of the leading centres of expertise and knowledge on UK electoral geography and geopolitics at national, local/regional and European scales.

Two-thirds of the CeRES academic staff in this submission are members of the School of Geography, Earth and Environmental Sciences (SoGEES; 70+ staff) in the Faculty of Science and Environment. It also includes staff from Politics/International Relations in the School of Government (in the EC and GID clusters), from Marine Science and Engineering (CCM) and from the Plymouth Medical School. As part of our interdisciplinary engagement, CeRES staff work

closely with colleagues in other University Research Centres, including those in Earth Sciences; Coastal & Ocean Science and Engineering; Biogeochemistry; Sustainable Leadership, Governance and Policy; Agriculture and Rural Sustainability. Our research complements world-class research-led teaching and training at both undergraduate and taught postgraduate levels in cognate disciplines.

b. Research strategy

The aim of CeRES is to draw together staff focussed on three linked fundamental elements, 1) environmental processes and change, 2) environment-society interactions, and 3) their governance through regulation, management policies and stakeholder involvement. Our different research clusters are linked through common engagement in substantive research themes ranging from understanding climate change (QE, ESG), environmental challenges from catchment to coast (CCM) to the sustainability of contemporary communities exposed to complex globalisation, political, environmental and development processes (GID, ESG, EC). CeRES is methodologically innovative and interdisciplinary by transcending and blending the traditions of the natural sciences (e.g. Physical Geography), social sciences and humanities (e.g. Human Geography, Politics/International Relations).

Our research strategy emphasises long-term sustainable progress; for example, all of the research clusters were part of our RAE2008 (UoA32) submission, and research strategies outlined in RAE2008 show good continuity through to REF2014, notwithstanding changes in academic staff and administrative structures. At RAE2008 we identified as future priorities (1) stronger engagement with the marine and coastal policy theme linked to the Marine Institute, and (2) strengthening geographical contributions to policy-based research. The first of these is reflected in the current REF submission in the research contributions of ***Rodwell*** and ***Glegg*** linked to the Centre for Marine and Coastal Policy (MarCoPol), while the second is described and clearly illustrated in our REF3a statement and Impact Case Studies. These cover smart ticketing for public transport in South West England, sea-level rise and critical transport infrastructure, the British Local Elections Database, and the wildfire threat to water resources.

Our future research vision is aligned with Plymouth University's Strategy 2020 to develop further our research standing and impact internationally, and to achieve resilience, sustainability and effectiveness. The University provides the conditions needed for world-class research and innovation to flourish, and to ensure that our research is built on strong ethical foundations. Since RAE2008, the University has established ~20 University Research Centres (URCs), of which CeRES is one. The URCs are the primary mechanism through which the University's research strategy is developed at grass roots level and put into practice, notably via strategic planning and investment. The URCs in turn are aligned with a number of overarching University Research Institutes, designed to promote inter-disciplinarity, with CeRES affiliated to the Marine Institute (MI) and the Institute for Sustainability Solutions Research (ISSR). Plymouth is home to some of the UK's leading marine and maritime research, as evidenced by the 2012 award of the Queen's Anniversary Prize for Higher Education in recognition of its world class marine research and training. The MI provides the University's interface with cognate institutions including Plymouth Marine Laboratory (PML), the UK Marine Biological Association (MBA) and the Sir Alistair Hardy Foundation. The ISSR provides an important framework for strengthening sustainability-oriented research within the University and acts as a gateway for business, government, civil society and the broader community. Its current director is a geographer (***Daley***).

CeRES aims to maintain and enhance a thriving international centre of research excellence, and in pursuit of this goal, the following key objectives lie at the core of our strategy for 2014-20:

i. Delivery of internationally excellent research publications: CeRES provides an enabling environment for research staff to produce outputs of the highest quality;

ii. Strengthening the contribution of CeRES to interdisciplinary understanding of complex environment-society linkages, in line with the University's desire to connect disciplines in novel ways;

iii. Enhanced engagement with policy-relevant research via stakeholders and funders, and

promotion of public understanding;

iv. Further expansion in size and scope of our PhD research training programme: linked to a policy of diversifying our intake of national and international research students (see Section c);

v. Maintenance of strong external research income, diversification of income streams, and expansion of post-doctoral communities, with funding from a variety of sources ranging from Research Councils, the EU, Charities, and the corporate sector (see Section d).

CeRES provides a wide range of support for individual researchers and for its research clusters, including:

- staff are given up to £1000/year for conference attendance or to cover other research costs. In addition, a competitive Pump Priming Fund (PUP) round allows staff to apply for in-house research grants of up to £3000 on a yearly basis, with the expectation that these will lead to larger external grant submissions. Competitive small research grants are also available through the University's Research Institutes (MI, ISSR). These schemes can be especially valuable for early career staff who are building their research profile;
- Staff in CeRES can take advantage of a sabbatical programme that allows staff to apply for one period of research leave every 3 to 4 years, with up to four staff on sabbatical in any given year. This enables staff to engage in depth with specific research projects for up to 6 months without the distractions from teaching and administration, and to develop international collaborative links. Sabbaticals are competitive and target-led, and staff subsequently have to report (on paper and via a research seminar) on the outcomes. In the current REF period, most staff in UoA17 benefited from a period of sabbatical leave, resulting in numerous strong publication outputs and grant applications. In several cases sabbaticals were associated with prestigious externally-funded research fellowships (e.g. Blaustein Fellowship to ***Roberts***, Stanford University; ***Gaskarth*** as Visiting Scholar at UC Berkeley; ***Holden*** as Visiting Fellow at the Institute for International Integration Studies at Trinity College Dublin; ***Demaine*** as Visiting Professor at Pfizer, Groton, USA)
- Grant applications are given excellent administrative support via the University's Research and Innovation Division (R&I), while academic staff are incentivised by a share of research council and other grant income being moved to individual Strategic Research Accounts for their own audited use. Equally important, the time commitment for holders of large grants forms part of their overall workload calculations, which can be used to offset teaching and administration. CeRES staff are engaging positively with the Research Council demand management policy, geared towards producing high quality grant applications. This includes mandatory but supportive CeRES-internal peer review and vetting of grant applications.

For individual academic staff, setting of targets and monitoring of their attainment is accomplished by:

- Personal research plans (PRPs) presented at the start of the academic year by all individual staff; these are both retrospective, reflecting on the previous year's target, and prospective for the coming 12 months. They are evaluated and monitored by CeRES coordinators (***Roberts*** + ***Wilson***),
- Collective research plans that draw on PRPs to summarise activities and targets in the research clusters each year,
- An annual research report, as a public factual record of publications and research activities, available via the CeRES web site.

Staff attainment as recorded in these documents is monitored by the CeRES research management group, which meets termly. They also feed into workload calculations and Performance Development Review for all staff, carried out by research cluster coordinators and the Head of School.

We foster active research dialogue within, between and beyond our research clusters via

- Weekly research seminars, by both invited external speakers and CeRES staff on their current research projects (e.g. sabbatical reports);

- the Plymouth International Studies Centre (PISC) which has hosted over thirty external guest speakers in the REF period as well as offering a platform for PhD students to present their work and contribute to research debates;
- regular lunchtime research meetings for Physical and Human Geography, where pertinent research issues, publication plans, PhD issues and projects, and project applications are discussed;
- conferences and workshop events, such as 1-day annual conferences for the ISSR and the MI, and events including the annual Southwest Quaternary lecture (joint Plymouth-Exeter-Cornwall) and the annual Plymouth marine lecture (joint with PML, MBA, etc).
- inter-disciplinary exchange of ideas through periodic meetings and exhibitions, such as Scott 100, which explored connections between science and the arts in Antarctica, on the centenary of the death of Captain RF Scott and his party. This was curated by the University's Peninsula Arts and involved both human and physical geographers.

Along with activities such as the University's 2-week public Festival of Research, these bring our research community together on a regular basis and help to ensure maintenance of a vibrant research culture.

Strategic initiatives currently under way to help deliver our research objectives, with University funding support, include two fixed-term lectureships using QR funds to support our programme of sabbatical research leave, the appointment of a research officer to aid developments in sustainable transport, two research assistants to help laboratory and data-analytical work in Human and Physical Geography, and extensive investment in enhanced capital infrastructure (see Section d). Collectively, these will encourage further strengthening and internationalisation of the CeRES research agenda. CeRES will continue to place great emphasis on a buoyant postgraduate community. Although the PGR funding environment is expected to continue to be challenging post-2013, we expect to maintain strong PGR numbers. We will draw, for example, on the European Social Fund convergence funding provided via the Combined Universities in Cornwall of which Plymouth University is a member, and on new links forged with Geography at Hong Kong Baptist University for joint PhD supervision and training.

c. People, including:

i. Staffing strategy and staff development

There has been a turnover of around half of our academic staff since RAE2008, with a small increase in staff numbers submitted to REF2014 (27.5 vs 29.2 Category A FTE). Two staff returned to UoA32 in RAE2008 have retired, two others have moved within the University, while seven have moved to positions in other universities within the UK or overseas). A strategy of replacement and succession planning has allowed the recruitment of five new lecturing staff in Human Geography (***Brigstocke, Lavau***, ***Simpson, Tyrrell,*** *Balch*) and six in Physical Geography (***Daley, Downs, Gilvear, Telfer, Whitehouse, Mills***). With the exception of two staff on 3-year posts, these are permanent appointments, and all but one of these new staff are being included in our REF2014 submission. The result is a diverse and demographically-balanced profile (7 professors [24%], 12 senior lecturers/readers [41%], and 11 lecturers [35%]). Senior academic leadership has been maintained in all of our research clusters, which has allowed overall continuity in research management.

A fundamental element in our staffing strategy is to ensure that new appointments are aligned with our strategic research objectives; e.g. high academic and practical/policy impact. Retention of talented research-active staff is another essential priority. A key vehicle for this is the annual round of open promotions that gives high priority to research activity. Since RAE 2008, there has been one promotion to professor (***Shaw***, to head the Centre for Sustainable Transport) and 7 promotions from lecturer to Senior Lecturer or Reader (***Bailey, Blake, Fyfe, Gaskarth, Rahman, Rodwell, Yarwood***).

We have been pro-active in ensuring that all staff are provided with clear career development pathways, via an array of methods that include staff mentoring, co-supervision of research

students, and leadership training for mid-career staff. Specific emphasis is placed on structured staff development for early career researchers (ECRs) including post-doctoral research staff. At School level, workload allocation systems are designed to ensure that early career staff are given time to develop their research profiles alongside building their teaching portfolios. At university level, the importance accorded to ECRs has been highlighted by Plymouth obtaining the EU HR Excellence in Research Award (2011) for implementation of the Concordat to Support the Career Development of Researchers. The university's Researchers Forum has also been instrumental in bringing together ECRs in bespoke development workshops to discuss research experiences and to exchange information about networking opportunities. Generic training on topics such as research ethics, PhD supervision and writing grant applications is provided through the University's Educational Development and Learning Technologies Unit (EdALT) and external courses. These and other research skills now form part of the Postgraduate Certificate in Education Practice (PGCAP) that is mandatory for all staff new to HE. Standards of research quality and integrity are maintained through rigorous procedures implemented by the University Ethics Committee (UREC) which establishes broad principles and guidelines, and the Faculty Research Ethics Committee (FREC) which scrutinises individual applications. All research projects involving human participants have to apply for ethical clearance and project proposals are frequently modified and improved as a consequence.

Equalities and diversity are central to our staff policies, with the goal to achieve gender and ethnic balance (e.g. recent appointments of ***Tyrrell, Whitehouse, Mills*** and ***Lavau***; 33% of staff entered into UoA17 are female, compared to only 9% in RAE2008). We work actively to ensure that staff taking maternity leave and other career interruptions are given the best opportunity to re-engage with their research careers, for example, via flexible working; this includes those progressing from PhDs to become post-doctoral researchers, and other staff who have been working outside academia for some time (e.g. ***Downs*** who worked for a decade in environmental consultancy before his appointment at Plymouth).

Our research community extends beyond the staff whose outputs are included in REF2:

- Emeritus staff, including several Professors Emeritae who have been active in research and publication during the current REF period (*Pinder, Gilbertson, Kent*) along with others from outside academia (e.g. *Sir Robert Coleman*, formerly head of the EC Transport Directorate); these have played an important role as senior advisors within CeRES;
- Regular visits by international staff to CeRES. Visiting staff stay periods of time from a few days to 6 months, and usually work with one or more staff on joint international projects, or join CeRES through a Visiting Research Fellowship Programme. During the last 5 years CeRES has welcomed visiting fellows from, among elsewhere, Israel, Italy, Spain, USA, Canada, Australia, China and Bangladesh.

ii. Research students

UoA 17 provides an excellent and supportive environment for PGR students, with continuing strong recruitment since 2008. CeRES currently has ~35 PhD/MPhil students, and ~80 students on our taught Masters courses in 'Sustainable Environmental Management', 'Planning', 'International Relations: Global Security and Development' and 'Environmental Consultancy', including several MRes degrees that are designed to lead towards PhD research. Together with our research-led undergraduate teaching, this creates a seamless pathway for talented and motivated students to progress towards postgraduate research at Plymouth or elsewhere. In particular, Masters dissertation projects are commonly linked to staff research programmes, and this allows students to be embedded within the wider research culture; the best of these projects lead into published outputs in which Masters students are (co-) authors. The period 2008-2013 has been particularly successful with regard to higher degrees, with 40 successful PhD completions (up from 29 completions over a longer period in RAE2008). We have worked to diversify our funding sources for research students, many of which have been externally-funded and competitive, including

- four studentships under the South West RDA Great Western Research scheme,
- two NERC- and three ESRC-funded PhD students,
- twelve overseas-funded PhD students (four of them linked to a Plymouth-Damascus

postgraduate training programme, others from Nigeria, China, Iran, Turkey, etc),
- a major strategic investment of the University's QR funds has supported 14 studentships, awarded competitively.

This diversity is crucial for the postgraduate culture and research environment in CeRES, as it promotes inter-disciplinarity, encourages (and funds) students to present their research at national/international fora, and provides a platform for close research interaction between research students and staff; many PGRs are also employed part-time in larger funded research projects. Our strong and integrated research student culture is evident in well-attended biennial PhD symposia (open to all PhD students, especially part-time) and the active participation of PhD students in the weekly research meetings for Physical and Human Geography, where they often shape discussion topics. Many of our PhD students contribute towards undergraduate teaching, and gain valuable experience and remuneration as a result. PhD students and post-doctoral researchers can apply for supplementary CeRES funds of up to £500/year to support their research beyond their grants or if they wish to attend special workshops/conferences.

The University operates a rigorous system for admissions of research students and monitoring of their progress. All applications are assessed by the respective chair of postgraduate affairs (e.g. ***Wilson*** for Geography, ***Rallings*** for the EC research cluster) and one other independent member of staff, and interviews are always held with prospective students. Overseas applicants are scrutinised thoroughly with regard to educational background, language skills and quality of the PhD proposal, and offers are often conditional upon further in-house training either in English language or in technical competencies. All PhD students are assigned to a team of at least two supervisors (one as Director of Studies). Co-supervisors can also be drawn in from other Research Centres at Plymouth encouraging interdisciplinarity (e.g. co-supervision of two PhD students between physical geography and analytical chemistry linked to the CoRiF laboratory) or inter-institution collaboration (e.g. with Exeter University for CUC- and GWR/RDA-funded students). All research students are further supported in a cohort approach with a mentoring system of peer student support. Academic staff supervising research students have to attend the University Supervisory Development and Mentoring Programme to support good practice in supervision and research degree examining. School-based PhD monitoring groups provide a forum for discussion of practical postgraduate issues.

All research students are initially enrolled as MPhil/PhD students and have to pass a rigorous upgrade procedure after 12-18 months (24-36 months for p-t students) before being confirmed into the PhD route. Scrutiny of candidates' progress at this stage also involves an independent assessor. The organisation of research student monitoring is undertaken by the University Graduate School with a unified regulatory and procedural framework. This includes the use of a student focussed logbook for monitoring progress from initial registration through to completion, and the monitoring of completion of progress report forms.

Research students are members of wider University Doctoral Training Centres (DTCs) that implement PhD training sessions based on shared PGR student needs and which provides a forum for wider academic debates and discussions. The Social Sciences DTC (of which ***Yarwood*** is currently Director) serves research students in Human Geography and Politics/IR, among other disciplines. The DTCs aim to enhance skills through selective courses in our MSc Social Research that offers courses on methodologies and analytical techniques. Beyond DTCs, postgraduate students are given opportunities for research development through campus-based workshops on writing skills, fieldwork practice and the research publication process. Research students are encouraged, where appropriate, to publish results during their PhD programme, with students and supervisors agreeing authorship at the beginning of projects. At University level, our PhD students are part of the Researcher Development Programme for research students and researchers mapped to the VITAE Researcher Development Framework. This also helps to create a seamless transition from doctoral to post-doctoral research, and hence aids career progression. Our completion rate is excellent and most of our PhD students have gone on to develop careers that build on their research training, in some cases via academic careers, in others in relevant government agencies, the voluntary sector or in businesses. Some, such as Rob Hopkins (Transition Towns movement), now have national profiles.

d. Income, infrastructure and facilities

Research grant income over the 5-year reporting period has totalled >£3.2m (with an overall ~30% success rate), averaging >£600k/year. Successful grant funding ranges from small grants for personal research (e.g. British Academy, Nuffield Foundation, Seale-Hayne Education Trust) to large grants from national and international agencies. Funding bodies range from charities, Research Councils, the European Commission, to government bodies such as DEFRA, the Environment Agency or SWRDA. Large research consortia play a particular important role in the CeRES research strategy and several members of staff (e.g. ***Shaw, Wilson, Bailey, Rodwell***) have been successful in securing shares in large consortia grants. We have been notably successful with NERC, receiving 10 new awards totalling £820K since RAE2008, and achieving a 35% success rate in grant applications since 2008.

Based on the CeRES research strategy, research funding and high quality research outputs in UoA17 are closely interlinked. Although some of the most widely cited outputs that are being submitted are associated with theoretical/conceptual developments of ideas, a clear majority of them are linked directly or indirectly to empirical research grants. A good example is provided by the Leverhulme-funded 'Deforesting Europe' project of ***Roberts*** and ***Fyfe***, which was initiated via a £5k internal pumping priming (PUP) grant and which has led to journal papers including Fyfe2 (REF2).

Large grants have enabled CeRES to maintain a buoyant post-doctoral community entirely funded by external income. Among the most prestigious competitive grant awards made to CeRES staff since 2008 have been;

- ***Bailey/Rodwell***: Wave Hub impact, PRIMaRE (SWRDA), SOWFIA & INTERREG MERIFIC (both EU)
- ***Blake***: Contaminated sediment in river basins, Marie Curie Fellowship to Hugh Smith
- ***Daley***: Palaeoclimate in Tierra del Fuego, and Carbon sequestration by peatlands (both NERC)
- ***Fyfe***: Dartmoor Blanket Bog Restoration (Dartmoor National Park)
- ***Gaskarth***: ESRC seminar series on 'Normative challenges to international society: rising powers and global responses'
- *Gehrels/Marshall*: Late Quaternary sea-level change, 3 NERC project grants
- ***Rahman***: KTP Milk Link Ltd
- ***Roberts/Fyfe***: Deforesting Europe, Leverhulme Trust
- ***Roberts***: Climate change and the Justinian Plague, NERC
- ***Rodwell***: Impact of climate change and of conservation management on fisheries, NERC (QUEST programme), Inshore Fisheries and Conservation Authority
- ***Shaw:*** smart ticketing (SW Capital Fund), and transport needs in an ageing society (EU)
- ***Tyrrell:*** Scientific Mobility and Family Life in Europe, EU Marie Curie award
- ***Wilson***: LEDDRA on land degradation and community resilience, and Farmpath (both EU)

In order to assist staff with grant applications, we offer incentives as well as targets, along with critical support and internal peer review (detailed in Section c above). Our overall strategy has been to support a spectrum of research applications, ranging from 'blue skies' (e.g. UK charities), through trans-national research agendas (EU), to national and regional policy relevance (UK Government and regional authorities), to more local needs (e.g. National Parks, local authorities); in many cases, these represent partnership arrangements, including KTPs.

Infrastructure, facilities and technical staff. Most staff in UoA 17 are now housed in new offices as part of the ~£100m redevelopment of the University campus. Geography staff were rehoused in 2012, with all academic, research and administrative staff co-located in a single modern office building. PGR students are housed in large open-plan offices that encourage in-depth academic exchange, and have their own desks and computers, replaced on a 4 year cycle. Library provision has been substantially upgraded since RAE2008, with investment in IT facilities and a state-of-the-art electronic library system. Technical support staff are located in an adjacent building (Davy) which incorporates the bulk of the University's science laboratories, along with some teaching space and the cartographic unit (and map reference collection). Research support is provided by a

technical manager, 3 laboratory technical officers and 3 geospatial/cartographic technical officers, all of whom have specialist skills (e.g. pollen slide preparation, identification and counting), and who provide vital support for our research projects. Staff working on coastal and marine environments draw benefit from the establishment of a £2m Marine Business Technology Centre to interact with marine businesses.

UoA 17 achievements in physical geography are underpinned by a commitment to maintaining laboratories and instrumentation to a level commensurate with leading institutions in the discipline. Research laboratory facilities have recently been upgraded and include a suite of laboratories, a field store and two walk-in cold stores. The laboratories house a Bran & Luebbe Autoanalyser, two Skalar-Primacs carbon analysers, a Perkin Elmer Lambda-35 UV/VIS spectrometer, a Malvern Mastersizer 2000 and Malvern Mastersizer-Xparticle size analyser, a Bartington Multisus magnetic susceptibility meter, optical research microscopes and an associated image analysis system. Our field capabilities include multiple coring systems and a pulseEKKO GPR for surveying. Of particular relevance to the CCM research cluster is the Consolidated Radio-Isotope Facility (**CoRIF**), with Faculty-wide users, for which ***Blake*** is academic director. It is an ISO 9001:2008 accredited laboratory that provides a range of contract analytical services (see REF3a). With external funding the University recently opened its £19M Marine Building and purchased the £14M ocean-going research vessel RV *Falcon Spirit* to service wave hub projects and facilitate other coastal surveys. Physical Geographers are also supported by the Electron Microscope Unit, a high-quality Faculty-wide facility. A rolling programme of capital expenditure allows planned renewal of equipment and new acquisitions which, during the current assessment period, include a Niton XRF analyser (XL3T 950), a Planetary Grinding Mill, a Mars Microwave digestion unit, 2 Thermo-Scientific ICP-MS, X-series II (located in Environmental Chemistry), a Modulyo D-230 Freeze Drier and a portable Gamma Spectrometer (Inspector 1000 digital hand-held MCA).

e. Collaboration and contribution to the discipline or research base

UoA 17 staff are actively involved in discipline-based and cross-disciplinary initiatives in the UK and overseas, which contribute significantly to the wider research base.

At international level, evidence of research engagement, collaboration esteem includes

- Organising symposia, conference sessions and workshops; e.g. 12th International Symposium on the Interactions between Sediments and Water, Dartington, Devon, 2011 (***Blake***); Anglo-German Rural Geographers Meeting, Oldenburg, Germany, 2008 (***Wilson***); ESF-funded MedCLIVAR workshop on oxygen isotopes as tracers of Mediterranean climate variability, 2008, Pisa, Italy (***Roberts***); CeRES staff also regularly act as invited keynote speakers at international conferences;
- Journal editorships including *Journal of Transport Geography* (***Shaw***), *Geography Compass* (***Wilson***, section editor) and *Quaternary Science Reviews* (***Roberts***); several staff also sit on journal editorial boards, such as *Environment and Planning C* and *Open Political Science Journal* (***Bailey***), *Journal of Rural Studies* and *Land Degradation and Development* (***Wilson***), *International Journal of Agricultural Management*, the *Singapore Journal of Tropical Geography* and *ISRN Economics* (***Rahman***), *International Journal of Rural Crime* and *Geography* (***Yarwood***), *Journal of Elections, Public Opinion and Parties* (***Rallings***), *The Holocene* (***Roberts***), *International Journal of Wildland Fire* (***Blake***), *Quaternary International* (***Whitehouse***), *Rivers Research and Management* (***Gilvear***), and *Geomorphology* (***Mather***);
- Advisory roles such as expert reviewing of the 4th and 5th IPCC reports (***Bailey, Roberts,*** *Gehrels*), advising the Scottish Beaver Trial and Beaver-Salmonid working group (***Gilvear***) and serving as Research Agreement Holder within IAEA/UN FAO Coordinated Research Programme on isotopic methods to evaluate Land Degradation (***Blake***), and holding senior positions in international bodies such as INQUA (*Gehrels,* ***Whitehouse***)
- International multi-disciplinary projects and collaborations, among them
  - EU-funded LEDDRA project on resilience and land degradation that has brought together human geographers ***Wilson*** and Kelly (PDRA) from CeRES with hydrologists from China,

ecologists from Spain and Morocco, economists from Italy and sociologists from Greece;
- ***Rahman***, who is adjunct Professor of Economics at Chiang Mai University (Thailand) and also has long-standing research collaboration with economists and agricultural scientists at the Curtin Business School (Australia) and with three universities in Bangladesh;
- Research on the effects of the Fukushima nuclear disaster via fluvial re-working of radio-isotopes, in collaboration with the University of Tsukuba (***Blake***)
- ***Hodder***, following a year-long research fellowship in the Philippines that involved collaboration with political scientists at the University of Manila on questions of governance and bureaucracy
- ***Rodwell***, Protected Area Network Across the Channel Ecosystem (€4.8M PANACHE programme)
- ***Whitehouse,*** ERC-funded FRAGSUS programme on cultural change on island environments, in collaboration with Queens' Belfast, Cambridge and Malta
- ***Demaine,*** collection and analysis of DNA samples from 'Cornish Celts' that has formed part of European studies investigating past population migration (for WHO and others)

At national level, CeRES staff have been actively involved in

- Professional societies, including the Royal Geographical Society (RGS/IBG) and its study groups, among them Transport, Rural Geography, Social and Cultural Geography, Children, Youth and Families (***Tyrrell*** is conference secretary), History and Philosophy (***Simpson*** is membership secretary), and Geomorphology (***Downs*** is national BSG Secretary); ***Roberts*** was an elected member of the RGS-IBG management and research committees (2008-10), and is Secretary to the Committee of Heads of British Geography in HEI; ***Fyfe*** was membership secretary and ***Whitehouse*** Chair of the UK Association for Environmental Archaeology;
- Research Councils, including the commissioning panel of the 2009/10 and 2015 ESRC British Election Study (***Rallings***), the NERC and AHRC Peer Review Colleges (*Gehrels,* ***Whitehouse***) and NERC Field Spectroscopy steering committee (***Gilvear***);
- Significant contribution to the wider UK academic community, e.g. with a collective total of over 30 external PhD examinations undertaken during the assessment period (2008-13)
- National advisory bodies, such as the Access to Elected Office Advisory panel set up by the Government Equalities Office within the Home Office (***Rallings***), and for the Foreign and Commonwealth Office on British Foreign Policy (***Gaskarth***);

With a strong focus on enterprise, Plymouth University particularly encourages staff to build partnerships with industry, commerce, third sector and other users of research at regional and local level (see also REF3a), and CeRES staff have engaged in this mission, for example:

- The Devon and Cornwall Rail Partnership (D&CRP) which has been based at Plymouth University since its establishment in 1991, with *David Pinder* (now Professor Emeritus) having played a central role. The University contributes in kind to this highly successful community partnership, alongside funding from local authorities and the rail franchise holder;
- with National Park Authorities, e.g. ***Fyfe's*** field research with archaeologists from Cornwall County Council, DNPA and English Heritage, which led to the excavation of a unique Bronze Age burial on Dartmoor (BBC TV national news 08/11; 2/13);
- Lyme Bay, the first large Marine Protected Area in the UK which was designated to protect high-biodiversity reefs from towed fishing gear, work coordinated by the Plymouth MI (***Rodwell***)
- Plymouth as the Southwest UK centre for daily pollen monitoring, linked to asthma and allergies (***Fyfe***) and Plymouth Medical School linked to National Institutes of Health Genome Wide Association Studies (***Demaine***)

These and other collaborations have greatly enriched the research environment of UoA17 by providing a stakeholder 'grassroots' perspective on key research questions investigated by our staff, by encouraging policy-relevant research with a real impact 'on the ground' and by providing links with networks, communities and policy recipients that would otherwise not have been accessible.