

EVALUATION OF NERC CENTRES 2020: METHODOLOGY

Introduction

1. NERC's Executive Chair commissioned an independent evaluation of the research excellence and impact of six Research Centres owned or supported by UKRI-NERC using Research Excellence Framework (REF)¹ methodology, modified where necessary. The evaluation follows a similar exercise conducted by NERC in 2013.
2. The purpose was to provide outcome and benchmarking evidence on the excellence and impact of the Centres. The evidence is used by NERC to inform funding decisions, demonstrate the excellence and impact of NERC investment and environmental science, and support funding bids. The results are also used to calculate Institutional Funding to Centres. The evaluation evidence is used by the Centres to demonstrate success, celebrate achievement and drive improvement.
3. The assessment period was 2013-2019. The evaluation covered six Research Centres: British Antarctic Survey (BAS), UK Centre for Ecology & Hydrology (UKCEH), National Centre for Atmospheric Science (NCAS), National Centre for Earth Observation (NCEO), National Oceanography Centre (NOC) and the Plymouth Marine Laboratory (PML)².
4. The scope included the quality of research outputs produced by current and former research staff, regardless of funding source; the Centre's economic and societal impact, regardless of funding source; and the vitality and sustainability of the Centre environment for research and impact. It excluded detailed assessment of infrastructure, facilities, service provision and Centre management which are evaluated separately.
5. It is important to note that the REF methodology (and hence methodology for this evaluation) has changed since the last exercise, which means that these results cannot be directly compared with the 2013 Centre evaluation results or the REF 2014 results.

Methodology

6. The evaluation was designed using the following key principles:
 - Enable benchmarking of Centres against higher education institutions by matching REF 2021 methodology as closely as possible; and the three main REF principles:
 - Equity: all types of research and all forms of research output across all disciplines shall be assessed on a fair and equal basis;
 - Equality: embed equality and diversity, Centres are expected to comply with equality legislation in their processes for submitting staff and outputs; and
 - Transparency: the credibility of the evaluation is reinforced by transparency in the process through which decisions are made.

¹ Evaluation of the excellence and impact of UK Higher Education Institutions www.ref.ac.uk

² Information about the Centres is available on their websites: www.bas.ac.uk, www.ceh.ac.uk, www.ncas.ac.uk, www.nceo.ac.uk, www.noc.ac.uk, www.pml.ac.uk. This was the first time PML and NCEO were included in this approach to evaluation. The NERC owned British Geological Survey uses a different approach for evaluation, due to BGS's specific role as a survey.

7. The evaluation was conducted by two independent Panels: a Research Excellence Panel comprising twenty-three active and recently retired researchers including one from each Centre being evaluated; and an Impact Panel comprising fifteen members from research user organisations including private, public and third sector (membership at **Annex A**). This is different from the REF, where the assessment is conducted by a single sub-Panel, and reflects the broader remit of Centres compared to HEIs.
8. Both Panels included members with experience of the previous and current REF and the previous NERC evaluation. The Chairs had experience of both. Both Panels included members of NERC Science Committee, and a member of NERC Council served on the Impact Panel. The exercise was led by the NERC Impact and Outcomes team.
9. The evaluation comprised three components: research excellence, impact excellence and 'research and impact environment':
 - **Research Excellence:** research outputs submitted by eligible research staff were assessed by the Research Excellence Panel using the REF criteria of originality, significance and rigour;
 - **Impact:** impact case studies were assessed by the Impact Excellence Panel using the REF criteria of reach and significance; and
 - **Research and impact environment:** narrative evidence submitted by the Centres was assessed by both Panels using the REF criteria of vitality and sustainability.
10. **Annex B** provides more detail on the eligibility criteria and assessment criteria for the three components. Transparency and fairness procedures were modelled on the REF, and are summarised at **Annex C**. **Annex D** summarises differences between the 2013 and 2020 evaluation methodology, which mean that the results cannot be directly compared.
11. Centres submitted their list of eligible staff in July 2019, and their evidence in February 2020. The Panels met during March – July 2020. Each had an induction meeting, followed by the main assessment meetings. The meetings were mostly conducted remotely due to the Covid-19 pandemic.
12. The evaluation results and a written response from each Centre were discussed by NERC Council in December 2020.

ANNEX A: PANEL MEMBERSHIP

Note: Panel members with major potential conflicts of interest in a Centre (e.g. staff member, member of Centre's Advisory Board), did not assess any evidence from that Centre and were not present for the Panel's discussion of that Centre.

Research Excellence Panel

- Professor Mary Fowler, Master, Darwin College, University of Cambridge (Chair). Member of Excellence Panel for 2013 Evaluation of NERC Centres, Deputy Chair of REF 2014 Main Panel B: Sub-panel 7
- Professor Sheldon Bacon, Head of Marine Physics and Ocean Climate, National Oceanography Centre
- Professor Mike Bentley, Head of Department, Geography, Durham University
- Professor Lucy Carpenter, Professor of Atmospheric Chemistry, University of York
- Professor Anny Cazenave, Emeritus scientist, LEGOS-CNES (Toulouse, France) and Director for Earth Sciences, International Space Science Institute, Bern
- Professor Helen Dacre, Lecturer in Dynamical Meteorology, University of Reading
- Professor Mat Disney, Professor of Remote Sensing, NERC National Centre for Earth Observation and University College, London
- Professor Lora Fleming, Chair, Director European Centre for Environment and Human Health, University of Exeter. Member of NERC Science Committee
- Professor Jim Harris, Professor of Environmental Technology, Cranfield University
- Professor Kate Heal, Professor of Catchment Biogeochemistry, University of Edinburgh
- Professor Alison Hester, Senior Scientist Ecological Sciences, James Hutton Institute
- Professor Maria Kanakidou, Professor Computational Environmental Chemistry and Director Environmental Chemical Processes laboratory, Department of Chemistry, University of Crete, Greece
- Professor Stuart Lane, Institute of Earth Surface Dynamics, University of Lausanne, Switzerland. Member of Excellence Panel for 2013 Evaluation of NERC Centres
- Professor Kathy Law, CNRS Director of Research in the LATMOS lab, Institute Pierre Simon Laplace (IPSL), France
- Professor David Marshall, Professor of Physical Oceanography, University of Oxford. Member of Excellence Panel for 2013 Evaluation of NERC Centres Member of REF 2021 Sub-panel 7
- Professor David Meldrum, Honorary Research Fellow, Technology Development, Scottish Marine Institute
- Professor Mike Meredith, Science Leader, Polar Oceans, NERC British Antarctic Survey
- Professor John Pyle CBE, NERC National Centre for Atmospheric Science and Professor of Physical Chemistry, University of Cambridge. Member of Excellence Panel for 2013 Evaluation of NERC Centres
- Dr Stefan Reis, Science Area Head – Atmospheric Chemistry and Effects, UK Centre for Ecology & Hydrology
- Professor Carol Robinson, Professor of Marine Sciences, University of East Anglia
- Dr Tim Smyth, Head of Science – Marine Biogeochemistry and Observations, Plymouth Marine Laboratory
- Professor David Thomas, Pro Vice-Chancellor for Research and Impact, and Professor of Marine Biology, Bangor University. Member of NERC Science Committee, member of Excellence Panel for 2013 Evaluation of NERC Centres

- Professor Paul Wignall, Professor of Palaeoenvironments, University of Leeds. Member of REF 2014 Main Panel B: Sub-panel 7

Additional assessors recruited to provide expert opinion for a small number of research outputs:

- Professor Tim Coulson, Professor of Zoology and Head of Department of Zoology, University of Oxford
- Professor Nick Polunin, Professor of Marine Environmental Science, Newcastle University

Attending ex officio

Dr Jennifer Jennings, NERC Associate Director Strategy and Insight

Main meeting day 1: Dr Andrea Sharpe, NERC Joint Head of Scientific Support & Facilities and Data

Main meeting day 2: Dr Blanche Wynne-Jones, NERC Joint Head of Scientific Support & Facilities and Data

Panel secretaries

Mrs Fiona Goff, NERC Head of Impact and Outcomes (Panel secretary)

Mrs Stephanie Cole, NERC Impact and Outcomes Manager

Impact Panel

- Dr Peter Costigan, Environmental Consultant (Chair). Member of REF 2021 and 2014 Main Panel B, Chair of the Evaluation of NERC Centres 2013 Impact Panel
- Dr Damitha Adikaari, Director for Science & Innovation for Climate & Energy, BEIS
- Ms Kirsty Britz, Director of Sustainable Banking, RBS
- Dr Alexandra Burch, Head of Public Programmes, Natural History Museum
- Dr Mark Fletcher, Global Water Business Leader, ARUP
- Dr Geoff Mackey, Corporate Affairs & Sustainability Director, BASF
- Professor Christine Maggs, Chief Scientist, JNCC. Member of REF 2021 Sub-panel 7 Earth Systems and Environmental Sciences, member of NERC Science Committee
- Mr Ben McCarthy, Head of Nature Conservation & Restoration Ecology, National Trust
- Mr Gordon McGregor, investor and advisor in a number of start up companies in energy and cleantech areas. Member of NERC Council, member of Evaluation of NERC Centres 2013 Impact Panel
- Professor Andrew Millar, Chief Scientific Adviser for Environment, Natural Resources and Agriculture, Scottish Government and Professor of Systems Biology, University of Edinburgh.
- Professor Kathryn Monk, Principal Advisor for Science, Natural Resources Wales. Member of REF 2014 and 2021 Sub-panel 7 Earth Systems and Environmental Sciences
- Dr Caron Montgomery, Chief Scientific Adviser's Private Office & Strategy Team, Defra.
- Mr Malcolm Ridout, Senior Advisor, DfID
- Ms Jo Royle, Managing Director, Common Seas
- Professor Jason Snape, Global Sustainability Director – Environment, Senior Principal Environmental Scientist, AstraZeneca

Attending ex officio

Dr Jennifer Jennings, NERC Associate Director Strategy and Insight

Induction meeting: Dr Hannah Collins, NERC Associate Director Strategic Programme Generation

Main meeting: Dr Iain Williams, NERC Director of Strategic Partnerships

Panel secretaries

Mrs Fiona Goff, NERC Head of Impact and Outcomes

Mr Alex Duffey, NERC Impact and Outcomes Senior Manager

ANNEX B: ELIGIBILITY CRITERIA AND ASSESSMENT CRITERIA

The REF methodology was followed, apart from a small number of changes to account for the differences between research centres and HEIs. These are noted below. The scoring level definitions are included in the accompanying results document.

Research Excellence

The staff eligibility criteria were designed to define a set of staff analogous to the REF, i.e. analogous to permanent, research-focussed academic staff at HEIs. Centres were required to submit all research active staff Band 5 and above in post on the census date of 1 January 2019, who spend 0.2FTE or more on research. Centres were required to submit an average of 2.5 research outputs per FTE submitted, with each person submitting between 1 and 5 outputs. REF procedure for Centres disproportionately affected by staff circumstances was followed.

Each output must have been produced during the assessment period, and be the product of research as defined in Box 1. All types of research outputs were eligible, regardless of funding source. Outputs produced by staff who left during the period were eligible provided the output was demonstrably generated at the Centre.

Box 1: REF definition of research

1. For the purposes of the evaluation, research is defined as a process of investigation leading to new insights, effectively shared.
2. It **includes** work of direct relevance to the needs of commerce, industry, and to the public and voluntary sectors; scholarship³; the invention and generation of ideas, images, performances, artefacts including design, where these lead to new or substantially improved insights; and the use of existing knowledge in experimental development to produce new or substantially improved materials, devices, products and processes, including design and construction. It **excludes** routine testing and routine analysis of materials, components and processes such as for the maintenance of national standards, as distinct from the development of new analytical techniques. It also **excludes** the development of teaching materials that do not embody original research.
3. It **includes** research that is published, disseminated or made publicly available in the form of assessable research outputs, and confidential reports.

The outputs were assessed against the following criteria:

- **Originality** will be understood as the extent to which the output makes an important and innovative contribution to understanding and knowledge in the field. Research outputs that demonstrate originality may do one or more of the following: produce and interpret new empirical findings or new material; engage with new and/or complex problems; develop innovative research methods, methodologies and analytical techniques; show imaginative and creative scope; provide new arguments and/or new forms of expression, formal innovations, interpretations and/or insights; collect and engage with novel types of data; and/or advance theory or the analysis of doctrine, policy or practice, and new forms of expression.

³ Scholarship is defined as the creation, development and maintenance of the intellectual infrastructure of subjects and disciplines, in forms such as dictionaries, scholarly editions, catalogues and contributions to major research databases.

- **Significance** will be understood as the extent to which the work has influenced, or has the capacity to influence, knowledge and scholarly thought, or the development and understanding of policy and/or practice.
- **Rigour** will be understood as the extent to which the work demonstrates intellectual coherence and integrity, and adopts robust and appropriate concepts, analyses, sources, theories and/or methodologies.

Impact

Centres were required to submit case studies describing impacts that had arisen during the assessment period as a result of their work. As in the REF, impact was defined as follows: Impact includes, but is not limited to, an effect on, change or benefit to:

- the activity, attitude, awareness, behaviour, capacity, opportunity, performance, policy, practice, process or understanding,
- of an audience, beneficiary, community, constituency, organisation or individuals,
- in any geographic location whether locally, regionally, nationally or internationally.

This includes the reduction or prevention of harm, risk, cost or other negative effects, and impacts on students and teaching.

The REF criteria and methodology were revised slightly to account for the broader and longer-term nature of Centres' remit compared to HEIs:

Feature	Evaluation methodology	REF methodology
Impact eligibility	Impacts may have arisen from any research/activity conducted by the Centre	Impacts must have arisen from excellent research
	The underpinning activities may have been conducted at any time	Research must have been conducted in the last 20 years
Submission requirement	One impact case study per 10 FTE eligible staff submitted	1 case study per 15 FTE eligible staff

Case studies describing a continuation of impacts submitted to the 2013 exercise were allowed providing it was demonstrated that significant (as judged against the criteria of reach and significance) new impact has been realised since the previous submission.

The criteria for assessing impacts were:

- **Reach:** The extent and/or diversity of the beneficiaries of the impact, as relevant to the nature of the impact. Assessed in terms of the extent to which the potential constituencies, number or groups of beneficiaries have been reached i.e. not in purely geographic terms, nor in terms of absolute numbers of beneficiaries. Wherever the impact occurred, regardless of geography or location, and whether in the UK or abroad; and
- **Significance:** The degree to which the impact has enabled, enriched, influenced, informed or changed the performance, policies, practices, products, services, understanding, awareness or wellbeing of the beneficiaries.

In assessing the impact described within a case study, the panel formed an overall view about its 'reach and significance' taken as a whole.

Research and Impact Environment

This component was assessed via narrative and data submitted by the Centres. The narrative word limit was defined by the number of staff submitted for the excellence component. The narrative comprised four sections:

- Context, mission and strategy;
- People;
- Income, infrastructure and facilities; and
- Collaboration and contribution to the research base, economy and society.

The assessment criteria were:

- **Vitality:** The extent to which a Centre supports a thriving and inclusive research culture for all staff and research students, that is based on a clearly articulated strategy for research and enabling its impact, that is engaged with the national and international research and user communities, and that is able to attract excellent postgraduate and postdoctoral researchers; and
- **Sustainability:** The extent to which the research and impact environment ensures the future health, diversity, wellbeing and wider contribution of the Centre and the discipline(s), including investment in people and in infrastructure.

ANNEX C: TRANSPARENCY AND FAIRNESS PROCEDURES

Equity, equality and transparency were key guiding principles from the outset. This Annex briefly summarises the main procedures followed, which were modelled on the REF procedures.

To ensure that Centres were treated equally:

- The evaluation was designed iteratively in consultation with the Centres;
- The same eligibility criteria and level definitions were used for each Centre; and
- Panel members assessed their sample research outputs/case studies in random order (rather than alphabetically by Centre).

To embed equality, diversity and inclusion (EDI), the evaluation followed the REF EDI measures, which had been designed in consultation with the research community and with expert advice.

These included:

- The evaluation team paid close attention to equality and diversity when recruiting the Panels;
- The REF procedures to take into account the effect of individual circumstances on the ability of staff to work productively during the assessment period;
- Each Centre was required to develop, document and apply a Code of Practice on their processes for selecting staff and outputs. The codes were peer reviewed by NERC and other Research Council EDI leads and modifications were requested where necessary;
- Each Centre was required to provide evidence about how equality and diversity in research careers and across its staff is supported and promoted in the environment submission;
- Panel members were briefed about EDI measures and the importance of considering EDI and being aware of bias and unconscious bias during the assessment process.

To ensure that the evidence was assessed fairly:

- Interdisciplinary research outputs were welcomed. The Panel chair and another member with REF experience were appointed as interdisciplinary champions for the Excellence Panel. Measures to ensure the fair treatment of interdisciplinary outputs were discussed with them prior to the induction meeting, and the Panel briefed at its induction meeting;
- Members were briefed about and discussed:
 - The importance of being aware of bias and unconscious bias;
 - All types of research and all forms of research output across all disciplines should be assessed on a fair and equal basis;
- Both Panels undertook a calibration exercise to ensure consistency of approach; and
- Following REF practice, co-authored papers were assessed for the quality of the overall paper, regardless of the number of authors or position of authors;
- Non-text or practice-based outputs could be accompanied by a brief description of the research process and content, where not evident within the output. These outputs were assessed by three, rather than two, members; and
- Members were informed how their scoring pattern related to the average for research output and impact case studies; and environment scores were moderated where needed to account for imbalance in scoring patterns.

REF conflicts of interest procedures were followed to ensure that Panel members' conflicts of interest did not unduly influence proceedings:

- All members signed a strict confidentiality policy before undertaking any work. This included the requirement to declare any potential conflicts of interest, and to treat all Panel business in strict confidence;
- Members were asked to declare potential conflicts of interest before the induction meeting, and to update them during the process where necessary;
- Major conflicts included where a Panel member or close family member was employed by a Centre, or was closely involved with the Centre in an advisory capacity. Panel members with major interests did not assess any of that Centre's submission, and withdrew for the Panel's discussion of that Centre;
- A minor interest included a Panel member collaborating with a submitted staff member, having recently worked with them, or having supervised their PhD. Panel members with minor interests remained for the discussion of that Centre, but did not assess any research outputs/impact case studies submitted by the staff with whom they had a potential vested interest; and
- A register of declared conflicts of interest was circulated prior to each meeting, and any issues discussed at the meeting. The Chair reminded the Panel at the start of each meeting of the importance of transparency.

ANNEX D: DIFFERENCES BETWEEN THE 2013 AND 2020 EVALUATIONS

There were a few key differences between the 2013 and 2020 evaluations of NERC Centres, which reflected changes in the REF methodology between the 2014 and 2021 exercises:

- Fewer research outputs were required: 2020 - 2.5 times the FTE of submitted staff, 2013 - each eligible staff member must submit 4 outputs, both with arrangements for reductions to account for individual staff circumstances;
- The outputs of staff who were employed during the assessment period but had since left could now be submitted;
- New measures to ensure equality and diversity, including codes of practice for selecting eligible staff;
- Impacts on teaching within, as well as beyond, the submitting Centre were now eligible; and
- Case studies describing impacts continued since the previous exercise could be submitted.