

How does Space Weather Research fit into the UK Strategic Programme?



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How could the UK contribute to research in a dedicated SW institute?



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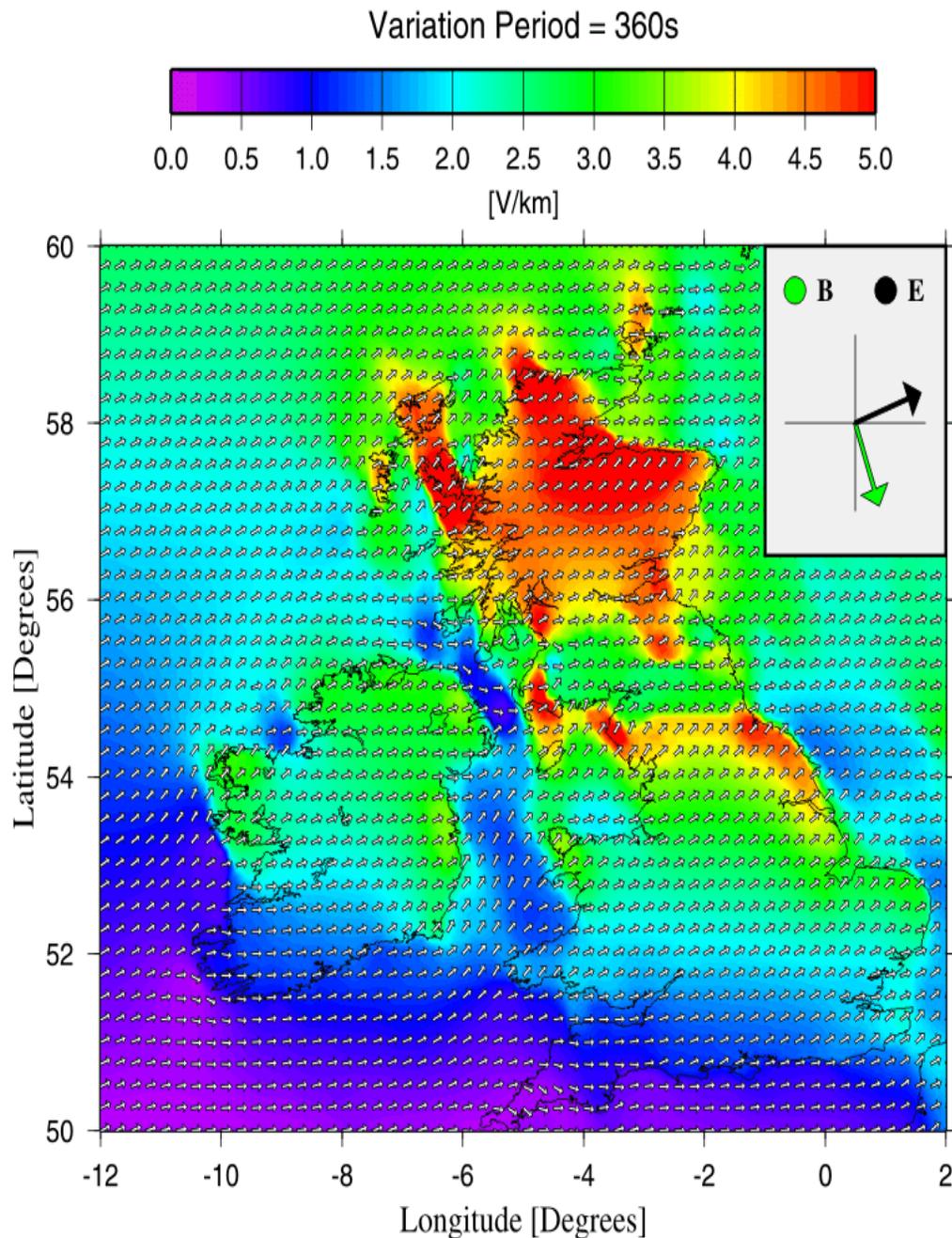


Outline

- Societal & political drivers and opportunity
- UK Solar-Terrestrial Physics research landscape
- Options for UK contribution
 - Possible mechanisms based on NERC experience
- Catalysts
- Key messages



An increasing societal and political agenda



UK electric field at the peak of the 30th October 2003 Storm

Increasing SW profile in the UK

- Space Environment Impact Expert Group (SEIEG) established to provide advice to government on worst case scenario planning for National Risk Assessment.
- House of Commons Science and Technology Committee on use of scientific advice in emergencies considered Space Weather as case study in its inquiry.
- NERC aiming to join the STFC, UKSA and Technology Strategy Board and private sector companies within the *International Space and Innovation Centre (ISIC)*.
- Geomagnetically Induced Currents in National Power Grids Workshop (Lancaster University).
- Lloyd's and RAL Space report on business impacts of Space Weather – a strong focus on impacts and mitigation techniques.



Riding the political wave

Tom Bogdan

“Given the increased societal and political interest in SW (especially in a regime of declining funding) we live in interesting times

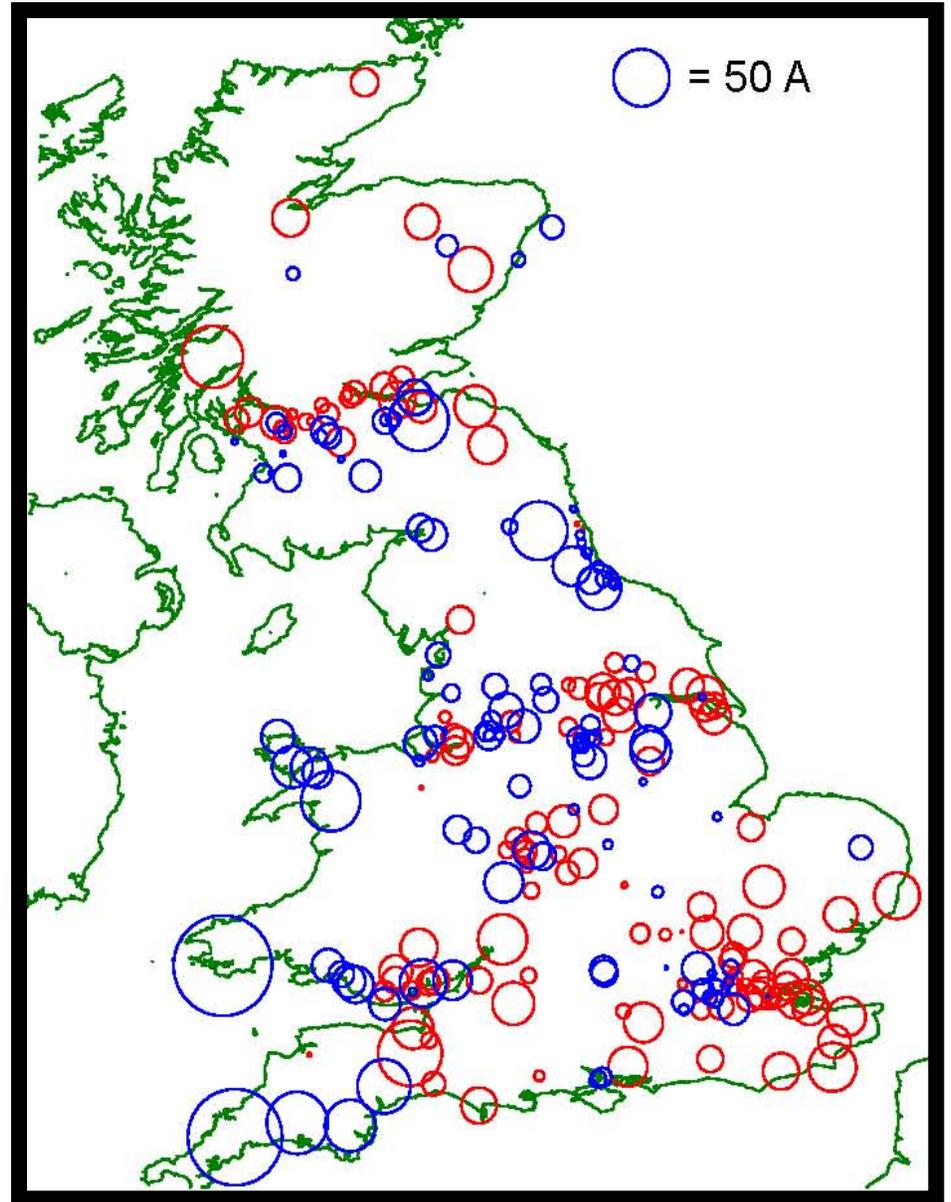
1. *We have a window of opportunity*
2. *We need to get our (collective) act together*
3. *We need tangible products”*

Need to consider the entire

research – operations – user perspective

UK Solar Terrestrial Physics Landscape

New UK Model: GIC flow at
major transformers at 21:24 30th
October 2003



Solar-Terrestrial Physics (STP) in the UK Research Councils

The **Natural Environment Research Council (NERC)**

- Earth orientated STP research
- Ground-based instruments
- Supports the UK subscription to EISCAT radars
- New Responsive Mode grants



The **Science and Technology Facilities Council (STFC)**

- Space-based facilities for STP research
- Spacecraft, instruments and operations
- Funds all non-Earth-oriented STP research
 - fundamental space plasma physics and not related to the Earth)





Réseau d'interconnexion
Verbundnetz
Interconnected network

UK - EU Collaboration

European Space Agency (ESA) programmes

- Space Situational Awareness
- UK subscriptions managed by UK Space Agency



EU Cooperation in Science and Technology (COST) and FP7/8 Space Weather research

- UK involved in 5 of the 9 (3rd) FP7 Space projects

US-UK Collaboration



- Rutherford Appleton Laboratory (RAL) Space in discussions with Lockheed, co-leading proposal, with NOAA, for US Space Climate and Society Institute to develop a system-level view of the SW risks and mitigation.
- UK support for the Electrical Infrastructure Security Council.
- Joint statement by Cameron/Obama (UK visit in May)
- Met Office Space agreement with NOAA's National Weather Service in delivery of Space Weather alerts. Met Office will build expertise in Space Weather modelling including links with Bath and UCL.



Options for UK contributions

NERC & STFC ambitions



Options - Based on NERC experience

NERC funding mechanisms



**NATURAL
ENVIRONMENT
RESEARCH COUNCIL**

1) NERC Responsive Mode

Recent Grants

- **Quantifying the Effect of the Upper Atmospheric Electric Potential on Lower Atmospheric Temperature and Pressure**
Chisham et al., British Antarctic Survey
- **A new radar for integrated atmospheric science in the southern hemisphere**
Freeman et al., British Antarctic Survey
- **Quantitative study of dusty plasma in the polar mesosphere**
Kosh, Lancaster University

2) NERC Strategic Themes

- BIODIVERSITY: To understand the role of biodiversity in key ecosystem processes
- **CLIMATE SYSTEM: risk-based climate predictions on regional-local and day-decadal scales**
- EARTH SYSTEM SCIENCE: providing the underpinning science to understand the Earth as a complex biogeochemical and physical system
- ENVIRONMENT, POLLUTION & HUMAN HEALTH: science to reduce the damaging health effects of pathogens and pollutants
- **NATURAL HAZARDS: improve the forecasting and mitigation of natural hazards**
- SUSTAINABLE USE OF NATURAL RESOURCES: science to manage natural resources sustainably
- **TECHNOLOGIES: exploitation of technological advances to develop improved methods to monitor environmental change**

Basis for selecting science actions



3) NERC National Capability



- **British Antarctic Survey**
- **British Geological Survey**
- Research into coupling of energy, momentum and chemistry between the mesosphere the stratosphere and thermosphere.
- Interests on weather, climate and ground-based hazard impacts.

Options for collaborative research programmes



- Co-design from the outset
- Development of separate but complementary programmes
- Funding from UK and partners could have a “virtual common pot”
- NERC funding normally only support UK scientists (with partners funding their own scientists).
- Can cover direct costs where justified

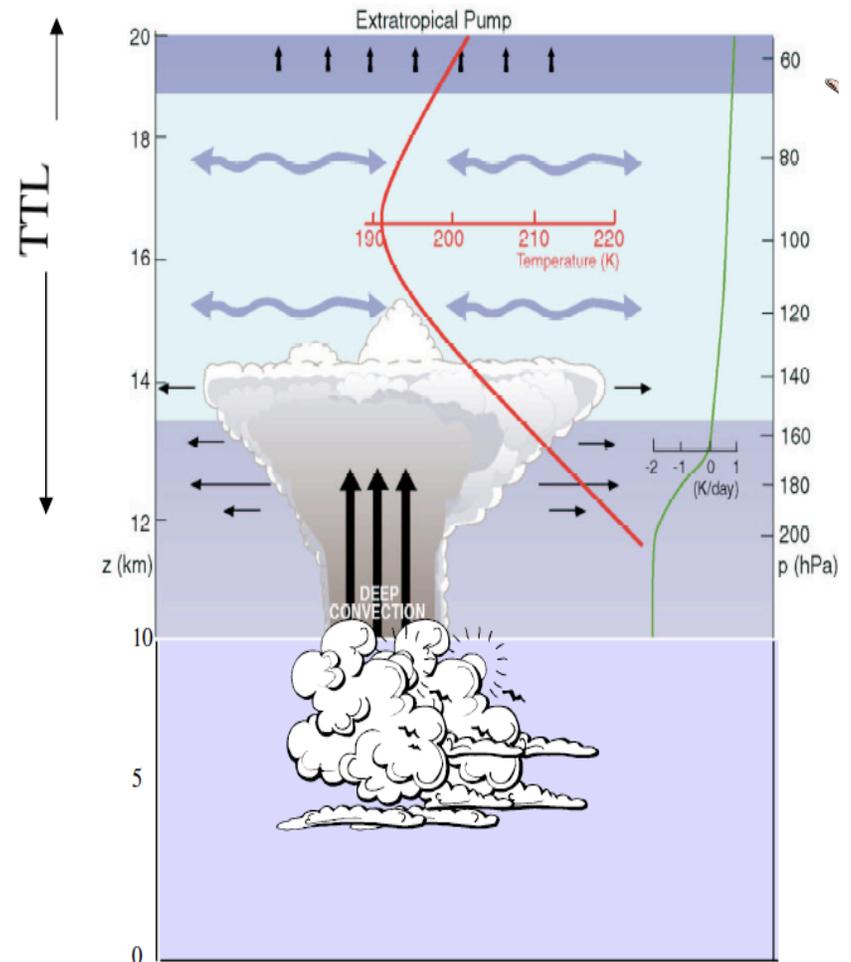
Recent NERC – US programmes

Informational Letter on cooperation

on airborne science

– NERC and NASA

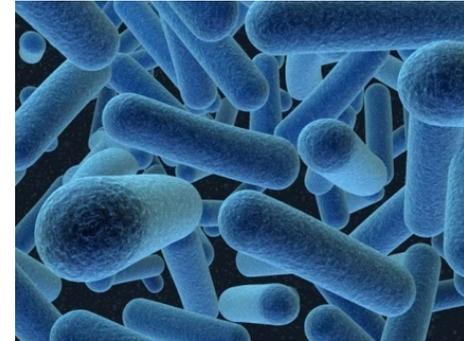
- Technologies Theme action on tropical tropopause interactions
- UK and US research based on joint operational campaigns using NERC's BAe146 and NASA's high altitude UAV Global Hawk



Recent NERC – US programmes

Environmental nanoscience

- NERC, Defra and the EA
- Joint call with Environmental Protection Agency (US-EPA) in Phase 2 of the programme
- Negotiations with NSF continuing.



Ecosystem Services and Poverty Alleviation

- NERC, ESRC and DFID
- Exploration of a joint mechanism to allow USAID or NSF (or both) to fund successful US PIs in a future ESPA round, facilitated by the RCUK USA Office.

Catalysts

The RCUK USA (Washington) Office

- Director: Ruth Lee)
- Support for development of new international programmes for all UK Research Councils
- Hands on facilitation in developing a UK/US joint approach in Space Weather and RCUK USA business planning

US BIS/FCO Science & Innovation Network (SIN)

- Co-located in the British Embassy, Washington
- Lead: Dr May Akrawi



Key Messages

- Need to explore mechanisms for research collaboration
- Seek added value
- Consider how a collaborative initiative would be most effectively developed within a SW Institute

Questions ?

