

## Science and Technology Committee: inquiry into the Science Budget and the Industrial Strategy

### Response from the Royal Astronomical Society

1. This is the official response from the Royal Astronomical Society (RAS), the lead UK body representing the sciences of astronomy, space science and geophysics. Our more than 4,000 members (described as 'Fellows') work in academia, industry, education, journalism, and a range of other occupations.
2. Universities and research establishments with excellence in astronomy and geophysics are distributed across the regions and nations of the UK, so have a wide geographical reach. It is important to note too that a significant number of our members, and those who completed initial studies in these areas (including the overwhelming majority of PhD students), began work in higher education and research establishments, but have moved on to work in the wider economy.
3. We are therefore pleased to respond to this inquiry, as it concerns not only the budget for science spending, but in the Industrial Strategy is also relevant to the work of our members in both academic research and private industry.
4. The Society remains concerned that the Industrial Strategy, and the general thrust of government policy in science, appears at present to make little mention of basic research. We would draw the attention of the Committee to the strength of the UK in this area, not least in astronomy and geophysics, the sciences we represent. Despite a middle-ranking level of public sector investment in research and development, (on the most recent OECD figures the UK invested 0.48% of GDP in government-financed R&D, compared with an average of 0.62% across the OECD and 0.64% in the European Union<sup>1</sup>), the UK was ranked third in the world in astronomy in citation indices in 2016, second in planetary science, and second in geophysics<sup>2</sup>.
5. We also alert the Committee to the many examples of wider impact that result, not least in technology transfer, start-up companies, and the supply of highly skilled people to the broader economy. The Society has commissioned a number of publications giving examples of this, most recently based on those cited by university groups in the 2014 Research Excellence Framework.<sup>3,4</sup>
6. Another example of the alignment of blue-skies science to wider societal impact is the recent support by the Science and Technology Facilities Council (STFC) of eight Centres for Doctoral Training (CDTs) in Data-Intensive Science. This directly funds 98 PhD students and includes support for industrial placements for doing work outside their postgraduate

---

<sup>1</sup> [http://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](http://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)

<sup>2</sup> <http://www.scimagojr.com/countryrank.php>

<sup>3</sup> <http://www.ras.org.uk/publications/other-publications/2798-astronomy-means-business>

<sup>4</sup> <http://www.ras.org.uk/publications/other-publications/3049-geophysics-means-business>

research in "private, public (including national or international facilities, but excluding universities) or third sector organisations engaged in the development and/or use of data intensive science techniques".

7. Astronomy and space science (including remote sensing) face huge challenges in data volume, data complexity and/or data throughput, as well as making demanding use of high performance computing, similar to those in many industries, so the CDTs have a cost-effective and fast impact outside academic research.
8. The planned uplift in R&D spend announced last year is welcome, and the Society would not argue against increased investment in experimental development, a gap recognised in the industrial strategy green paper. We note though that the evidence used to support this (not least the graph on page 27 of the green paper<sup>5</sup>) also demonstrates that the UK spends a comparatively low proportion of its investment in R&D on basic research, less than 24 of the 29 other countries cited.
9. A number of different consultations have also considered the merits of European Union membership for science and the impact of leaving. In astronomy and space science, researchers have been particularly adept at engaging with EU institutions, and using its grants to support their programmes. Information supplied to us by STFC suggests that around 30% of grant funding in these areas originates from EU programmes, such as the European Research Council.
10. With uncertainty over our future relationship with the EU27 countries, and a possible end to access to EU resources for science after 2019, areas of science like this thus face a potential 'cliff edge' reduction in support.
11. Further concern remains around the formation of UK Research and Innovation (UKRI) with its implied tighter control of research priorities, and also the share of research bodies' budgets earmarked for the Global Challenge Research Fund (GCRF). Though its aims are laudable, there are a limited number of curiosity-driven research projects in subjects like astronomy and space science that can meet the GCRF criteria, whereby funding is targeted at projects solely in countries covered by rules for Official Development Assistance (ODA).
12. These factors i.e. Brexit, the steer of policy in the Industrial Strategy, the formation of UKRI and potentially a diminishing controllable grants fund, give little comfort to those scientists working in basic research.
13. *We ask members of the Committee to investigate this area, and to press the Government for assurances that these significant policy shifts will not, even inadvertently, damage areas of science where the UK currently excels.*

---

<sup>5</sup> [https://beisgovuk.citizenspace.com/strategy/industrial-strategy/supporting\\_documents/buildingourindustrialstrategygreenpaper.pdf](https://beisgovuk.citizenspace.com/strategy/industrial-strategy/supporting_documents/buildingourindustrialstrategygreenpaper.pdf)

14. On one of the specific questions posed by the inquiry, namely *the rationale and coherence between the Industrial Strategy Challenge Fund (and its individual ISCF schemes) and the rest of the Science budget*:
15. The ISCF scheme for establishing a satellite test facility is relevant to both astronomy and geophysics, in that our sciences include orbiting observatories used to study the wider universe and the planet we inhabit. With the current US administration cutting support for research in areas like climatology, continued UK capacity in the second of these areas is vital, and it would be reasonable for the ICSF scheme to align with the programme of bodies such as the Natural Environment Research Council (NERC).
16. Data science as described above could also be a facet of the ICSF, and given its importance to the wider economy, could merit becoming one of the specific listed challenges, in this case aligned to the programme of STFC.