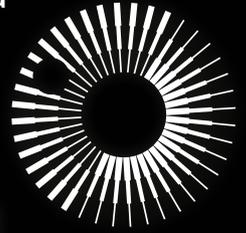


May 2021 4.2a



Royal
Astronomical
Society

Annual Report & Financial Statements 2020

Patron

Her Majesty the Queen

Trustees

Council members who served during 2020:

Prof. Emma Bunce (President-Elect until June 2020, President, G, from June 2020, University of Leicester)

Prof. Mike Cruise (President, A, until June 2020, University of Birmingham)

Prof. Mahesh Anand (Vice-President, G, Open University)

Dr Megan Argo (Councillor, A, until June 2020, Vice-President, A, from June 2020, University of Central Lancashire)

Dr Mandy Bailey (Secretary, A, Open University)

Dr Nigel M Berman (Treasurer, A)

Prof. William Chaplin (Councillor, G, University of Birmingham)

Prof. Phil Charles (Councillor, A, from June 2020, University of Southampton)

Dr Hannah Dalglish (Councillor, A, from June 2020, University of Oxford/University of Namibia)

Dr Paul Daniels (Vice-President, A)

Prof. Lyndsay Fletcher (Senior Secretary, G, University of Glasgow)

Dr Claire Foulton (Councillor, G, University of Exeter)

Dr Stacey Habergham-Mawson (Vice-President, A, until June 2020, Liverpool John Moores)

Prof. Lorraine Hanlon (Councillor, A, University College Dublin)

Kevin Kilburn (Councillor, A)

Prof. Mark Lester (Secretary, G, University of Leicester)

Martin Lunn (Councillor, A)

Dr Jane MacArthur (Councillor, G, University of Manchester)

Dr Matthew Middleton (Councillor, A, University of Southampton)

Prof. Steven Miller (Councillor, G, until June 2020, Vice-President, G, from June 2020, University College London)

Dr Arvind Parmar (Councillor, A, from June 2020, ESA)

Dr Colin Snodgrass (Councillor, G, from June 2020, University of Edinburgh)

Dr Sheona Urquhart (Councillor, A, Open University)

Dr Indhu Varatharajan (Councillor, G, until June 2020, German Aerospace Center, Berlin)

Dr Clare Watt (Councillor, G, until June 2020, University of Reading)

Prof. Anton Ziolkowski (Vice-President, G, until June 2020, University of Edinburgh)

- Note: "A" signifies all areas of astronomy and astrophysics; "G" covers geophysics, solar-terrestrial physics and planetary sciences

Senior staff

Executive Director: Philip Diamond

Deputy Executive Director: Dr Robert Massey

Registered and Principal Office

Burlington House
Piccadilly
London
W1J 0BQ

Charity registration number

226545

Auditor

Buzzacott LLP
130 Wood Street
London
EC2V 6DL

Bankers

HSBC Bank plc
West End Corporate Banking Centre
70 Pall Mall
London
SW1Y 5EZ

National Westminster Bank
St James' & Piccadilly Branch
PO Box 2 DG
208 Piccadilly
London
SWJ 9HE

Investment managers

Newton Investment Management Ltd
The Bank of New York Mellon Centre
160 Queen Victoria Street
London
EC4V 4LA

Solicitors

Bristows
3 Lincoln's Inn Fields
London
WC2A 3AA

Contents

Astronomy for Beginners	4
From Our President	5
2020: Our Bicentenary	6
Objectives	8
Advancing Understanding	9
Sharing Knowledge	15
Our Organisation	19
Looking Forward	21
Structure, Governance and Management	23
Financial Statements	26

COVER IMAGE A mosaic of Viking Orbiter images of Mars showing the 2000km long Valles Marineris system. Mars was the focus of National Astronomy Week 2020, supported by the RAS. (NASA/JPL-Caltech)

NEXT PAGE The Milky Way, zodiacal light and airglow from Chile. (ESO/B Tafreshi twanight.org)

Astronomy for Beginners

Simon Armitage

*You were eight and fishing for planets and stars,
slopping a bucket of rain into the back yard.
You were waiting for cloudless dark, expecting
the pinpoint reflections of Rigil Kentaurus or Mars
to crystallise under your nose, or a constellation –
whole and in tact – to glaze the surface*

*like a web of frost. Or what if the Moon
grew hard and dense in the water's depths
like some knuckle of dinosaur bone – you'd need
a landing net. But only Polaris proved itself
in the liquid lens, then dissolved
when you lifted it out on your fingertip.*

*A Russian telescope didn't help:
some camera obscura inside the tube
flipped the map of the galaxy upside down;
in the peephole eyepiece, families dangled from ceilings
like bats, and sheep hung from green clouds
by their hooves. You were thirty by now,*

*Tired of the stake-out, tired of panning
for sunspots and fool's gold you traded
starlight for bird life, birds with their costumes
and songs and shows. Once, in a shoulder of sand
on Windermere's west shore, a dunnock curtsied
while eating bread from your open hand.*

*Old brightnesses, old loves. And now you're
scanning again for omens and signs, apple bobbing
for hyper giants and white dwarves, calling down
deep space onto a blank page, trawling
for angels and black holes with a glass jar, knowing
we're dying, knowing we'll never make it that far.*

*Where did that tin of luminous stickers go?
And the solar system mobile spinning
on near-invisible thread? When she left home
you crashed out on your daughter's bed and woke
in a Navajo cave, a remote language of light
coming steadily into creation overhead.*



From Our President

Our *Annual Report* for 2020 is an opportunity to reflect on this exceptional year and outline some plans for the future. The Covid-19 pandemic changed every aspect of our lives during 2020, and it seems likely to continue to affect our daily lives for some time to come. During the first national lockdown last March, the RAS had to react quickly, not only closing Burlington House and providing for staff to work from home, but also regarding our meetings, including Council and, sadly, our bicentenary plans and the National Astronomy Meeting. Council decided to plan for a full season of online provision, to give clarity to organisers and attendees alike. As a result, we have run Council meetings via Zoom to continue our core business, while Ordinary Meetings, Specialist Discussion Meetings and the Bicentenary Public Lectures all moved completely online.

These meetings were very well attended and I have received many emails expressing thanks for them. For me personally they have provided an uplifting highlight and a reminder of the great research in our communities. The change in delivery also provided a more accessible and inclusive option for Fellows outside London – or, indeed, the UK – who cannot normally travel to Burlington House. This is a great improvement and we will continue to provide quality online access

in future, as well as returning to face-to-face meetings when it is safe to do so.

Our wonderful outreach and education team delivered online classes to preschool, primary and secondary-age children and families, again reaching far beyond the UK to Cyprus, South Korea, India, Australia, UAE and France.

Despite our concerns regarding the impact of the pandemic, our journals continued to thrive, with ever more papers submitted. We saw a 7% increase in submissions to *GJI* and 10% to *MNRAS*. In addition, we have moved ahead with plans to launch a new journal.

An exciting new venture for the Society in 2020 was the creation of the Early Career Network. This is being run by, and will represent the views of, early-career Fellows. The Early Career Online Poster Exhibition in September was the network's first event, showcasing the work of 270 researchers. I took part in the judging and the quality of research presented was outstanding. The popularity of this inaugural event is an indication that there is a real appetite for this kind of network to support a key part of our community.

The Society has maintained its well-respected contributions to the UK policy debate by means of responses to government consultations and RAS policy statements. These are incredibly difficult and uncertain times for researchers and the Policy Group works to ensure that our collective voice continues to be heard in support of fundamental research. We continue lobbying government to provide the welcoming and supportive environment necessary for international science to thrive. A recent example of our advocacy work relates to the impact on astronomy of megaconstellations with key stakeholders: scientists, satellite companies and the space agencies.

Despite the obvious challenges of 2020, I am grateful to Council, the committees, the RAS staff and our community of Fellows for helping us to continue our activities. Even though we have been separated for over a year, we have been able to continue to achieve our core objectives as a charity: to advance understanding and widely share knowledge on our specialist subjects of astronomy and geophysics. We look forward to reuniting our community in Burlington House when it is safe to do so, and continuing our work as a Society into our third century.

Emma Bunce President, 2020–22

2020: Our Bicentenary

The Society had planned a year of celebrations and special activities for the year of our bicentenary, including a celebratory evening, Bicentenary Public Lectures and a National Astronomy Meeting in our first President William Herschel's home town, hosted by the University of Bath. The Covid-19 pandemic disrupted these plans as well as ordinary Society activities. Some events took place as intended, others were modified or postponed and a few were cancelled. Creative thinking and hard work by RAS staff made sure that the Society's work continued.

Celebration

The year began with an evening celebration at the Langham Hotel in London, introduced by President-Elect Emma Bunce. Some 300 Fellows and guests heard an entertaining address by Astronomer Royal Martin Rees. The evening also featured a poem written for the occasion by Poet Laureate Simon Armitage (see page 4). We were also delighted to receive, from coin and medal specialist Margaret Morris, the very generous gift of the Gold Medal awarded to John Herschel in 1826. We are grateful to have in our collection a tangible link to one of our most significant Fellows.

Executive Director Phil Diamond spoke about the future, talking to people who have benefited from RAS support. Jo Barstow spoke about her RAS Research Fellowship, and Manasvee Saraf described her undergraduate research placement. And Charlotte Grundy of Girlguiding UK, one of our bicentenary projects, spoke about



Above: The Society's new monthly podcast has kept going through the pandemic.

Right: Astronomer Royal and former President of the RAS Martin Rees addressing the audience at the Bicentenary celebration evening in January.



the value of RAS200: Sky & Earth for girls and young women.

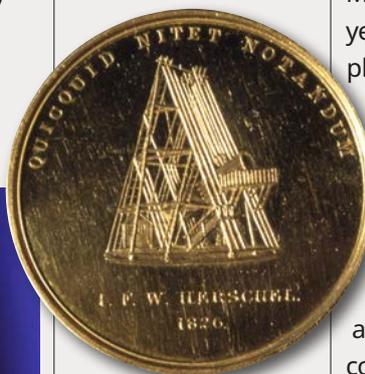
RAS200

RAS200 is the major RAS outreach programme initiated in 2013 to celebrate the Bicentenary. The Society has been working with 12 specialist charities and organisations over the past six years to reach new audiences: more than 130,000 people had engaged with our sciences by the end of 2020. Many of the projects had planned events to celebrate the RAS Bicentenary in 2020 that were cancelled or postponed as a precaution against Covid-19.

Online meetings

The RAS decided in March 2020 to move all Specialist Discussion Meetings and Ordinary Meetings online for the rest of the academic year. The 2020 National Astronomy Meeting, planned to take place in Bath, was postponed until 2021. Recognising the importance of NAM for early-career scientists, especially, the Society organised a very well received online poster session through the new Early Career Network. The Community Session, a fixture at NAMs in recent years, also took place virtually. We were unable to congratulate the winners of our 2020 medals and awards in person, but we saw them all online at our Virtual Awards Ceremony, hosted by our President.

Prof. Bunce also featured in an episode of *The Life Scientific* on BBC Radio 4 in March,



RAS Executive Director Philip Diamond shows off the Gold Medal returned to the Society by Margaret Morris.



Left: RAS200 partners Girlguiding UK provided activities and meetings online during lockdown, while Care4Carers (below) focused their efforts on practical supports for their clients.

in which she spoke about the bicentenary of the Society, as well as discussing her life and career in space science.

Other celebratory events planned for the Bicentenary have gone ahead, some in slightly different forms. An inflatable planetarium appeared in the Burlington House courtyard from 15–28 February and more than 2500 people attended the free shows. *The Super-massive Podcast* appeared monthly throughout the year, and the Bicentenary Public Lectures, planned to take place at locations outside London, were instead mostly given online, gaining larger audiences from across the world. The Bicentenary Quilt project, led by the RAS Membership Officer, also became a virtual project with online sewing sessions throughout the year. The finished quilt will be displayed at the RAS when it is open to Fellows again. ■

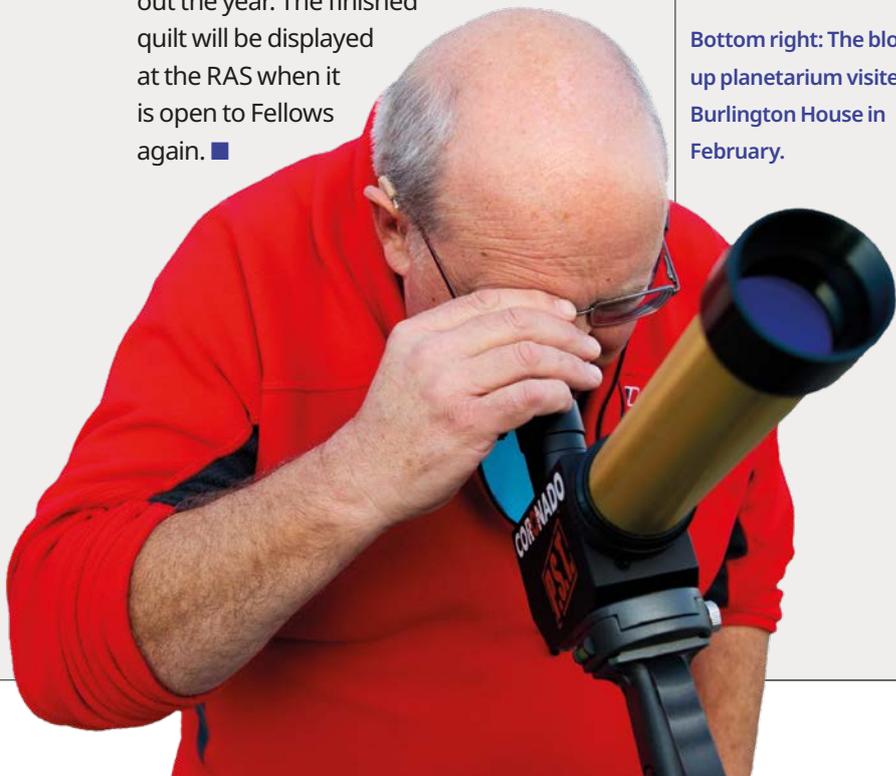


Right and top right: Two of the completed patches from the RAS Bicentenary Quilt, depicting Jupiter and a solar eclipse.



Right: Most of the planned Bicentenary Public Lectures were moved online.

Bottom right: The blow-up planetarium visited Burlington House in February.



Objectives

The RAS exists to advance, and to record the history of, our understanding of the Earth, the solar system, the stars and galaxies, and the nature of the universe. It does this by promoting astronomy and geophysics, interdisciplinary sciences that encompass and further our understanding of physics, chemistry, mathematics, biology, engineering and computer science to answer deep questions about the origin and fate of the cosmos, and people's place in it. Through this the Society contributes to the growth and dissemination of knowledge and thereby fulfils its charitable objective of serving the public interest.

The Society refers to the Charity Commission's general guidance on Public Benefit when reviewing its aims and objectives and in planning future activities. These disclosures comply with the Charities Act 2011.

Our objectives for 2020 fall within two broad areas: advancing understanding and sharing knowledge; the organisation of the Society supports these goals.

The Society's principal objectives are to:

- Publish high-quality peer-reviewed journals
- Support students and early-career scientists through research fellowships and grants
- Recognise achievement through its medals and prizes
- Maintain high-quality research meetings, including the National Astronomy Meeting, and Public Lectures
- Sustain our Library and Archive service
- Continue our political engagement
- Maintain our programme of education and outreach activity, including Friends of the RAS
- Promote the work of the Society and Fellows in the media and on social media
- Build our outreach work with other Courtyard Societies.

In 2020, the Society planned, in addition, to:

- Establish a Sustainability Working Group to address the local and wider environmental impact of astronomy, space science and geophysics
- Establish a Property Working Group to explore a range of options for the Society's accommodation in the future
- Launch an Early Career Network to support its young Fellows.

Advancing Understanding



During 2020, the Library supplied materials for an exhibition in Sydney on early colonial astronomy. Augmented reality using an iPad brings Governor Thomas Brisbane's star chart alive.

(Created by K Richards, J Harle, M F Valenzuela and WSU students L Parsons, H Chourbaji, N Lamoridan, and M Ly. Photo by J Perera)

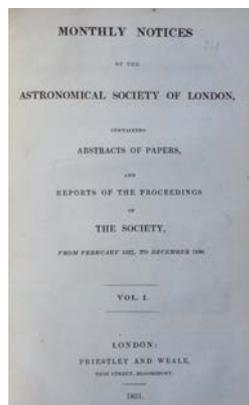
The RAS is committed to advancing understanding of our sciences by:

- Publishing journals
- Supporting scientists financially with fellowships and grants
- Organising scientific meetings
- Recognising excellence through awards
- Running a Library and Archive for research
- Producing a magazine for our members
- Lobbying government
- Promoting diversity in our community
- Supporting early-career researchers

Journals

The Society publishes two academic peer-reviewed journals which are world-renowned: *Monthly Notices of the Royal Astronomical Society (MNRAS)* and *Geophysical Journal International (GJI)*. *MNRAS* publishes the results of original research in astronomy and astrophysics, including work which is observational, theoretical or concerned with astronomical instrumentation and software. *GJI* publishes articles on all aspects of theoretical, computational, applied and observational geophysics. Both journals receive submissions from authors worldwide. The peer-review process is overseen by an editorial team of eight assistant editors and the Publishing Manager, Kim Clube. Profiles of all of our scientific editors and editorial team can be found on our website at ras.ac.uk/journals/Editorial-Boards-and-Team.

The impact factor of a journal reflects the frequency with which articles are cited in the scientific literature. In 2020, *MNRAS* achieved an impact factor of 5.356, there were 3,969,893 article downloads, 5196 articles were submitted and 4208 articles were published. There are 26 scientific editors and Prof. David Flower continued as editor-in-chief. *GJI* received an impact factor of 2.574, published 582 papers in 2020, received 1264 submissions and there were 1,811,851 article downloads. Prof. Joerg Renner remained as editor-in-chief and there are currently 33 editors. Despite the pandemic, both journals saw an increase in submissions in 2020, with *MNRAS* showing a 10% increase compared with 2019, and *GJI* a 7% increase.



The first and the last paper issues of *Monthly Notices*, from 1831 and 2020. It continues in a digital-only format now.

Due to a decrease in the demand for print, *MNRAS* moved to online-only publication in 2020, a year earlier than planned due to the disruption caused by the pandemic. The final paper issue was volume 493, issue 2.

The *MNRAS* annual editorial board meeting was held in March and the *GJI* board meeting was held in October, both via Zoom. This meant a very early 5 a.m. meeting for those editors on the west coast of the USA, and a midnight meeting for those in Australia. Annual reports are prepared for these meetings to look at performance and agree plans for the next year. The Publications Management Committee met in April as usual.

Our subscription business model means that it is free for authors to publish in our journals unless papers exceed 20 pages in length, in which case there is an excess page charge of £50 per page over the limit. The journals are “hybrid” journals as authors can opt to pay for Open Access if they wish to make their paper freely available to everyone. Very few authors opt to pay for Open Access as our self-archiving policy allows them to upload their papers to institutional or subject repositories and free public servers. Some content, such as Zooniverse (citizen science project) papers, special issues and *GJI* Express Letters, are freely available online. Members also have free online access to the journals.

Our journals are published by Oxford University Press (OUP), who have been our publishing partner since 1 January 2013. The journals had new branding and covers in 2020 to mark the Society’s bicentenary. New and improved content was added to the website and includes articles written by the editorial team on the history of our journals and on publishing in the future: ras.ac.uk/journals.

We help early-career researchers to communicate their research effectively by running workshops at conferences, and engage with and support our community through our journals’ Twitter account (@RAS_Journals), which has a growing following. There were two winners of the *GJI* student prize for best paper in 2020 – Daniele Brandt and Kenny Graham – who received a cash prize and certificate. Their papers are freely available at ras.ac.uk/news-and-press/news/gji-2020-student-author-award-winners-announced.

Research fellowships and grants

59 grants, fellowships and awards – including the Norman Lockyer Fellowship – totalling £263,091 were made to institutes, and 59 grants, fellowships and awards totalling £20,141 were made to individuals. Expenditure supporting the Norman Lockyer Fellowship totalled £54,000, and one research fellowship ended during its final year contributing to credits to expenditure totalling £42,642. Adjustments to other grants resulted in credits to expenditure totalling £34,442.

The Society supported four research fellowships and the RAS Norman Lockyer Fellowship during 2020:

Dr Elisa Chisari (University of Oxford): Accurate astrophysics for the next era of cosmology

Dr Thomas Collett (University of Portsmouth): Fundamental physics with gravitational lensing

Dr Amy Gilligan (University of Aberdeen): When subduction stops: understanding tectonic process in post-subduction settings

Dr Matt Nicholl (University of Edinburgh): Superluminous supernovae: a comprehensive observational and theoretical study of Nature’s brightest fireworks

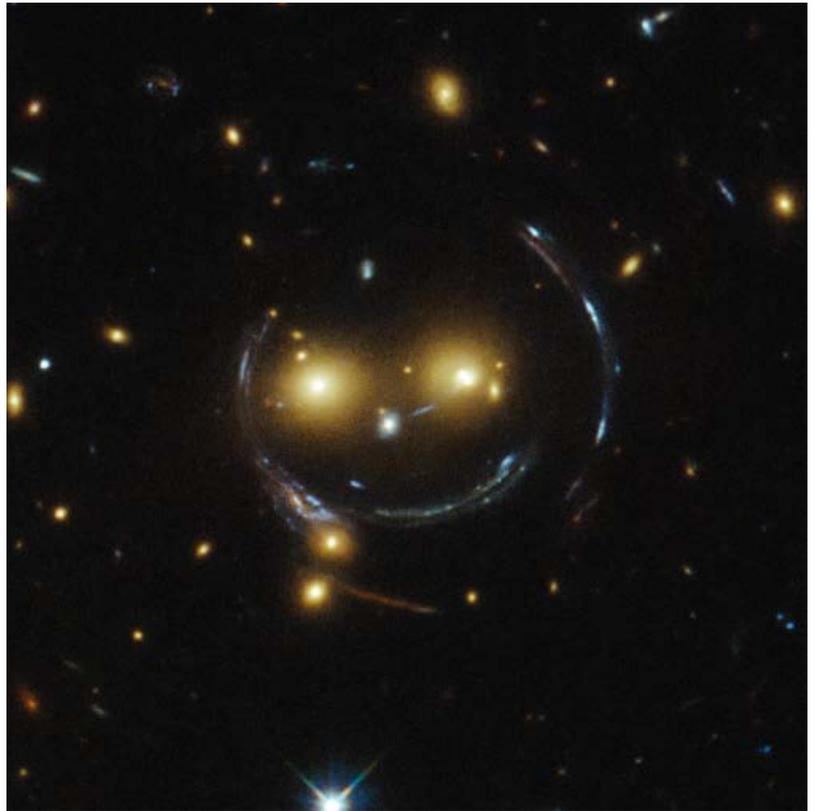
RAS Norman Lockyer Fellowship:

Dr Vinesh Maguire-Rajpaul (University of Cambridge; until September 2020): Transforming the search for Earth-like planets with advanced modelling tools

Dr Cyrielle Opitom (Royal Observatory Edinburgh; from November 2020): Cometary ices and the role of coma evolution: understanding the impact of coma evolution on comet taxonomies

Scientific meetings

The RAS meetings during 2020 were affected by Covid-19 precautions; 11 out of the normal 16 Specialist Discussion Meetings took place, six of them online and one as a hybrid meeting, at Burlington House and online. The remaining SDMs were postponed. Six Ordinary Meetings took place, four of them virtually; the online meetings had larger audiences than typical in Burlington House, with almost 400 at the October meeting. The National Astronomy Meeting (NAM) was postponed until 2021, but the RAS held a community meeting online. RAS President Prof. Emma Bunce chaired the session,



Gravitational lenses such as this one are a happy discovery for astronomers such as RAS Research Fellow Thomas Collett, who uses them to explore fundamental physics. (NASA/ESA)



Vinesh Maguire-Rajpaul, Norman Lockyer Research Fellow: “It’s given me freedom to conduct my own programme of astronomical research, and also allowed me to pursue astronomy education research.”

(Victoria Maguire-Rajpaul)

with presentations from and a discussion with Prof. Mark Thomson, executive chair of the Science and Technology Facilities Council (STFC), and Dr Graham Turnock, chief executive officer of the UK Space Agency (UKSA). The turnout was larger than normal for the Community Session at NAM, with 382 viewing online and a further 607 on the RAS YouTube channel.

Specialist Discussion Meetings held in 2020:

- Radiation belt modelling in the post Van Allen Probes era
- Radiation hydrodynamics: implementation and application
- UK Solar System Atmospheres Community Meeting
- Galactic disc and halo dynamics towards Gaia EDR3
- The near-Sun solar wind at solar minimum
- Biosignature identification in habitable martian environments
- The new window on transients and variable-star astronomy with the Rubin Observatory
- Modelling and observing the lower solar atmosphere: new solutions to old problems
- Progress in astrophysics with Type Ia supernovae
- Analysis of returned extraterrestrial materials: current capabilities and future opportunities
- Exploring the transient universe into the 2030s



Prof. Yvonne Elsworth was awarded the RAS Gold Medal in Geophysics, recognising both her pioneering solar physics research and her service to the scientific community.

Ordinary Meetings held in 2020:

Dr Allan Chapman (Wadham College, University of Oxford): Ancestors and descendants: the RAS and the origins of the British learned society, 200 years on

Prof. Anton Ziolkowski (University of Edinburgh): Understanding the physics of planet Earth

Dr Megan Argo (University of Central Lancashire): The next blink of a cosmic eye: astronomy in the next 200 years

Dr Philippe Escoubet (ESA) *Group Achievement G Award 2019* Cluster: the first mission probing the Sun–Earth connection in 3D

Prof. Jo Bovy (University of Toronto): The Milky Way in the era of large astronomical surveys

Dr Jasmine Sandhu (University College London): Outreach – a postdoc’s perspective

Dr Elisa Chisari (Utrecht University): *RAS Research Fellow* Galaxy shapes as a tool for cosmology and galaxy evolution

Dr Peter Wyper (University of Durham): *RAS Research Fellow* Simulations of eruptions from the Sun’s corona: what can we learn?

Dr Timothy Craig (University of Leeds): *Winton G Prize 2019* Bending and breaking subducting tectonic plates

Prof. Stuart Bale (University of California, Berkeley): The Parker Solar Probe – the mission and its first results

STFC, UKSA, ESA: RAS Community Meeting

Prof. Ofer Lahav (University College London): *George Darwin Lecture 2020* Darkness visible: AI in cosmological experiments

Dr Amaury Triaud (University of Birmingham): *Fowler A Award 2020* The ultracool dwarf and the seven planets

Dr Josh Nall (Whipple Museum of the History of Science, University of Cambridge): Calculation and conflict: anniversary reflections on the early history of the RAS

Dr Craig Magee (University of Leeds): *Fowler G Award 2020* Seismic reflection data and space exploration

Prof. Richard A Harrison MBE (chief scientist, RAL Space): Imaging solar coronal mass ejections in the heliosphere: from STEREO to Lagrange

Awards

The Society recognises outstanding achievements among early-career researchers as well as celebrating career-long excellence and service to our sciences. These are the recipients of the 2020 awards and medals:

Gold Medal in Astronomy Prof. Sandra Moore Faber (University of California, Santa Cruz, and the Lick Observatory)

Gold Medal in Geophysics Prof. Yvonne Elsworth (University of Birmingham)

Eddington Medal Prof. Steven Balbus (Oxford University)

Chapman Medal Prof. Cathryn Mitchell (University of Bath)

Herschel Medal Prof. Robert Fender (Oxford University)

Price Medal Dr Philip Livermore (University of Leeds)

Jackson-Gwilt Medal Prof. Roland Bacon (University of Lyon)

Agnes Mary Clerke Medal Dr Michael Hoskin (Churchill College Cambridge)

Annie Maunder Medal Dr Roberto Trotta (Imperial College, London)

Patrick Moore Medal Dr Caroline Neuberg (Fulneck School, Leeds)

Award for Service to the Astronomy and Geophysics Community Kim Burchell (Science and Technologies Facilities Council)

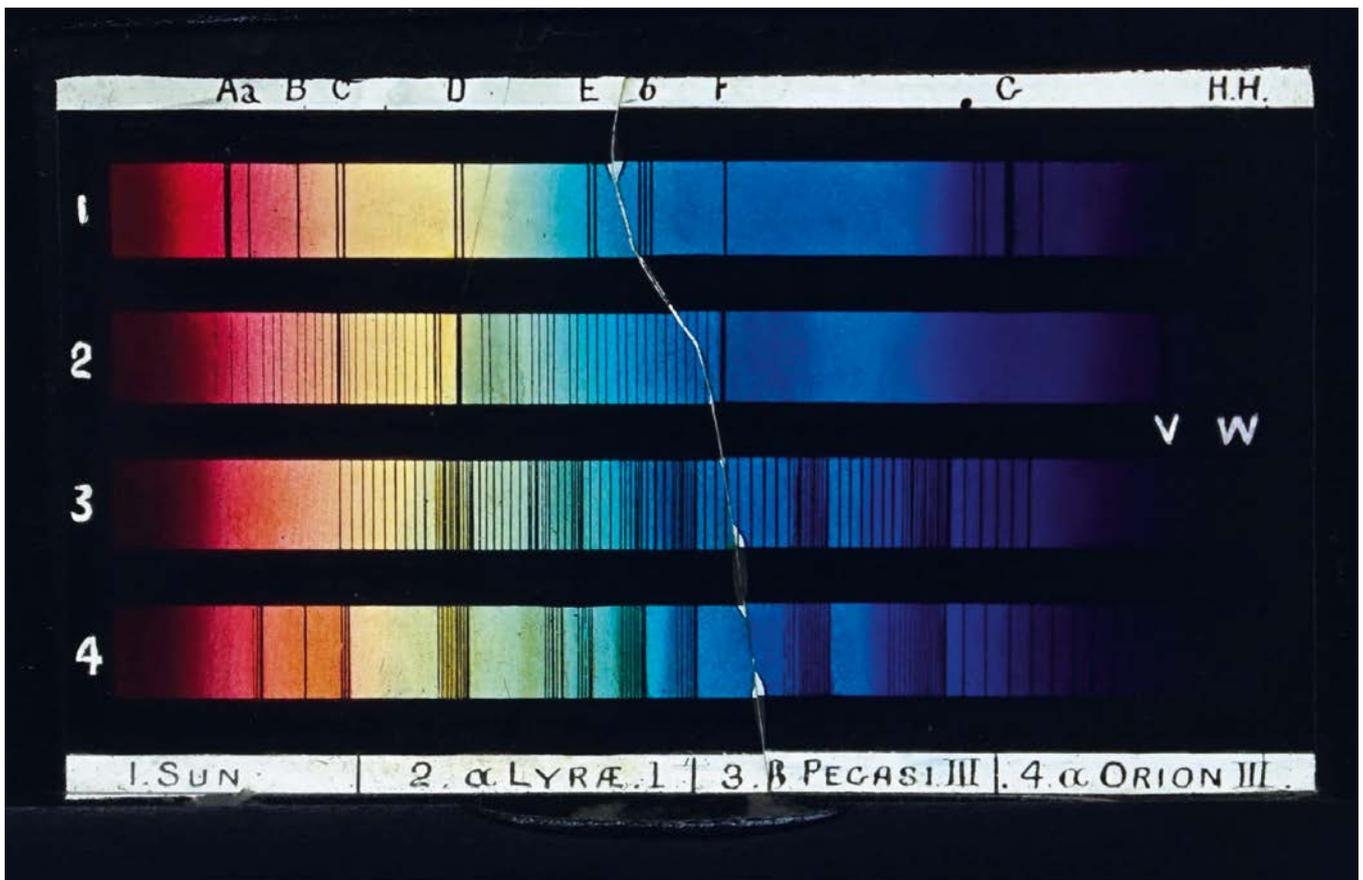
Fowler Award for Astronomy Dr Amaury Triaud (University of Birmingham)

Fowler Award for Geophysics Dr Craig Magee (University of Leeds)

Winton Award for Astronomy Dr Thomas Collett (University of Portsmouth)

Winton Award for Geophysics Dr Michele

**382 PEOPLE
ATTENDED
THE RAS
COMMUNITY
SESSION**



Bannister (Queen's University Belfast)
Group Achievement Award in Astronomy
 The Astropy Project
Group Achievement Award in Geophysics
 The Stereo Heliospheric Imagers Team
Gerald Whitrow Lectureship Prof. Andrew Pontzen (University College London)
George Darwin Lecture Prof. Ofer Lahav (University College London)
James Dungey Lecture Prof. Sarah Matthews (Mullard Space Science Laboratory, University College London)

Library and Archive

Burlington House was closed for most of the year, so we saw very few visitors to the Library in 2020. We received over a hundred research enquiries throughout the year, mainly from individual researchers. Some came from broadcasters, including National Geographic and *The Sky at Night*, who used several RAS historical sunspot images in an animated sequence (bbc.co.uk/iplayer/episode/m000kxjy/the-sky-at-night-stars-a-matter-of-life-and-death). Library staff also facilitated research for the National Gallery's *Conversations with God: Jan Matejko's Copernicus* exhibition and provided images for an

Solar and stellar spectra on a glass lantern slide used by Mary Proctor (1862–1957), one of our first women Fellows. She was a prolific and successful professional lecturer on astronomy, and the author of 16 books. The RAS is cataloguing the thousands of fragile glass slides in its care. (RAS)

**MORE THAN
1000 PEOPLE
ATTENDED
SPECIALIST
DISCUSSION
MEETINGS**

exhibition on Thomas Brisbane in Australia, among others.

A seminar with artist Kate Bernstein about her book *Measuring the Heavens* and the RAS Library in general for University of the West of England Centre for Print Research attracted an audience of around 50 (cfpr.uwe.ac.uk/print-in-conversation-artists-in-the-library-21-may-2020).

This extraordinary year has also presented an opportunity for behind-the-scenes work. Library staff have made progress with revisions to the catalogue of archives and manuscripts started in 1978. The descriptions have been revised to modern standards, enhanced and added to the Jisc Archives Hub, where they will include consistent information about the creator, and the scope and content of the materials. This remains a work in progress.

Working with Jisc, we have now uploaded all online RAS Library catalogue records to Library Hub Discover, the database of 172 national, academic and specialist library catalogues, where it will be available to the public at some time in the future. This means, for example, that when researchers use the database to find out which libraries in the UK and Ireland hold first editions of Isaac Newton's

Principia Mathematica, our copies will be in the search results.

Staff have also carried out retrospective cataloguing of books in the reserve and rare books collections, including our two copies of the 1687 edition of Isaac Newton's *Principia Mathematica*. This is part of a project to develop online catalogue records.

In spite of the closure of Burlington House, Library staff have continued with environmental monitoring and collection management, completing a project to audit the reserve journals collection. Caroline Herschel's copy of John Flamsteed's *Atlas Coelestis* (1729) has been conserved in preparation for digitisation.

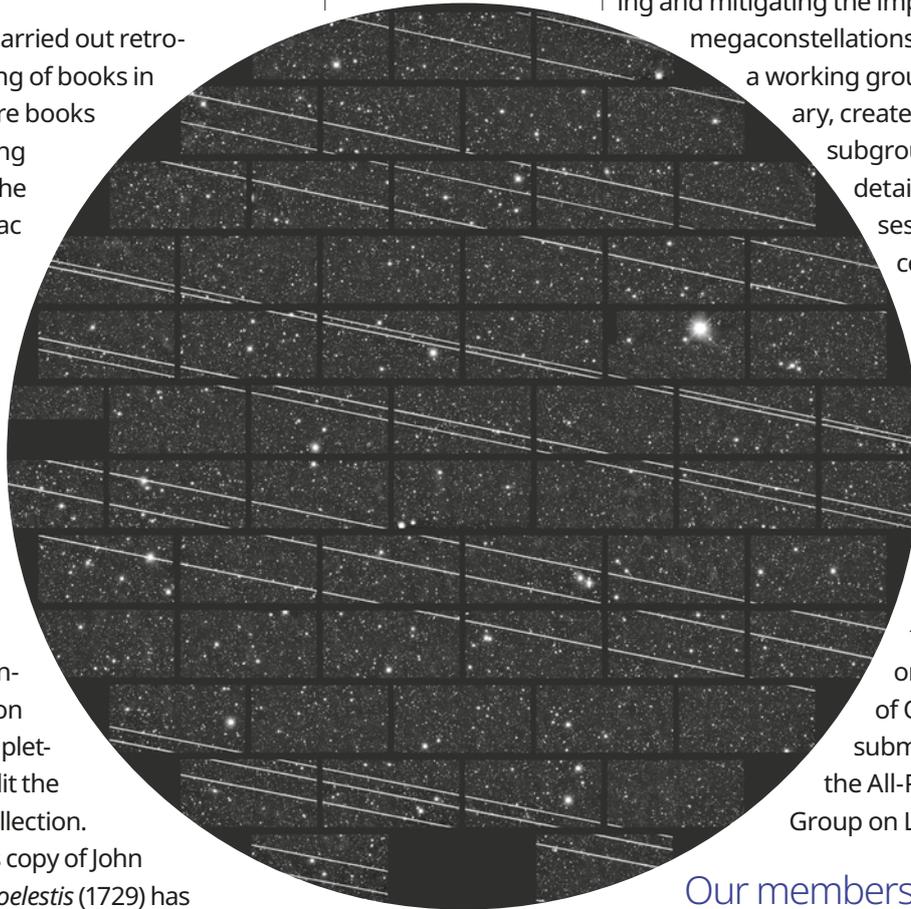
Diversity

The Society carried out a survey on harassment and bullying in our community, getting responses from more than 600 people across the astronomy, space science and geophysics sectors.

In May, the RAS formally established the Early Career Network, bringing together undergraduate and postgraduate students, and postdoctoral researchers to give them a stronger voice in the Society. One of its first pieces of work was a highly successful online poster competition, which attracted 272 entries from 47 countries and generated valuable scientific discussion on social media.

Political engagement

The Society responded to the UK parliament Science and Technology Select Committee inquiry into proposals for a new funding agency. In December, the RAS solicited views on diversity in astronomy and geophysics for the All-Party Parliamentary Group on Diversity and Inclusion in STEM.



We continued to work on understanding and mitigating the impact of satellite megaconstellations. The RAS hosted a working group meeting in January, created optical and radio subgroups for technical detail, and co-organised sessions and a press conference at the European Astronomical Society annual meeting. We also took part in the international development of the Dark and Quiet Skies report for the UN Committee on the Peaceful Uses of Outer Space, and submitted evidence to the All-Party Parliamentary Group on Light Pollution.

Our membership magazine

From the first issue of 2020, the Society's membership magazine *A&G* had a refreshed design aligned with the new RAS branding. Fellows continue to support the magazine, sharing their work within our community by writing articles and sending in news items. *A&G* published 53 research reviews, reports of RAS meetings and outreach projects, discussion and analysis, as well as some 200 short news items. There were 252,571 downloads of *A&G* articles during the year, of which 205,312 represented "visits with content engagement".

Articles also included reviews focusing on the history and publishing heritage of the Society, accounts of RAS Specialist Discussion Meetings, and achievements of the RAS200 bicentenary projects. It was also a pleasure to highlight the career of distinguished Nigerian radio astronomer Samuel Okoye in October, to coincide with Black History Month. ■

Starlink satellite trails in a 5-minute exposure from the Blanco 4m telescope at the Cerro Tololo Inter-American Observatory in Chile.

(NSF's National Optical-Infrared Astronomy Research Lab/CTIO/AURA/DELVE)



Sharing Knowledge



Artist's impression of a low-mass, high-velocity white dwarf reported in *Monthly Notices of the RAS* to be the result of an unusual, possibly partial, supernova.

(Mark Garlick/University of Warwick)

The Society disseminates knowledge to students, the press and the wider public by:

- Organising education and outreach events
- Supporting the Friends of the RAS
- Exploiting the resources of the Library and Archives
- Arranging a programme of Public Lectures
- Working with specialist partners through RAS200
- Promoting research in the media and social media
- Working with the Courtyard Societies as a cultural hub

Education and outreach

The switch to virtual meetings in 2020 brought larger audiences for RAS Public Lectures and events and made it possible for Fellows based outside the UK to take a fuller part in outreach activities.

The RAS ran a number of special bicentenary outreach events. In July, we connected to scientists in Leicester and Hawaii as they used the Infrared Telescope Observatory in Hawaii to make observations of Jupiter when Ganymede and its shadow passed in front of the giant planet. 300 people signed up for the event itself, and the recording was watched more than 11,000 times on YouTube. The event included a presentation using materials from our Library and Archive.

The RAS chaired the steering group for National Astronomy Week 2020, celebrating the close approach of Mars in October with a programme of events and public viewings. Amateur and professional astronomers, broadcasters, writers and artists joined the sessions online, with classes for children, an evening event with a panel of speakers, and live links to observatories around the UK and in Cyprus. An audience of more than 150 people watched each event.

After schools closed to most pupils in March, RAS staff started online classes to support home-schooling. The first tranche of “lockdown learning” ran twice a month for four months, covering early years,

This is Rocket, budding young astronaut and star of the book *Look Up!*, which attracted around 2000 schools to an online reading and Q&A.

**2500
CHILDREN
ATTENDED
RAS
LOCKDOWN
LEARNING
CLASSES**



primary and secondary, with an average of 70 in each session. With additional views on the RAS YouTube channel, the classes have reached an estimated 2500 people to date.

In the autumn, RAS staff worked with Kevin Walsh of Westminster School to create online live classes for GCSE Astronomy, bringing together 48 students from across the UK each week. In July, the RAS also joined the UK Space Agency and ESA to present online training on Space Resources for Teachers.

In December, we hosted author Nathan Byron and illustrator Dapo Adeola who presented their children’s book *Look Up!*, with a drawing session followed by questions. 500 schools attended and a further 1500 schools watched on YouTube; we estimate that at least 40,000 children took part.

Friends of the RAS

Friends events were affected by the Covid-19 restrictions but after the first lecture of 2020, the rest continued online, with four taking place, one postponed and one cancelled. Around 40 people attended each, on average. Talk topics included “The secret signal hidden in every solar and stellar flare” and “Astronomy in Ancient Egypt”. There were 274 members of the Friends by the end of 2020.

A cultural hub with other Courtyard Societies

We took part in the “Lunchtime Scientist” sessions run jointly with the other Courtyard Societies, targeting GCSE and A-level pupils and their teachers. These sessions ran online and involved conversations with leading researchers including astro-biologist Jane Greaves, planetary geologist Divya Persaud, and biologist, artist and space researcher Anguelo Vermuelen.

Social media provided an alternative way of marking

key outreach events in our calendar such as Open House, with videos about our building and collections. Even though the Courtyard Societies weren't open to the public, we collaborated on social media both for Open House, and during the rest of the year under the hashtag #CollectionsUnited, a series of tweets showing connections between our collections and societies.

Library outreach

Library materials featured in articles on Sacrobosco's *Sphere* and Copernicus's *De Revolutionibus* in *Popular Astronomy* magazine, and *The Supermassive Podcast* episodes included conversations about our editions of *De Revolutionibus* and Caroline Herschel's copy of Flamsteed's star atlas. We also supported an exhibition at the Herschel Museum in Bath on the work of John Herschel, which opened on 29 February, only to close three weeks later as a consequence of Covid-19 regulations.

Pandemic precautions limited access to the Library in person, but fostered wider online audiences for some events. We collaborated with the Linda Hall Library, a science-focused independent public library in Kansas City, USA, to deliver four hour-long talks. Each event had a live audience of 100–200 people on both sides of the Atlantic, with lively Q&A sessions afterwards. The events were simultaneously streamed on Facebook and the videos each have 600–800 views. Links to the recordings have been uploaded to the Treasures of the RAS section of the website: ras.ac.uk/library/treasures-of-the-ras.

The Library and the history of astronomy featured on Astro Radio's *Lock in at the Locked Inn* show; Annie Maunder and the importance of role models was the focus of a presentation to the Finding Ada conference, with 830 delegates; and we welcomed a virtual Library tour for 20 artists taking part in a virtual residency organised by Mayes Creative and Carolyn Kennett.

RAS200

RAS200: Sky and Earth, the flagship Society project, saw much of its activity curtailed after the spring of 2020. Some partners did continue their activity, including the Prince's Trust, with week-long sessions for 20 young people,



Our projects and lead partners

Astronomy and Geophysics through the Traditional Culture of Wales
Aberystwyth University

Beyond Prison Walls
Bounce Back Foundation

Stepping Out:
Astronomy Short Breaks for Carers
Care for Carers

Cornwall Sea to Stars
Cornwall Sea to Stars

Reaching for the Stars
Girlguiding UK

Space, Earth and Autism
National Autistic Society

The Planets 360
National Space Centre Creative

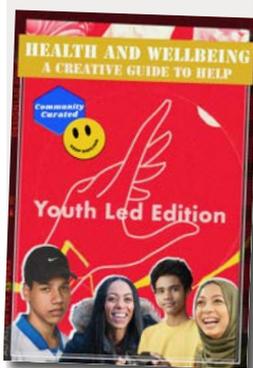
Geophysics in a Box
National Youth Agency

Astronomical Data: from Small and Beautiful to Big and Overwhelming
South African Astronomical Observatory

Stars and Space
The Prince's Trust

Making Space
University of Ireland Galway

Open Your Eyes, Look up to the Skies
Workers' Educational Association



some of whom produced a leaflet (pictured below) including ways astronomy can boost well-being; Girlguiding, whose online engagement included a month of astronomy in November and virtual astronomy sleepovers; and the WEA, with tutor training, eight-week astronomy courses and stand-alone talks. Online courses offered the opportunity for a wider cross-section of Fellows to be involved in these activities; they are also more accessible for many participants.

Public Lectures

In addition to our usual programme of Public Lectures taking place at Burlington House, for 2020 we planned a series of lectures delivered around the UK. As a result of pandemic precautions, from March onwards these were all given virtually. Some of the public engagement events planned to celebrate our bicentenary took place early in 2020. The first Bicentenary Public Lecture – a series planned for venues outside London – took place in Cardiff in January. From March onwards, the remaining talks were given online, and very well received. The online Bicentenary and regular Public Lecture programme saw large audiences, with each event attracting between 250 and 400 people registered, and between 400 and 1700 additional views on YouTube.

The Public Lectures held in 2020:

Prof. Alberto Vecchio (University of Birmingham): Gravitational waves and spacetime fireworks: a new era in astronomy

Anna Nash (Mullard Space Science Laboratory, University College London): ExoMars PanCam and planetary protection

Prof. Andrew Norton (Open University): Exploring the variable star zoo: citizen science and SuperWASP

Prof. Chris Done (University of Durham): Black holes and space science

The Bicentenary Public Lectures held in 2020:

Dr Edward Gomez (Cardiff University): Only a matter of time: is time-travel science or science fiction?

Dr Steven Wilkins (University of Sussex): Happy birthday Hubble

Dr Michelle Collins (University of Surrey):

Adventures in galactic archaeology

Rosie Cane (UK Centre for Astrobiology, University of Edinburgh): From microbes to Mars: how can we use bacteria in the search for life beyond the Earth?

Dr Matt Bothwell (Institute of Astronomy, University of Cambridge): Searching for Earth 2.0

Prof. Tim Wright (University of Leeds and director of COMET): Monitoring our hazardous planet from space

Prof. Michele Dougherty (Imperial College London): Cassini spacecraft mission at Saturn

Dr Tana Joseph (University of Amsterdam): Challenging Afro-pessimism: the SKA in Africa

Dr Aprajita Verma (University of Oxford): Rise of a giant: the Extremely Large Telescope

Media and social media

In 2020, the Society issued 16 press releases and RAS staff and officers gave 97 radio, TV and press interviews, commenting on topics including megaconstellations of satellites, diversity and inclusion in astronomy, and the exploration of Mars. The Society also created video content related to, for example, the Lyrids meteor shower, Venus in front of the Pleiades, and Comet NEOWISE, that accrued up to 25,000 views.

For our bicentenary year, the RAS launched its first podcast series, *The Supermassive*

**RAS200
PROJECTS
HAVE NOW
REACHED
131,546
PEOPLE**

Ed Gomez discussing the concept of time travel in his Bicentenary Public Lecture in January.

(Olivia Gomez)

Podcast, in association with Boffin Media. By the end of the year it had been downloaded more than 53,000 times, with listeners in 57 countries; it was the fourth most popular astronomy podcast for UK listeners, with women forming a third of its audience, and two-thirds of listeners aged under 35.

The highlight of the year for RAS media engagement was the press briefing on the discovery of phosphine in the atmosphere of Venus and its status as a biosignature. Working with the European Southern Observatory, James Clerk Maxwell Telescope, Jodrell Bank Observatory, the Science and Technology Facilities Council, Imperial College London, the University of Cambridge and the Open University, the briefing was hosted virtually by the Society. Around 250 journalists attended the event, which was broadcast live on YouTube and has now been watched more than 264,000 times; associated media resources attracted 17,000 and 105,000 views respectively. In November, the Society ran a second briefing, this time on the Gaia Early Data Release 3. 150 journalists attended this virtual event, and associated video animations of the solar neighbourhood and of the Large and Small Magellanic Clouds were viewed more than 21,000 times.

All our social media channels grew during 2020: Twitter by 52%; Facebook by 32%; Instagram by 369%; and our LinkedIn page, resurrected in March 2020, now has more than 1000 followers. The Library Twitter account increased engagement by 25%, reaching more than 300,000 impressions. Social media directed viewers to a range of RAS activities, including bicentenary events; the school classes engaged audiences from around the world; and our #lockdownlearning hashtag was adopted widely. In addition, video on social media had a high level of engagement, being collectively viewed more than 400,000 times over the course of the year.

The Society also ran a successful campaign around Black History Month in October, including examples of black astronomers and geophysicists now and in history. Over the month we saw more than one million impressions. On 19 November, the Institute for Historical Research ran "History Day" as an online event for postgraduate researchers, which included a short video tour of our collections. ■



Our Organisation



An audience watching *The Planets 360*, a planetarium show produced for the RAS bicentenary by our RAS200 partners NSC Creative. (NSC Creative)

The organisation of the RAS supported our objectives during 2020 by:

- Addressing the sustainability of our activities
- Exploring options for the Society's accommodation in the future
- Supporting younger Fellows



The Fellowship

The RAS had 4204 Fellows at the end of 2020, 166 (4%) of whom were Honorary Fellows. This slight increase on the number in 2019 continues the pattern of steady expansion that has seen the number of Fellows grow by 5% since 2015. A quarter of our Fellows (26%) live outside the UK. 19% of our Fellows are female. 32% of our members were over 65 and 7% under 25.

Our future accommodation

The Society has set up a Property Working Group and continued to seek discussions with our landlords about the future of our accommodation at Burlington House. We have engaged with the other Courtyard Societies.

Sustainability Working Group

This group met to consider the report on the carbon footprint of Society activities commissioned from Alectro. The report highlighted the impact of travel by staff, Trustees and researchers engaged in activities supported

by the RAS. The group noted that the change to working and meeting online during the pandemic cut our carbon emissions and demonstrated that online meetings can be successful.

Working remotely

In common with many Fellows, RAS staff worked remotely for most of the year, with only essential visits to Burlington House. Online engagement was higher throughout 2020, on social media and in nominations for Council elections and awards.

The Early Career Network

In May, the RAS formally established the Early Career Network (ECN), bringing together undergraduate and postgraduate students, and postdoctoral researchers in order to give them a stronger voice in the Society. ■



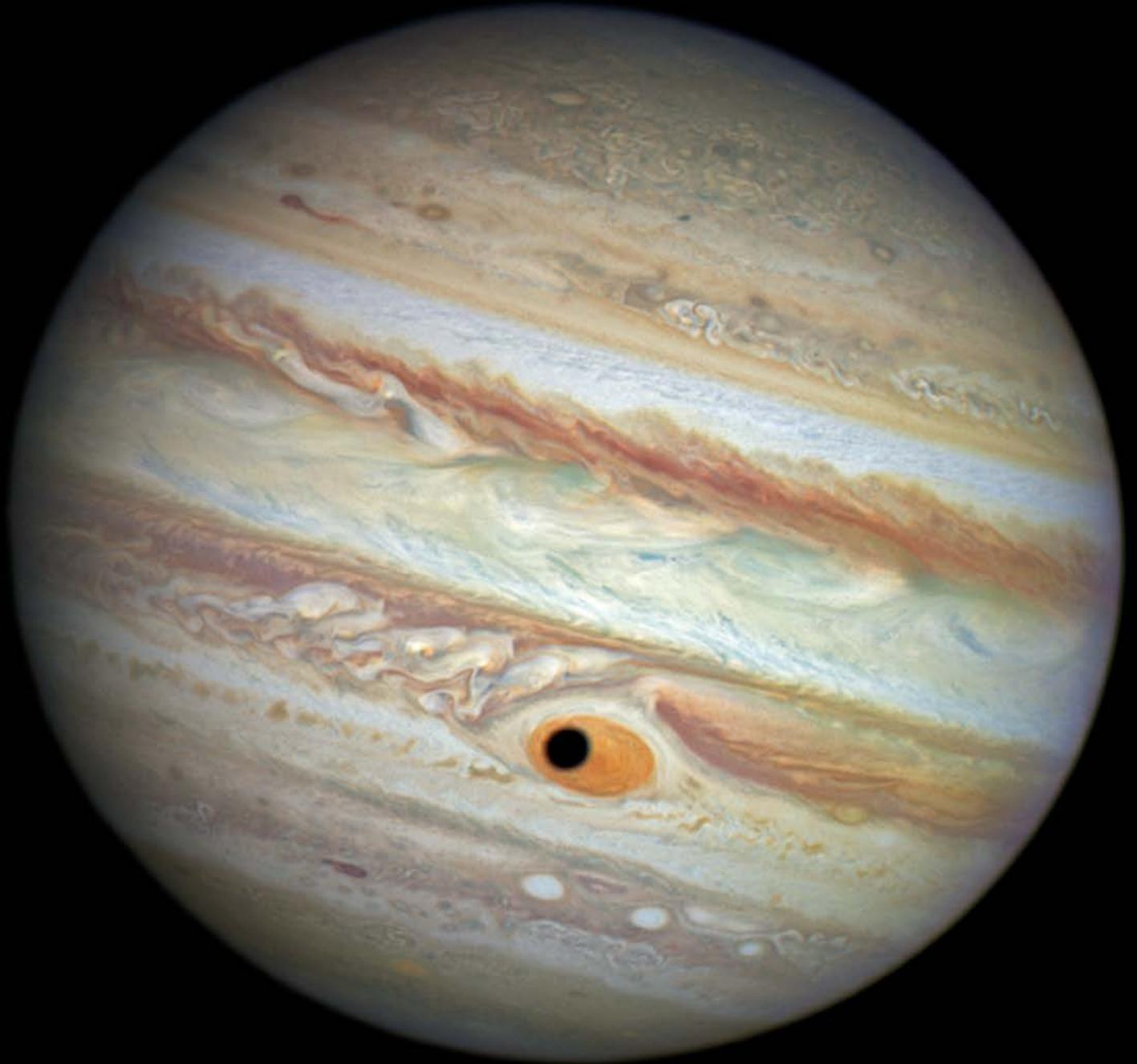
Áine O'Brien, a PhD student at the University of Glasgow, was appointed the first chair of the Early Career Network. "As part of its 200th anniversary, RAS Council wanted to celebrate the future, by supporting its early-

career Fellows. Given that many early-career researchers (ECRs) have specific needs – in terms of networking, career guidance and mentoring, for example – it was thought the best way for the RAS to help was to form a committee of early-career researchers to provide mutual support and request what they need. One impact of Covid-19 was the loss of conferences, so we ran a free online poster exhibition. I was bowled over by the participation and engagement: there were more than 2000 views of the posters on day one!" The map shows where entries to the poster competition came from (in blue).

We have continued to explore options for our future in Burlington House. (Lynda Laird/RAS)



Looking Forward



The transit of the moon Ganymede across the face of Jupiter was covered live in July as part of our bicentenary outreach. 11,000 people watched on YouTube. (NASA, ESA, A Simon [Goddard Space Flight Center]. Acknowledgment: C Go and Hubble Heritage Team [STScI/AURA])

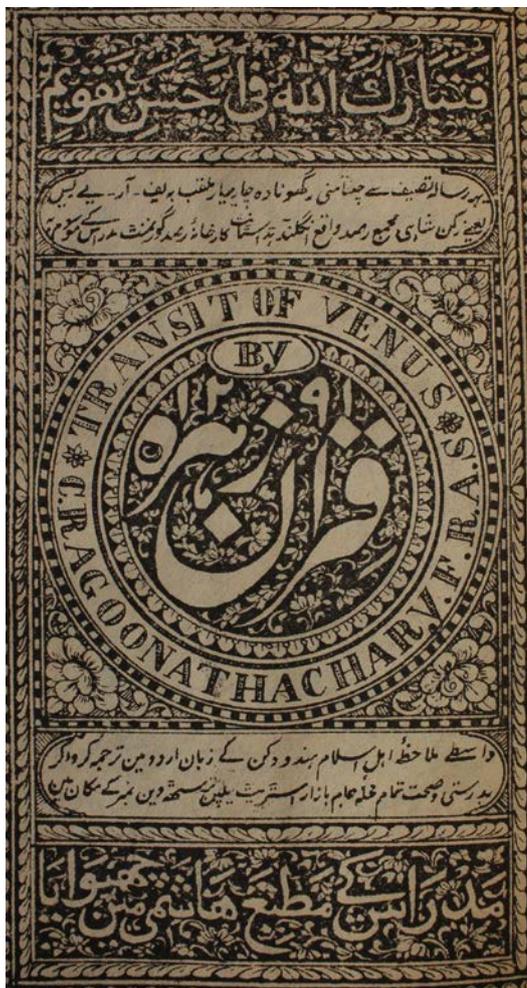
The RAS is making plans for 2021 and the future by:

- Setting objectives for our activities
- Identifying specific goals for 2021

Objectives

The Society will:

- Publish high-quality peer-reviewed journals
- Support students and early-career scientists through research fellowships and grants
- Recognise achievement through our medals and prizes
- Maintain high-quality research meetings, including the National Astronomy Meeting, and Public Lectures
- Sustain our Library and Archive service
- Continue our political engagement
- Maintain our programme of education and outreach, including the Friends of the RAS
- Promote the work of the Society and Fellows in the media and on social media
- Build our outreach work with other Courtyard Societies.



The 2020 National Astronomy Meeting had to be postponed; NAM 2021 will be held online.

Right: A cover of covers, reflecting the changing look and breadth of content of *A&G* – or *Astronomy & Geophysics* as it was known when it launched in 1997.

Left: A pamphlet published in three languages by Fellow Chintamanny Ragoonatha Chary in 1872, featured on our forthcoming Timeline. (RAS)

A&G MARKED 25 YEARS AS THE RAS MEMBERSHIP MAGAZINE

A&G
FEBRUARY 2021 | VOL. 62 | ISSUE 1

Royal
Astronomical
Society



In 2021, the Society will also:

- Launch an Open Access journal
- Update our demographic survey
- Work towards reducing our carbon footprint
- Make our programme of awards and prizes more open and inclusive
- Build on our experience of online events to give our physical meetings, when they are possible, a greater reach
- Digitise the observation notebooks and working papers of Caroline Herschel
- Continue to seek a sustainable future for the Society in Burlington House.

Events since the year end

National Astronomy Meeting 2021 The Society has decided that the 2021 NAM, postponed from 2020, will be held as a virtual event.

A silver anniversary February 2021 saw the publication of the 25th volume of membership magazine *A&G*.

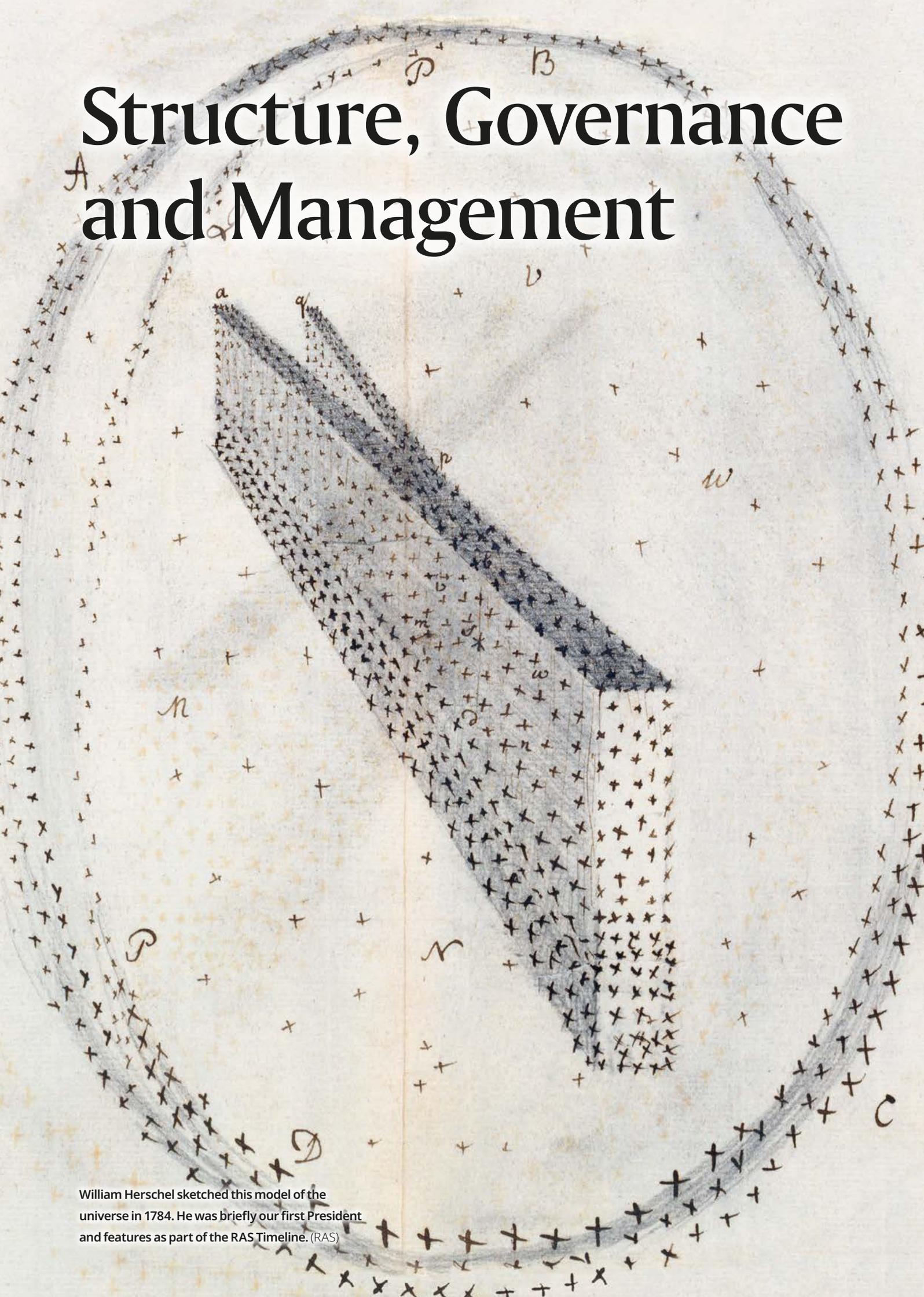
Supporting researchers The Society held a meeting in January 2021 to find out how Covid-19 has affected our research community.

Sustainability The RAS has signed the UN Climate Neutral Now declaration, committing us to reduce carbon dioxide emissions by 50% by 2030, and to reach net-zero emissions by 2050.

Accommodation We have written to our Fellows to ask for their support and coordinated with other Courtyard Societies about a sustainable future in Burlington House.

Timeline Staff have been completing an online Timeline to mark significant events in the 200 years of the Society. 2021 will see the spectacular installation in Burlington House.

Structure, Governance and Management



William Herschel sketched this model of the universe in 1784. He was briefly our first President and features as part of the RAS Timeline. (RAS)

The regulations and procedures of the Society:

- Society governance
- Trustee recruitment and appointment
- Trustee induction and training
- Organisational structure
- Risks

Governance

The Royal Astronomical Society was founded in 1820 and is incorporated by Royal Charter and managed according to byelaws that were revised at the Annual General Meeting in 2015. The RAS's objectives, charters and byelaws are detailed on the Society's website ras.ac.uk.

The control of the Society rests with the General Meeting of Fellows. Subject to that, direction and management are the responsibility of the Council (as the Trustees of the charity). The Council consists of a President, a Treasurer and three Secretaries together with four Vice-Presidents and 12 Councillors. In addition, the President-Elect attends Council for one year prior to taking up the post.

Trustee recruitment and appointment

Annually, the full membership of the Society is asked to nominate themselves or other members of the Society to available positions on Council. A nomination must be supported by two other members of the Society. Council approves the ballot list and this together with a narrative on each candidate is sent to the full membership for their consideration prior to casting their votes. We moved to fully electronic voting and an online AGM in 2020 in line with Covid-19 restrictions; we will continue with solely online voting in future.

Members of the Council are elected by ballot at the Annual General Meeting, for the following normal and maximum terms of office, as set out in the byelaws. In summary:

- President, two years
- Vice-Presidents, two years
- Treasurer and Secretaries, five years
- Councillors, three years.

Trustee induction and training

New members of Council attend a Trustee induction programme before their first

2020 SAW INCREASED PARTICIPATION FROM FELLOWS BASED OUTSIDE THE UK

Council meeting. All members of Council are asked to complete a conflict of interest declaration and to sign a Trustee declaration form. Trustees have the opportunity to attend training, where appropriate; for example, on The Governance Code.

Fundraising

The Society is not currently fundraising actively, but if it does so in future it will comply with best practice as outlined by the Charity Commission, and also in compliance with GDPR. The Society offers information and guidance about leaving a legacy to the RAS on the website.

Organisational structure

The RAS Council normally meets six times during the year and its function is to direct, on behalf of the Society, all the affairs and business of the Society. Council appoints standing committees (Publications Management, Editorial [for each journal], Outreach and Education, Finance, International, Membership, Library, Astronomical Heritage, Diversity in Astronomy and Geophysics) and *ad hoc* committees (e.g. Awards) to forward its objectives.

It appoints the managing editors and editors of the Society's research journals, *Monthly Notices of the Royal Astronomical Society* and *Geophysical Journal International*, who provide their services, as does the Treasurer, for an honorarium.

The Society has formal associations with a number of organisations having shared interests, and has less formal arrangements with several other bodies. These include:

- The British Geophysical Association, jointly sponsored by the RAS and the Geological Society of London to represent solid-Earth geophysicists whose interests fall within the remits of both parent societies
- The Paneth Meteorite Fund that the Society administers under the direction of the Paneth Fund Trustees
- The Society is the UK national member organisation of the International Astronomical Union and the European Astronomical Society and is represented on the UK Panel of the International Union of Radio Science
- The Society is represented on a number of organisations including the Science Council, the Parliamentary and Scientific



RAS staff pictured at the bicentenary celebration evening in January.

(Lynda Laird/RAS)

Committee and the Campaign for Science and Engineering

- The Society recognises the appeal of astronomy and geophysics to the general public by offering annual membership to Friends of the RAS for a small fee. Friends' benefits include a series of Friends-only lectures, as well as priority seating for the Society's popular Public Lectures, visits to observatories and science centres, use of the Society's Library, as well as a reduced subscription to the Society's members' magazine *A&G*.

Risks

The principal risks and uncertainties identified by the Trustees are:

- Maintenance of the quality of, and income from, publications (a significant income stream of above 60%)
- Open Access publishing
- Affordability of rent and service charges for the premises at Burlington House
- Covid-19 and its potential impacts on access to the building, Society activities, publishing and investments.

The Finance Committee regularly reviews the Society's risk register and the Council annually reviews the major risks to which the Society is exposed and the systems that have been established to manage those risks. In regards to the three most significant risks:

The Society insists that rigorous peer review is used to maintain the quality of the two journals and thereby the demand by authors and readers for the highly successful publications and, with the publishers, ensures that it adopts a robust business model for production and sales.

**RAS STAFF
WORKED
LARGELY
FROM HOME
DURING 2020**

The uncertainty over future rental charges remains an ongoing concern for the Society. The Society, alongside the other Courtyard Societies, continues to seek a satisfactory resolution with the landlord. The Trustees still hold the view previously stated (*Annual Report 2015*) that the Society has the resources to cover increases in rental charges over the current lease period. In the meantime, the Society will explore options for alternative accommodation if a satisfactory resolution cannot be achieved.

Other key risks identified and their mitigation measures include:

- Maintenance of the (listed) premises (by regular repair and refurbishment)
- Maintenance of the size of the membership (by regular review of services and subscriptions and outreach activities to potential new members)
- The implementation of a broad range of statutory regulation, for example GDPR (using expert external assistance where necessary).

The Trustees consider the fluctuations in investment fund values and variability of investment returns to be a risk for the Society. The fund, Newton Growth and Income Fund for Charities, is actively and expertly managed and administered by Newton Investment Management who were reappointed after a competitive tender. Funds are invested in a diverse portfolio comprising commodities, equities, bonds and gilts. This managed strategy mitigates fluctuations in fund values and seeks opportunities for fund growth and income. The Trustees consider this approach mitigates the subsequent exposure to any investment risk. ■



A photograph of the Aurora Borealis (Northern Lights) in a snowy landscape. The aurora is a vibrant green, glowing in the dark night sky above a snow-covered mountain range. The foreground shows a dense forest of evergreen trees, also covered in snow. The overall scene is serene and majestic.

Financial Statements

Aurora arise from the connection between the Sun and the Earth, a focus of ESA's Cluster mission, and the subject of a Specialist Discussion Meeting. (ESA/Sara Mazrouei)

FINANCIAL REVIEW

The Society's total funds increased from £21,240,147 to £21,507,367 during the year, both figures including a large contribution from the Society's heritage assets (rare books, clocks, telescopes and fine art), which totalled £9,470,879 (2019 – £9,440,879). Income increased to £4,845,401 (2019 – £4,679,347) due to increased income from publishing and membership. Due to the Covid-19 pandemic the National Astronomy Meeting (NAM) did not take place. Publishing income increased by £251,303. The Society's expenditure decreased to £4,532,478 (2019 – £4,810,880), which is mainly due to the Covid-19 pandemic reducing support costs due to reduced occupancy of Burlington House, postponing NAM and reducing grant-making activity. Net investment losses totalled £45,703 (2019 – gains of £1,154,287).

Policy on reserves

The reserves policy aims to maintain adequate financial cover for the main risks to the Society and provide in the normal way for an efficient winding-up if that ever became necessary. Working cash reserves are maintained so the Society does not rely on realisation of investments gains, or capital invested. The total funds are now £21,507,367, of which £9,470,879 are held in heritage assets, leaving funds of £12,036,488 (2019 – £11,799,268) to cover the main risks and the operational needs of a going concern.

The requirement for significant reserves falls into two areas:

- The need to have contingency plans in place to maintain publication income if Open Access regulations threaten the current business model for academic journals; and
- The need to make some provision for either substantial increases in rent, and maintaining the premises, or alternatively, a change in the status of our accommodation. This remains under continual review by the Society and four other Courtyard Societies. The Society's right to remain at Burlington House under the present lease is not in doubt, but whilst the scale of future rent increases has been estimated, there remains uncertainty as to when these increases will slow down or cease. Negotiations continue with the landlord and all long-term options including alternative accommodation will be explored. The new Accommodation fund is detailed in note 17, page 50, along with the other Designated funds.

The Open Access fund and the Burlington House fund are currently maintained at high levels to support any significant changes to the Society's operations, and the General Fund is available to provide further financial support if either of these risks materialise. The General Fund is also available, should it ever be needed, to enable an orderly

winding up of the Society. At present the free reserves of the Society, defined as unrestricted, undesignated funds, excluding tangible fixed assets, are £5,713,233 (2019 – £6,026,888) and these would allow operation of the Society for at least 15 months if publishing were continued and expenditure incurred during that period and 37 months if publishing were halted. The Trustees are satisfied that the current level of reserves is appropriate given the risks and uncertainties outlined above.

It has been the policy of the Society to fund grant activity from the Research and Grants fund, which is now included in the balance of designated reserves.

Investment policy

Investments are held with BNY Mellon Charities Fund: Newton Growth and Income Fund for Charities, with the aim of generating capital growth and income over the medium to long term, with actively managed assets held in global equities and fixed income securities. Surplus cash is held in the COIF Charities Deposit Fund with CCLA Investment Management, which provides a high level of capital security, interest and liquidity. The Fund has an actively managed diversified portfolio of sterling denominated money market deposits and instruments. Income and gains from these investments contribute to fund the Society's charitable activities. Investment performance is monitored by the Accountant, Treasurer, Finance Committee and Council.

The Trustees, by resolution, adopted a total returns approach to the invested endowment funds in accordance with the requirements of the Charity Commission, believing that this approach is in the best interests of the Society. The fund reconciliation is disclosed in note 12. This approach was applied from 1 January 2015 when the value of the endowment funds at that date of £1,652,682 was used as a proxy for the original value of the endowment funds. In adopting this policy, permanent endowment funds will not be permitted to fall below the original value of £1,652,682. The Trustees aim to maintain the real value of the permanent endowment as a measure against the movements in the retail prices index. This was 1.2% for the year (2019 – 2.2%). No transfers to the restricted funds were made during the year (2019 – £207,695) as the funding levels held were considered adequate to cover commitments in 2021.

Grant-making policy

The RAS has for many years provided small grants to support the community in activities not funded by the Research Councils. Primarily these have been awarded to help students at the start of their careers, either with funding for summer bursaries enabling them to

experience working in a research environment while still an undergraduate, or to enable PhD students to present work at research conferences. The RAS has also supported scientific meetings in the UK, especially those held outside London. These broad categories of support have been discussed many times at Council and serve the purpose of encouraging entrants to the profession and extending the activities of the Society to members and the public outside London.

In addition to these grants to individuals, the Society funds a series of fellowships to promote the careers of the highest quality young postdoctoral scientists. These currently include RAS Fellowships (on any subject) and the Norman Lockyer Fellowship (in solar and solar-terrestrial physics). The Norman Lockyer Fellow is funded from an endowment fund set up for that purpose.

A further activity funded by the Society is the award of medals to recognise the highest quality work in various categories. These awards are proposed to Council by a separate awards panel and no awards are made to serving councillors.

The grants, fellowships and awards are funded from a number of sources. The Society has its restricted and endowment funds invested with Newton Investment Management and the income and gains from these investments are used to support the grants expenditure in accordance with the bequests and interest from the COIF Charities Deposit Fund.

The grants panel deliberates twice a year and further grants are awarded by the Education and Outreach Committee. It comprises the Treasurer (chair) and the three Secretaries. 166 applications were received for the two deadlines in February and in August. Panel members observe strict rules on conflict of interest, taking no part in decisions on grant applications from their home institutions. In addition, it is usual for panel members to absent themselves from discussions on grant applications from scientists with whom they have had recent close contact, such as research students supervised in the past five years.

Information relating to RAS200 can be found on pages 6 and 17.

Key management personnel

The key management personnel of the charity in charge of directing and controlling, running and operating the charity are the Trustees, the Executive Director and the Deputy Executive Director; the latter two are employees. They are assisted by an Accountant, a further three managerial level officers and other staff.

Council ensures that the RAS carries out a salary comparison exercise every 3–5 years. The comparability

study compares the staff salaries to other similar external positions to reassure the Trustees that the levels of remuneration are appropriate. The last comparison exercise was carried out in 2018.

The Society does not have a performance-related pay scheme. The Trustees annually consider a salary increase in regards to cost of living that applies to all staff.

Pension scheme

The Society's defined benefit pension surplus and its accounting treatment is explained in note 20 of these financial statements. This scheme is closed to new members and has four deferred members only and eight annuitants. The Society operates a defined contribution group personal pension scheme for current staff.

Legacies and donations

The Society encourages Fellows to include donations to the Society in their wills and receives donations during the year from Fellows and members of the public. During the year the Society received donations of £34,064 (2019 – £8,362) and £2,000 legacies (2019 – £nil).

Heritage assets

The Society's collection of rare books, fine art, telescopes and clocks was valued in 2011 at approximately £9.5 million. The Society does not regard these as assets which can be converted to their cash value, except in the most dire circumstances.

The Society continues to receive donated items periodically. All such donations are gratefully received and appreciated by the Society. Where a valuation is available for additions to the collection, this is reflected in the financial statements. A valuation will always be obtained for additions that are financially material to the whole collection.

Investment performance

The Newton Growth and Income Fund for charities provided a yield of 1.95% and a total return gross of 1.42% in the year. Annual management charges of 0.6% are taken from the capital of the fund. Interest from the COIF Charities Deposit Fund yielded 0.2%. Performance of the fund managers is kept under continual review. The impact of the Covid-19 pandemic reduced dividend income by 27.7%, although by 31 December 2020 the fund had recovered almost all the losses incurred when the Covid-19 pandemic impacted investment markets in March 2020.

TRUSTEES' RESPONSIBILITIES IN THE PREPARATION OF FINANCIAL STATEMENTS

The Trustees are responsible for preparing the Trustees' report and the financial statements in accordance with applicable law and United Kingdom Accounting Standards (United Kingdom Generally Accepted Accounting Practice).

The law applicable to charities in England and Wales requires the Trustees to prepare financial statements for each financial year which give a true and fair view of the state of affairs of the charity and of the income and expenditure of the charity for that period. In preparing these financial statements, the Trustees are required to:

- select suitable accounting policies and then apply them consistently;
- observe the methods and principles in Accounting and Reporting by Charities: Statement of Recommended Practice applicable to charities preparing their financial statements in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS 102);
- make judgements and estimates that are reasonable and prudent;
- state whether applicable United Kingdom Accounting Standards have been followed, subject to any material departures disclosed and explained in the financial statements;
- prepare the financial statements on the going concern basis unless it is inappropriate to presume that the charity will continue in operation.

The Trustees are responsible for keeping proper accounting records that disclose with reasonable accuracy at any time the financial position of the charity and enable them to ensure that the financial statements comply with the Charities Act 2011 and the provisions of the Royal Charter and Bye Laws. They are also responsible for safeguarding the assets of the charity and hence for taking reasonable steps for the prevention and detection of fraud and other irregularities. The Trustees are responsible for the maintenance and integrity of the charity and financial information included on the charity's website.

The Council of the Society believes that it has carried out these requirements.

AUDITORS

A resolution to appoint Buzzacott for 2021 will be proposed at the Annual General Meeting.

Approved by the Council and signed on its behalf by:

Prof. Emma Bunce
President

Date: 14 May 2021

INDEPENDENT AUDITOR'S REPORT TO THE TRUSTEES OF THE ROYAL ASTRONOMICAL SOCIETY

Opinion

We have audited the financial statements of the Royal Astronomical Society (the 'charity') for the year ended 31 December 2020, which comprise the statement of financial activities, the balance sheet, the statement of cash flows, the principal accounting policies and the notes to the financial statements. The financial reporting framework that has been applied in their preparation is applicable law and United Kingdom Accounting Standards, including Financial Reporting Standard 102 'The Financial Reporting Standard applicable in the UK and Republic of Ireland' (United Kingdom Generally Accepted Accounting Practice).

In our opinion, the financial statements:

- give a true and fair view of the state of the charity's affairs as at 31 December 2020 and of its income and expenditure for the year then ended;
- have been properly prepared in accordance with United Kingdom Generally Accepted Accounting Practice; and
- have been prepared in accordance with the requirements of the Charities Act 2011.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing (UK) (ISAs (UK)) and applicable law. Our responsibilities under those standards are further described in the auditor's responsibilities for the audit of the financial statements section of our report. We are independent of the charity in accordance with the ethical requirements that are relevant to our audit of the financial statements in the UK, including the FRC's Ethical Standard, and we have fulfilled our other ethical responsibilities in accordance with these requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Conclusions relating to going concern

In auditing the financial statements, we have concluded that the Trustees' use of the going concern basis of accounting in the preparation of the financial statements is appropriate.

Based on the work we have performed, we have not identified any material uncertainties relating to events or conditions that, individually or collectively, may cast significant doubt on the charity's ability to continue as a going concern for a period of at least 12 months from when the financial statements are authorised for issue.

Our responsibilities and the responsibilities of the

Trustees with respect to going concern are described in the relevant sections of this report.

Other information

The Trustees are responsible for the other information. The other information comprises the information included in the annual report and financial statements other than the financial statements and our auditor's report thereon. Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit or otherwise appears to be materially misstated. If we identify such material inconsistencies or apparent material misstatements, we are required to determine whether there is a material misstatement in the financial statements or a material misstatement of the other information. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact.

We have nothing to report in this regard.

Matters on which we are required to report by exception

We have nothing to report in respect of the following matters in relation to which the Charities Act 2011 requires us to report to you if, in our opinion:

- the information given in the Trustees' annual report is inconsistent in any material respect with the financial statements; or
- sufficient accounting records have not been kept; or
- the financial statements are not in agreement with the accounting records and returns; or
- we have not received all the information and explanations we require for our audit.

Responsibilities of Trustees

As explained more fully in the Trustees' responsibilities statement, the Trustees are responsible for the preparation of the financial statements and for being satisfied that they give a true and fair view, and for such internal control as the Trustees determine is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, the Trustees are responsible for assessing the charity's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern

basis of accounting unless the Trustees either intend to liquidate the charity or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs (UK) will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

Irregularities, including fraud, are instances of non-compliance with laws and regulations. We design procedures in line with our responsibilities, outlined above, to detect material misstatements in respect of irregularities, including fraud. The extent to which our procedures are capable of detecting irregularities, including fraud is detailed below.

Our approach to identifying and assessing the risks of material misstatement in respect of irregularities, including fraud and non-compliance with laws and regulations, was as follows:

- the engagement partner ensured that the engagement team collectively had the appropriate competence, capabilities and skills to identify or recognise non-compliance with applicable laws and regulations;
- we identified the laws and regulations applicable to the charity through discussions with management, and from our commercial knowledge and experience of the sector;
- we focused on specific laws and regulations which we considered may have a direct material effect on the financial statements or the operations of the charity, including the Charities Act 2011 and the financial reporting framework described above;
- we assessed the extent of compliance with the laws and regulations identified above through making enquiries of management and inspecting legal correspondence; and
- identified laws and regulations were communicated within the audit team regularly and the team remained alert to instances of non-compliance throughout the audit.

We assessed the susceptibility of the charity's financial statements to material misstatement, including obtaining

an understanding of how fraud might occur, by:

- making enquiries of management as to where they considered there was susceptibility to fraud, their knowledge of actual, suspected and alleged fraud;
- considering the control environment implemented by service organisations, including in publishing; and
- considering the internal controls in place to mitigate risks of fraud and non-compliance with laws and regulations.

To address the risk of fraud through management bias and override of controls, we:

- performed analytical procedures to identify any unusual or unexpected relationships;
- tested journal entries to identify unusual transactions;
- tested authorisation controls during substantive testing of expenditure;
- assessed whether judgements and assumptions made were indicative of potential bias; and
- investigated the rationale behind significant or unusual transactions.

In response to the risk of irregularities and non-compliance with laws and regulations, we designed procedures which included, but were not limited to:

- agreeing financial statement disclosures to underlying supporting documentation;
- reading the minutes of meetings of those charged with governance;
- enquiring of management as to actual and potential litigation and claims; and
- reviewing correspondence with HMRC and the charity's legal advisors.

There are inherent limitations in our audit procedures described above. The more removed that laws and regulations are from financial transactions, the less likely it is that we would become aware of non-compliance. Auditing standards also limit the audit procedures required to identify non-compliance with laws and regulations to enquiry of the Trustees and other management and the inspection of regulatory and legal correspondence, if any.

Material misstatements that arise due to fraud can be harder to detect than those that arise from error as they may involve deliberate concealment or collusion.

A further description of our responsibilities for the audit of the financial statements is located on the Financial Reporting Council's website at www.frc.org.uk/auditorsresponsibilities. This description forms part of our auditor's report.

Use of our report

This report is made solely to the charity's Trustees, as a body, in accordance with section 144 of the Charities Act 2011 and with regulations made under section 154 of

that Act. Our audit work has been undertaken so that we might state to the charity's Trustees those matters we are required to state to them in an auditor's report and for no other purpose. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the charity and the charity's Trustees as a body, for our audit work, for this report, or for the opinions we have formed.

Date: 14 May 2021

Buzzacott LLP
Statutory Auditor
130 Wood Street
London
EC2V 6DL

Buzzacott LLP is eligible to act as an auditor in terms of section 1212 of the Companies Act 2006.

STATEMENT OF FINANCIAL ACTIVITIES YEAR TO 31 DECEMBER 2020

	Notes	Unrestricted funds £	Restricted funds £	Endowment funds £	2020 Total funds £	2019 Total funds £
Income						
Donations and legacies	1	31,064	5,000	—	36,064	8,362
Other trading activities		40,263	—	—	40,263	47,349
Investment income	2	121,586	6,420	45,884	173,890	248,492
Charitable activities	3	4,595,184	—	—	4,595,184	4,375,144
Total income		4,788,097	11,420	45,884	4,845,401	4,679,347
Expenditure						
Raising funds		9,251	—	—	9,251	15,553
Charitable activities	5	4,462,379	60,848	—	4,523,227	4,795,327
Total expenditure		4,471,630	60,848	—	4,532,478	4,810,880
Net income (expenditure) before investment gains and losses		316,467	(49,428)	45,884	312,923	(131,533)
Net (losses) gains on investments	12	(31,992)	(1,683)	(12,028)	(45,703)	1,154,287
Net income (expenditure) for the year and net movement in funds		284,475	(51,111)	33,856	267,220	1,022,754
Reconciliation of funds:						
Total funds brought forward at 1 January 2020		18,572,550	795,109	1,872,488	21,240,147	20,217,393
Total funds carried forward at 31 December 2020		18,857,025	743,998	1,906,344	21,507,367	21,240,147

All gains and losses for the year are recognised in the above statement. All activities are classed as continuing. The notes on pages 41 to 54 form part of these financial statements.

STATEMENT OF FINANCIAL ACTIVITIES YEAR TO 31 DECEMBER 2019

	Notes	Unrestricted funds £	Restricted funds £	Endowment funds £	2019 Total funds £
Income					
Donations and legacies	1	3,009	5,353	—	8,362
Other trading activities		47,349	—	—	47,349
Investment income	2	172,093	8,464	67,935	248,492
Charitable activities	3	4,375,144	—	—	4,375,144
Total income		4,597,595	13,817	67,935	4,679,347
Expenditure					
Raising funds		15,553	—	—	15,553
Charitable activities	5	4,681,757	113,570	—	4,795,327
Total expenditure		4,697,310	113,570	—	4,810,880
Net (expenditure) income before investment gains and losses		(99,715)	(99,753)	67,935	(131,533)
Net gains on investments	12	796,458	39,641	318,188	1,154,287
Net income (expenditure)		696,743	(60,112)	386,123	1,022,754
Transfer between funds	15	—	207,695	(207,695)	—
Net movement in funds		696,743	147,583	178,428	1,022,754
Reconciliation of funds:					
Total funds brought forward at 1 January 2019		17,875,807	647,526	1,694,060	20,217,393
Total funds carried forward at 31 December 2019		18,572,550	795,109	1,872,488	21,240,147

All gains and losses for the year are recognised in the above statement. All activities are classed as continuing. The notes on pages 41 to 54 form part of these financial statements.

BALANCE SHEET 31 DECEMBER 2020

	Notes	2020 £	2020 £	2019 £	2019 £
Fixed assets					
Tangible assets					
. Heritage assets	11	9,470,879		9,440,879	
. Other assets	11	763,093		858,713	
Investments	12	8,514,773		8,560,476	
			18,748,745		18,860,068
Current assets					
Debtors	13	848,383		662,440	
Cash at bank and in hand		3,736,532		3,699,813	
		4,584,915		4,362,253	
Creditors: amounts falling due within one year	14	(1,712,745)		(1,864,459)	
Net current assets			2,872,170		2,497,794
Total assets less current liabilities			21,620,915		21,357,862
Creditors: amounts falling due after one year	14		(113,548)		(117,715)
Total net assets			21,507,367		21,240,147
The funds of the charity					
Endowment funds	15		1,906,344		1,872,488
Restricted income funds	16		743,998		795,109
Unrestricted income funds					
. Designated funds	17	13,027,499		12,427,713	
. General funds		5,829,526		6,144,837	
			18,857,025		18,572,550
			21,507,367		21,240,147

The financial statements were approved by Council on 14 May 2021 and signed on its behalf by

Prof. Emma Bunce
President

The notes on pages 41 to 54 form part of these financial statements

STATEMENT OF CASH FLOWS YEAR TO 31 DECEMBER 2020

	Notes	2020 £	2019 £
Cash flow from operating activities			
Net cash used in operating activities	A	(81,319)	(719,550)
Cash inflow from investing activities			
Dividends and interest from investments		173,890	248,492
Purchase of tangible fixed assets		(55,852)	(39,347)
Net cash provided by investing activities		118,038	209,145
Change in cash and cash equivalents in the year		36,719	(510,405)
Cash and cash equivalents at 1 January 2020	B	3,699,813	4,210,218
Cash and cash equivalents at 31 December 2020	B	3,736,532	3,699,813

Notes to the statement of cash flows for the year to 31 December 2020

A Reconciliation of net movement in funds to net cash flow from operating activities

	2020 £	2019 £
Net movement in funds (as per the statement of financial activities)	267,220	1,022,754
Adjustments for:		
Depreciation charge	121,472	113,457
Net (gains) losses on investments	45,703	(1,154,287)
Dividends and interest from investments	(173,890)	(248,492)
Increase in debtors	(185,943)	(107,914)
Decrease in creditors	(155,881)	(345,068)
Net cash used in operating activities	(81,319)	(719,550)

B Analysis of cash and cash equivalents

	2020 £	2019 £
Total cash and cash equivalents: Cash at bank and in hand	3,736,532	3,699,813

C Reconciliation of net funds

	1 January 2020 £	Cash flows £	31 December 2020 £
Cash and cash equivalents	3,699,813	36,719	3,736,532

PRINCIPAL ACCOUNTING POLICIES

The principal accounting policies adopted, judgements and key sources of estimation uncertainty in the preparation of the financial statements are laid out below.

Basis of preparation

These financial statements have been prepared for the year to 31 December 2020.

The financial statements have been prepared under the historical cost convention with items recognised at cost or transaction value unless otherwise stated in the relevant accounting policies below or the notes to these financial statements.

The financial statements have been prepared in accordance with Accounting and Reporting by Charities: Statement of Recommended Practice applicable to charities preparing their financial statements in accordance with the Financial Reporting Standard applicable in the UK and Republic of Ireland (Charities SORP) the Financial Reporting Standard applicable in the UK and Republic of Ireland (FRS 102) and the Charities Act 2011.

The charity constitutes a public benefit entity as defined by FRS 102.

The financial statements are presented in sterling and are rounded to the nearest pound.

Critical accounting estimates and areas of judgement

Preparation of the financial statements requires the Trustees and management to make significant judgements and estimates.

The items in the financial statements where these judgements and estimates have been made include:

- the liability for multi-year grant commitments;
- the useful economic life of tangible fixed assets;
- the accrual for Burlington House rent; and
- the impact of Covid-19 on the Society including the use of the going concern basis.

Assessment of going concern

The Trustees have assessed whether the use of the going concern assumption is appropriate in preparing these financial statements. The Trustees have made this assessment in respect of a period of at least one year from the date of approval of these financial statements.

The Trustees are fully cognisant of the risks that the Society is carrying such as the uncertainty and risks of increased rental charges for the accommodation in Burlington House, the possible risk posed by Open Access and a possible impact on the business model that relies on the publishing income and also of a low probability, albeit high impact risk, that the quality and success of the Society's

publications will decrease.

Whilst recognising these risks the Trustees are content that the Society has strategies in place to manage them and are of the opinion that the Society has adequate free reserves and therefore sufficient resources to meet its liabilities as they fall due. The Reserves Policy on page 28 of the Trustees' report provides more detail.

The Trustees have considered the impact due to Covid-19 on the ability of the Society to continue its charitable activities. Whilst some public, national and scientific meetings have been cancelled or postponed, these activities do not generate surpluses. Although access to its Burlington House premises is restricted, the core functions of membership, publishing, outreach, some library activities, grant making and public policy & engagement are continuing without any immediate or material impact on income and cash reserves. Future grant making from the restricted income funds can also continue for up to three years and the Trustees therefore conclude that the preparation of these financial statements on a going concern basis is justified.

The Trustees have concluded that there are no other material uncertainties related to events or conditions that may cast significant doubt on the ability of the charity to continue as a going concern.

The most significant areas of judgement that affect items in the financial statements are mentioned above and detail provided in the section on risks in the Trustees' report.

With regard to the next accounting period, the year ending 31 December 2021, the most significant areas that affect the carrying value of the assets held by the charity are expected to be the same as for 2020 along with the residual or ongoing impact of Covid-19.

Income recognition

Income is recognised in the period in which the charity has entitlement to the income, the amount of income can be measured reliably and it is probable that the income will be received.

Income comprises donations, investment income, income from the sale of publications, membership subscriptions, and other related income.

Donations, are recognised when the charity has confirmation of both the amount and settlement date. In the event of donations pledged but not received, the amount is accrued for where the receipt is considered probable. In the event that a donation is subject to conditions that require a level of performance before the charity is entitled to the funds, the income is deferred and not recognised until either those conditions are fully met, or the fulfilment of those conditions is wholly within the control

of the charity and it is probable that those conditions will be fulfilled in the reporting period.

Legacies are included in the statement of financial activities when the charity is entitled to the legacy, the executors have established that there are sufficient surplus assets in the estate to pay the legacy, and any conditions attached to the legacy are within the control of the charity.

The Society has a contract with Oxford University Press for the publication of journals, which gives a percentage of the surplus made to 31 December each year to the Society. Although payments are received net, income is recognised in the financial statements on a gross basis which reflects that the Society retains the underlying long term rights. All publication income is accounted for on a receivable basis.

Membership subscriptions are payable in respect of a twelve month period in advance. The unearned portion of income received relating to the period after 31 December is carried forward as deferred income.

Investment income is recognised once the dividend has been declared and notification has been received of the dividend due.

Interest on funds held on deposit is included when receivable and the amount can be measured reliably by the charity; this is normally upon notification of the interest paid or payable by the bank.

Expenditure recognition

Expenditure is recognised as soon as there is a legal or constructive obligation committing the charity to the expenditure. All expenditure is accounted for on an accruals basis and has been classified under headings that aggregate all costs related to the category.

Expenditure on charitable activities includes all costs associated with furthering the charitable purposes of the charity as described in the Trustees' Report.

Grants payable for the support of research or study in any areas of astronomy and geophysics are recognised in the financial statements as soon as the obligation has been authorised by the Grants Committee, which meets twice-yearly (ca. February and August) to allocate funds, the recipient has a reasonable expectation that they will receive a grant and any condition attaching to the grant is outside the control of the Society.

The costs of raising funds consist of room hire expenditure and RAS diaries bought for resale.

Allocation of support and governance costs

Support costs, including governance costs, represent indirect charitable expenditure. In order to carry out the primary purposes of the charity it is necessary to provide

support in the form of personnel development, financial procedures, provision of office services and equipment and a suitable working environment.

Governance costs comprise audit fees, legal advice for Trustees and costs associated with constitutional and statutory requirements, e.g. cost of Trustee meetings and preparing statutory financial statements as well as costs associated with the strategic management of the Society.

Support costs are apportioned based on the proportion of floor area occupied by, or proportion of staff time spent on, the activity.

Taxation

The Society is a registered charity and no liability to taxation arises on the results of its activities as applied for charitable purposes, with the exception of investment income, which is taxed at source.

Operating leases

Rentals under operating leases are charged to the statement of financial activities on a straight-line basis over the term of the lease.

Pension costs

The Society operates two pension schemes for employees and former employees. The assets of the schemes are held separately from those of the Society.

The Society operates a defined benefit pension scheme for former employees, who joined its service before 1 January 2002, providing benefits based upon final pensionable earnings. Royal London manages the pension scheme, with the investments now 100% held by Royal London.

The latest actuarial valuation at 31 December 2020 shows a pension surplus which is not recognised on the balance sheet as an asset because it is not available to the Society by way of reduced future contributions.

Actuarial gains and losses arising from new valuations and from updating valuations to the balance sheet date are recognised in the statement of financial activities as other recognised gains and losses.

The Society has established a second pension scheme (a defined contribution scheme) for employees who began service with the Society after 1 January 2002. The amount charged in the statement of financial activities in respect of the defined contribution pension scheme is the contributions payable in the year.

Foreign currencies

Monetary assets and liabilities denominated in foreign currencies are translated at the rate of exchange ruling at the balance sheet date. Transactions in foreign currencies are recorded at the rate ruling at the date of the

transaction. All differences are taken to the statement of financial activities.

Heritage assets

Heritage assets are included in the financial statements at a historic valuation which is being treated as deemed cost. There are two main classes of heritage assets that the Society possesses, which are:

- Rare Books and Manuscripts
- Fine Art and Collectibles – Historic books, portraits, busts, instruments and antique furniture.

The Society's rare book and manuscript collection is reported in the balance sheet at a valuation by Christies in 1996, with a number of items re-valued by B Quaritch Limited in 2011. The valuation basis was High Auction Estimate.

The Society's fine art and collectibles are reported in the balance sheet at a valuation by Bonhams in 1992, including index linking, with a number of items revalued by Bonhams in 2011.

The Society continues to periodically receive donated items. All such donations are gratefully received and appreciated by the Society. Where a valuation is available for additions to the collection, this is reflected in the financial statements. A valuation will always be obtained for additions that are financially material to the whole collection.

Depreciation is not charged on heritage assets due to immateriality based on their extremely long useful lives and high residual values.

Other tangible fixed assets

The Society capitalises tangible fixed assets with a cost greater than £250 and an estimated useful life over one year.

Tangible fixed assets are depreciated on cost on a straight line basis from the date of acquisition over their expected useful lives as follows:

- Telephone and security system and computer equipment 4 years
- Leasehold Improvements 20 years
- Plant and machinery 10 years

Investments

Listed investments are a form of basic financial instrument and are initially recognised at their transaction value and subsequently measured at their fair value as at the balance sheet date using the closing quoted market price.

Realised gains (or losses) on investment assets are calculated as the difference between disposal proceeds and their opening carrying value or their purchase value where the investment is acquired subsequent to the first

day of the financial year. Unrealised gains and losses are calculated as the difference between the fair value at the year end and their carrying value at that date. Realised and unrealised investment gains (or losses) are combined in the statement of financial activities and are credited (or debited) in the year in which they arise.

Debtors

Debtors are recognised at their settlement amount, less any provision for non-recoverability. Prepayments are valued at the amount prepaid.

Cash at bank and in hand

Cash at bank and in hand represents such accounts and instruments that are available on demand or have a maturity of less than three months from the date of acquisition.

Creditors and provisions

Creditors and provisions are recognised when there is an obligation at the balance sheet date as a result of a past event, it is probable that a transfer of economic benefit will be required in settlement, and the amount of the settlement can be estimated reliably. Creditors and provisions are recognised at the amount the charity anticipates it will pay to settle the debt.

Fund structure

Endowment funds comprise assets which normally must be held as capital. The income arising therefrom is used to support specific activities determined in accordance with the wishes of the donor.

Restricted funds comprise monies raised for, or their use restricted to, a specific purpose, or contributions subject to donor imposed conditions.

Designated funds represent monies set aside out of unrestricted funds and designated by the Trustees for a specific purpose.

Unrestricted funds represent those monies which are freely available for application towards achieving any charitable purpose that falls within the Society's charitable objects.

NOTES TO THE FINANCIAL STATEMENTS

1 Donations and legacies

	Unrestricted funds £	Restricted funds £	2020 Total funds £	Unrestricted funds £	Restricted funds £	2019 Total funds £
Donations	31,064	3,000	34,064	3,009	5,353	8,362
Legacies	—	2,000	2,000	—	—	—
Total funds	31,064	5,000	36,064	3,009	5,353	8,362

2 Investment income

	Unrestricted funds £	Restricted funds £	Endowment funds £	2020 Total funds £
Income from listed investments	116,763	6,202	44,321	167,286
Bank interest	4,823	218	1,563	6,604
2020 Total funds	121,586	6,420	45,884	173,890

	Unrestricted funds £	Restricted funds £	Endowment funds £	2019 Total funds £
Income from listed investments	160,417	7,858	63,073	231,348
Bank interest	11,676	606	4,862	17,144
2019 Total funds	172,093	8,464	67,935	248,492

3 Income from charitable activities

	Unrestricted funds	
	2020 £	2019 £
Publications (note 4)	4,217,341	3,966,038
Membership	362,860	350,267
Scientific meetings	1,445	40,226
Public policy	2,297	1,262
Library	3,399	8,370
Educational	4,167	6,306
Other	3,675	2,675
Total funds	4,595,184	4,375,144

4 Publications

	2020 £	2019 £
Income		
Monthly Notices of the Royal Astronomical Society	3,103,852	2,865,379
Geophysical Journal International	1,021,726	1,007,409
Astronomy & Geophysics	84,996	86,136
Other	6,767	7,114
	4,217,341	3,966,038
Expenditure		
Monthly Notices of the Royal Astronomical Society	2,421,830	2,290,130
Geophysical Journal International	638,652	663,151
Astronomy & Geophysics	186,076	166,790
Other	22,432	29,828
	3,268,990	3,149,899

5 Expenditure on charitable activities

Expenditure on charitable activities is analysed as follows:

	Direct costs £	Support costs £	2020 £	Direct costs £	Support costs £	2019 £
Publications (note 4)	2,848,351	420,639	3,268,990	2,713,442	436,457	3,149,899
Scientific meetings	17,041	194,273	211,314	113,843	201,579	315,422
Membership	11,259	49,858	61,117	9,514	51,733	61,247
Educational	234,672	53,308	287,980	505,670	54,463	560,133
RAS 200	93,250	4,000	97,250	98,405	5,000	103,405
Library	110,178	370,781	480,959	99,165	384,723	483,888
Public policy	62,321	53,296	115,617	66,033	55,300	121,333
	3,377,072	1,146,155	4,523,227	3,606,072	1,189,255	4,795,327

Grants, fellowships and awards, in support of research, are principally included under Educational and RAS200 above to reflect the responsibilities for the management and administration of grants. 59 grants, fellowships and awards – including the Norman Lockyer Fellowship, totalling £263,091 (2019 – £542,711) were made to institutes, and 59 grants, fellowships and awards totalling £20,141 (2019 – £22,239) were made to individuals. Expenditure supporting the Norman Lockyer Fellowship totalled £54,000 (2019 – £104,000), and one research fellowship ended during its final year contributing to credits to expenditure totalling £42,642 (2019 – £50,000). Adjustments to other grants resulted in credits to expenditure totalling £34,442 (2019 – £2,958).

Total grant-making support costs were £28,000 (2019 – £27,500).

A full list of all grantees and analysis can be found on the Society's website.

All expenditure on charitable activities is unrestricted except for £60,848 (which is almost entirely included within the educational category) which is restricted (2019 – £113,570).

6 Support costs

Support costs analysed by function are as follows:

	2020 £	2019 £
Executive	144,564	140,714
Finance	78,739	88,689
Facilities	83,858	92,285
Membership	34,965	34,595
IT	68,396	61,032
Policy, development and press	81,089	86,078
Burlington House	153,033	149,728
Other	324,218	347,815
Governance (note 7)	177,293	188,319
	1,146,155	1,189,255

Staff time (based on a review of staff time apportionment) and floor area, are used as bases of apportioning support costs over charitable activities.

7 Governance costs

	2020 £	2019 £
Auditor's remuneration (note 8)	25,325	24,765
Trustees' and Committee costs	23,914	29,845
AGM expenses	7,974	10,650
Staff time and other expenses	120,080	123,059
	177,293	188,319

8 Net income (expenditure) for the year

This is stated after charging:

	2020 £	2019 £
Depreciation	121,472	113,457
Auditor's remuneration:		
. Charity audit	19,250	16,025
. Pension scheme audit	6,075	5,675
. Other services	500	3,065
Operating lease rentals		
. Office equipment	9,750	14,156

9 Staff costs and remuneration of key management personnel

	2020 £	2019 £
Wages and salaries	864,583	821,677
Social security costs	89,979	83,870
Pension costs (see note 20)		
. Stakeholder pension scheme	72,379	68,347
. Death in service contributions	4,172	5,493
	<u>1,031,113</u>	<u>979,387</u>

During the year one employee of the Society earned between £70,000 and £80,000 (2019 – one) and one employee earned between £60,000 and £70,000 (2019 – one). Employer contributions to the stakeholder pension scheme for employees earning over £60,000 were £14,395 (2019 – £14,010).

The average number of employees was 23 (Administration 6, Outreach 1, Editorial 10, Library 2, House 2, Press & Policy 2) (2019 – 22).

The key management personnel of the charity in charge of directing and controlling, running and operating the charity on a day to day basis comprise the Trustees and the Executive and Deputy Executive Directors. The total remuneration (including taxable benefits and employer's pension and national insurance contributions) of the key management personnel for the year was £182,069 (2019 – £176,863).

10 Transactions with Trustees

The Trustees receive reimbursement for travel expenses actually incurred in attending meetings. The amount reimbursed during the year for 13 Trustees was £6,769 (2019 – £16,815).

Remuneration of £6,337 was paid to one Trustee during 2020 (2019 – £5,923 to one Trustee). By agreement with the Charity Commissioners (dated 14 June 2004, case No. 299189, Sealing No. 344/04) the Treasurer is paid an Honorarium. This is uplifted by inflation at the RPI rate and formally approved each year by Council.

Grants made to Councillors

The following grants were made to Councillors during the year as part of the RAS grant awarding process. The recipients had no influence or part in the decisions on the award of these grants. For the most part the grant holders were not the main personal beneficiaries as the support was directly received by their students or meeting attendees. Excluding Councillors from the grants round completely is not seen as a satisfactory policy. It would strongly dissuade members from standing for election as Councillors and would be at variance with the accepted practice in Research Councils where members of grants panels are not excluded from applying. The process of grant review and award fully complies with the Nolan Principles and closely follows Government Research Council practice. The grants were:

- Sir Norman Lockyer Memorial Trust as disclosed in note 22 (which shares the same board of Trustees as the Society).
- Paneth Meteorite Collection as disclosed in note 22. Dr Nigel Berman, Treasurer, is a Trustee.

11 Tangible fixed assets

(a) Heritage assets

	Rare books and manuscripts £	Fine art and collectibles £	Total £
At 1 January 2020	4,951,500	4,489,379	9,440,879
Additions	—	30,000	30,000
At 31 December 2020	4,951,500	4,519,379	9,470,879

There have been no recorded movements between 2016 and 2019.

The rare book collection is preserved by storing in an air-conditioned, temperature-controlled environment; the fine art and collectibles are also continually preserved in order to maintain their values.

Certain heritage assets are on public display at exhibitions. The Society's Librarian controls access to those heritage assets which are kept at Burlington House.

(b) Other assets

	Leasehold improve- ments £	Plant and machinery £	Telephone, security & computer equipment £	Past Presidents' Portraits £	Total £
Cost					
At 1 January 2020	1,878,405	30,541	298,992	9,994	2,217,932
Additions	—	1,703	24,149	—	25,852
Disposals	—	—	(17,171)	—	(17,171)
At 31 December 2020	1,878,405	32,244	305,970	9,994	2,226,613
Depreciation					
At 1 January 2020	1,106,595	10,684	241,940	—	1,359,219
Charge for the year	93,964	3,069	24,439	—	121,472
Disposals	—	—	(17,171)	—	(17,171)
At 31 December 2020	1,200,559	13,753	249,208	—	1,463,520
Net book values					
At 31 December 2020	677,846	18,491	56,762	9,994	763,093
At 31 December 2019	771,810	19,857	57,052	9,994	858,713

12 Investments

	2020 Total funds £	2019 Total funds £
Market value at 1 January 2020	8,560,476	7,406,189
Net unrealised investment (losses) gains	(45,703)	1,154,287
Market value at 31 December 2020	8,514,773	8,560,476
Historical cost as at 31 December 2020	4,917,081	4,917,081

Investments comprise BNY Mellon: Global Growth and Income Fund.

The permanent endowment fund investments and movements in the unapplied total return are set out below.

	Trust for investment £	Unapplied total return £	Total endowment £
At 1 January 2020	1,652,682	219,806	1,872,488
Add: Total return			
. Investment income		45,884	45,884
. Net losses on listed investments		(12,028)	(12,028)
		33,856	33,856
At 31 December 2020	1,652,682	253,662	1,906,344

	Trust for investment £	Unapplied total return £	Total endowment £
At 1 January 2019	1,652,682	41,378	1,694,060
Add: Total return			
. Investment income		67,935	67,935
. Net gains on listed investments		318,188	318,188
		386,123	386,123
Less:			
. Allocation to income from total return		(207,695)	(207,695)
At 31 December 2019	1,652,682	219,806	1,872,488

When adopting total applied return with effect from 1 January 2015, in the absence of reliable records of the original donations, the Trustees considered that the market values of the investments as recorded as at 1 January 2015 were appropriate to be considered as the initial value of the trust for investment. Since that figure sets the baseline below which disposals may not be made, taking a higher value than the actual original donations was considered to be prudent.

The Trustees have resolved that they wish to maintain the real value of the permanent endowment using the retail price index as a measure. No transfers to the restricted funds were made during the year as the funding levels held were considered adequate to cover commitments in 2021 (2019 – £207,695).

13 Debtors

	2020 £	2019 £
Trade debtors	21,988	40,572
Prepayments and accrued income	799,543	614,525
Other debtors	26,852	7,343
	848,383	662,440

14 Creditors

(a) Amounts falling due within one year

	2020 £	2019 £
Trade creditors	20,017	87,265
Accruals	130,466	74,371
Grants payable	250,342	455,160
Tax and social security	209,549	195,918
Deferred income	1,054,806	1,012,898
Other creditors	47,565	38,847
	1,712,745	1,864,459

(b) Amounts falling due after more than one year

	2020 £	2019 £
Grants payable	113,548	117,715

(c) Deferred income

	2020 £	2019 £
Balance as at 1 January 2020	1,012,898	1,030,736
Released to income	(1,012,898)	(1,030,736)
Income received from Fellows in advance	64,936	62,898
Publications income received in advance	950,000	950,000
Other income received in advance	39,870	—
Balance as at 31 December 2020	1,054,806	1,012,898

15 Endowment funds

	1 January 2020 £	Income £	Investment losses £	Transfers £	31 December 2020 £
Research and Grants funds:					
. Sir Norman Lockyer fund	1,448,558	35,496	(9,305)	—	1,474,749
. Other funds	145,269	3,560	(933)	—	147,896
	1,593,827	39,056	(10,238)	—	1,622,645
Benevolent fund	91,179	2,234	(586)	—	92,827
Library fund	43,309	1,061	(278)	—	44,092
Lectures and awards fund	144,173	3,533	(926)	—	146,780
	1,872,488	45,884	(12,028)	—	1,906,344

	1 January 2019 £	Income £	Investment gains £	Transfers £	31 December 2019 £
Research and Grants funds:					
. Sir Norman Lockyer fund	1,309,838	52,527	246,021	(159,828)	1,448,558
. Other funds	131,427	5,270	24,685	(16,113)	145,269
	1,441,265	57,797	270,706	(175,941)	1,593,827
Benevolent fund	82,489	3,309	15,494	(10,113)	91,179
Library fund	39,183	1,571	7,360	(4,805)	43,309
Lectures and awards fund	131,123	5,258	24,628	(16,836)	144,173
	1,694,060	67,935	318,188	(207,695)	1,872,488

There were no transfers from the endowment fund to the restricted income fund in 2020 (2019 – £207,695).

16 Restricted income funds

	1 January 2020 £	Income £	Expenditure £	Investment losses £	Transfers £	31 December 2020 £
Research & Grants fund	573,001	5,212	(55,500)	(842)	—	521,871
Benevolent fund	31,632	—	(2,140)	—	—	29,492
Library fund	38,307	537	—	(141)	—	38,703
Education fund	109,018	5,671	(1,000)	(700)	—	112,989
Lectures and awards fund	43,151	—	(2,208)	—	—	40,943
	795,109	11,420	(60,848)	(1,683)	—	743,998

	1 January 2019 £	Income £	Expenditure £	Investment gains £	Transfers £	31 December 2019 £
Research & Grants fund	477,679	9,166	(109,300)	19,515	175,941	573,001
Benevolent fund	22,644	—	(1,125)	—	10,113	31,632
Library fund	29,434	716	—	3,352	4,805	38,307
Education fund	89,309	3,935	(1,000)	16,774	—	109,018
Lectures and awards fund	28,460	—	(2,145)	—	16,836	43,151
	647,526	13,817	(113,570)	39,641	207,695	795,109

The restricted funds are consolidated into five groups to serve the Council's priorities and address modern needs: Research & Grants, Benevolent, Library, Education and Lectures & Awards. A detailed fund summary can be found on the RAS website.

The restricted funds were classified to either Restricted (R), Endowment (E), Designated (D), or General (G) funds:

Research & Grants fund

E AG Stillhamer Trust Fund (1937)
D EW Brown Trust Fund (1939)
E Plummer Bequest (1946)
G General
R Victor Nadarov Fund (1950)
E Sir Norman Lockyer Memorial Trust (1990)
R Hosie Bequest (2000)
D Mrs JM Jelley-Freeman Bequest (2000)
D CAG Bearpark Trust (2000)
R Patricia Tomkins Fund (2011)
G Special Purposes Fund
E EA Milne Travel Fund (2013)
R R Potter Research Fund (2017)
R Osmaston Fund (2020)

Library fund

E Turnor Fund and Horrocks Memorial Fund (1853/1876)
E Harry Watson Memorial Fund (1923)
E Warin Bushell Fund (1964)
E Gaythorp Bequest (1969)
E Ian Ridpath Conservation Fund (2006)
R Dewhirst Fund (2013)
Education fund
R Newbigen Fund (1990)
R Michael Penston Memorial Fund (1991)
R Sir William Hunter McCrea Memorial Fund (2000)
R Paul Ruffle Memorial Fund (2014)
D Education Committee

Benevolent fund

E Lee & Jansen Trust Fund (1834/1879)
E Gerald Merton Fund (1986)
G Donald R Barber Fund (2001)

Lectures & Awards fund

E Hannah Jackson-Gwilt Trust Fund (1861/1893)
E George Darwin Lectureship Fund (1926)
E George Darwin Support Fund
D AS Eddington Commemoration Fund (1948)
E Harold Jeffreys Lectureship Fund (1962)
E AT Price Medal Fund (1999)
E Gerald Whitrow Memorial Lecture Fund (2001)
E Fowler Prizes Fund (2004)

17 Designated funds

	1 January 2020 £	New designation £	Utilised/ released £	31 December 2020 £
Accommodation fund	—	1,000,000	—	1,000,000
Burlington House fund	740,764	—	(93,964)	646,800
Heritage Asset fund	9,440,879	30,000	—	9,470,879
Building fund	1,123,694	—	93,964	1,217,658
Open Access fund	393,440	—	(844)	392,596
RAS 200	254,968	—	(93,250)	161,718
RAS 2020	314,858	—	(299,858)	15,000
Research and grants fund	159,110	—	(36,262)	122,848
Total designated funds	12,427,713	1,030,000	(430,214)	13,027,499

	1 January 2019 £	New designation £	Utilised/ released £	31 December 2019 £
Burlington House fund	834,728	—	(93,964)	740,764
Heritage Asset fund	9,440,879	—	—	9,440,879
Building fund	1,029,730	—	93,964	1,123,694
Open Access fund	400,000	—	(6,560)	393,440
RAS 200	353,373	—	(98,405)	254,968
RAS 2020	389,459	—	(74,601)	314,858
Research and grants fund	116,769	173,335	(130,994)	159,110
Total designated funds	12,564,938	173,335	(310,560)	12,427,713

(i) Accommodation fund

This new fund represents the requirement to finance a possible relocation due to the uncertainties concerning the lease at Burlington House.

(ii) Burlington House fund

Under lease agreements signed in 2005 with the Department of Communities and Local Government (previously Office of the Deputy Prime Minister – ODPM), the Society and four others in the Burlington House courtyard secured future occupancy on the basis of paying rent and, additionally, being responsible for the external fabric of the building following a renovation programme carried out by the ODPM in mid-2006. In 2006–07, the Society executed a refurbishment project on the interior of the apartments. Expenditure incurred on the project has been capitalised and designated as the Burlington House fund.

(iii) Heritage Asset fund

A fund has been established to include the Society's heritage assets to recognise that there is no intention to dispose of these assets and the amount is not readily available to meet expenditure.

(iv) Building fund

The repairs and maintenance of the exterior of the building, its insurance and some security costs are carried out by the landlord for all the occupants and a proportion recharged to the Society. The Building fund should provide for internal and external maintenance of the building. The Finance Committee will recommend how much more to accumulate in this fund and at what rate. The timescale for expenditure is difficult to forecast but in principle could start within five years.

(v) Open Access fund

A fund has been established to provide against the risk of the possible collapse of the current business model for learned publishing due to various forms of Open Access. The timescale for expenditure is difficult to forecast but could in principle start within five years.

(vi) RAS200

The original fund balance of £1,000,000 was the total committed grant expenditure for RAS200. RAS200 grant expenditure is being charged to this fund from 2015 to 2022.

(vii) RAS 2020

This represents the estimated expenditure associated with the RAS bicentenary celebrations, associated events and activities.

(viii) Research and grants fund

This represents those funds to be used for research and grants.

18 Analysis of net assets between funds

Fund balances at 31 December 2020 are represented by:

	General funds £	Designated funds £	Restricted funds £	Endowment funds £	2020 Total funds £
Tangible assets					
. Heritage assets	—	9,470,879	—	—	9,470,879
. Other fixed assets	116,293	646,800	—	—	763,093
Investments	3,753,956	2,110,475	743,998	1,906,344	8,514,773
Current assets					
. Debtors	848,383	—	—	—	848,383
. Cash at bank and in hand	2,615,573	1,013,926	107,033	—	3,736,532
Current liabilities	(1,491,679)	(127,033)	(94,033)	—	(1,712,745)
Non-current liabilities	(13,000)	(87,548)	(13,000)	—	(113,548)
Total net assets	5,829,526	13,027,499	743,998	1,906,344	21,507,367
	General funds £	Designated funds £	Restricted funds £	Endowment funds £	2019 Total funds £
Tangible assets					
. Heritage assets	—	9,440,879	—	—	9,440,879
. Other fixed assets	117,949	740,764	—	—	858,713
Investments	4,318,597	1,574,282	795,109	1,872,488	8,560,476
Current assets					
. Debtors	662,440	—	—	—	662,440
. Cash at bank and in hand	2,632,692	1,000,001	67,120	—	3,699,813
Current liabilities	(1,536,303)	(261,036)	(67,120)	—	(1,864,459)
Non-current liabilities	(50,538)	(67,177)	—	—	(117,715)
Total net assets	6,144,837	12,427,713	795,109	1,872,488	21,240,147

19 Leasing commitments

At 31 December 2020, the charity had total future minimum commitments in respect of non-cancellable operating leases as follows:

	2020	2019
	£	£
Office equipment		
Amounts payable within one year	6,898	9,293
Amounts payable between two and five years	26,133	26,134
	33,031	35,427

20 Pension schemes

A qualified actuary carried out a triennial review of the defined benefit scheme as at 1 January 2019; the actuarial valuation showed that the market value of the scheme's assets was £823,000, which represents 141% of the benefits that accrued to members after allowing for expected future increases in earnings. The actuary has calculated that no contributions are payable from 1 January 2016.

Pension costs comprise £72,379 (2019 – £68,347) in respect of the defined contribution scheme and £4,172 (2019 – £5,493) in respect of Death in Service contributions.

Retirement benefits disclosure under FRS102

The actuarial valuation for FRS 102 purposes, at 31 December 2020, shows a pension surplus of £368,000 (2019 – £423,000), which cannot be recognised as this is not available to the Society by way of reduced future contributions. The amounts recognised in the balance sheet are as follows:

	2020	2019
	£'000	£'000
Present value of funded obligations	(548)	(488)
Fair value of scheme assets	916	911
Surplus not recognised	(368)	(423)
Surplus in scheme at end of the year and available to the Society	—	—

Changes in the present value of the defined benefit obligations are as follows:

	2020	2019
	£'000	£'000
Opening defined benefit obligation	488	461
Interest cost	10	13
Re-measurement arising from changes in assumptions and experience	50	14
Closing defined benefit obligation	548	488

Changes in fair value of scheme assets are as follows:

	2020	2019
	£'000	£'000
Opening scheme assets	911	823
Interest Income	19	24
Actual return on plan assets, excluding interest income	(14)	64
Closing scheme assets	916	911

The amounts recognised in other recognised gains and losses are as follows:

	2020 £'000	2019 £'000
Remeasurement of defined benefit obligation	50	14
Return on plan assets	14	(64)
Effect of surplus restriction	(64)	50
Total	—	—

The actual return on scheme assets was £5,000 (2019 – £88,000).

The major categories of scheme assets as a percentage of total scheme assets are as follows (fair value):

	2020 %	2019 %
Equities	45	41
Bonds	17	21
Property	11	13
Cash	8	8
Gilts	19	17
	100	100

Principal actuarial assumptions at the balance sheet date (expressed as a weighted average):

	2020 %	2019 %
Discount rate at 31 December	1.5	2.1
Retail Prices Index	3.1	3.2
Consumer Prices Index	2.4	2.3
Increases in deferment	2.4	2.3
Future pension increases – pension earned before 6 April 1997	0.0	0.0
Future pension increases – pension earned after 6 April 1997	3.1	3.2

The current mortality rate assumptions include sufficient allowance for future improvements in mortality rates. The assumed life expectancy for a pensioner retiring at 65 on the balance sheet date is:

	2020	2019
Retiring now		
Male	20.2	20.1
Female	22.4	22.3
Retiring in 20 years		
Male	21.5	21.4
Female	23.8	23.7

Amounts for the current and previous four periods are as follows (defined benefit pension scheme):

	2020 £'000	2019 £'000	2018 £'000	2017 £'000	2016 £'000
Defined benefit obligations	548	488	461	493	426
Scheme assets	916	911	823	846	795
Surplus	368	423	362	353	369

21 Grants committed

Grants, principally fellowships and travel and research grants to the value of £287,819 have been committed for future payment, subject to certain conditions, specified by the Society, having been met (2019 – £405,748). These grants were not approved or communicated to the recipients until after the year end and therefore have not been accounted for in the year ended 31 December 2020.

22 Connected Charities and related party transactions

Since 2001, the Society has been the administration agent for the Trustees of FA Paneth Meteorite Collection, a charity connected to the Royal Astronomical Society. The Paneth Trustees decided that its income should support research in cosmochemistry by graduate and postdoctoral students. The accumulated net expenditure of £36,916 (2019 – £28,477), is included in Other Creditors. Due to the Covid-19 pandemic, no grants were awarded (2019 – £10,573). Total income was £8,439 (2019 – £11,670).

The Society also administers the Sir Norman Lockyer Memorial Trust, (charity registration number 900135). By agreement with the Charity Commission, the Society includes the following information within these financial statements. Each charity remains a separate legal entity. The Norman Lockyer Fellowship is awarded to enable an outstanding researcher to devote the majority of their time to research on an astronomical topic, including solar system and planetary science. They are named after Sir Norman Lockyer (1836–1920), pioneering solar astronomer and discoverer of helium. The fellowship is available every three years, with applications sought in the years 2013, 2016, 2019 etc for fellowships starting in the following year. The fellowship is open to those who hold a doctorate from a recognised institution of higher education at the time of taking up the award. Applicants must normally be 30 years of age or younger on 1 October of the year of appointment. The Society funds Fellows between spine points 30 and 36 (inclusive) on the UCU HE Framework single pay spine. The Norman Lockyer Fellowship is currently funding a three-year fellowship from October 2020, totalling £162,000. The fund balance, including the unspent balance in the restricted fund, is £1,828,652 (2019 – £1,856,461).

Transactions involving Trustees are disclosed in note 10.

There are no other related party transactions requiring disclosure.



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