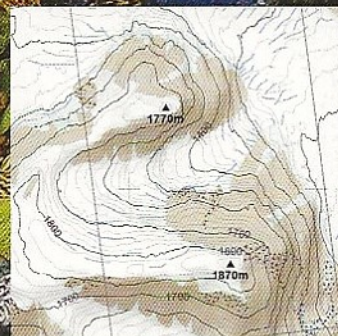


SUMMER 2020

Maplines

THE MAGAZINE OF THE BRITISH CARTOGRAPHIC SOCIETY

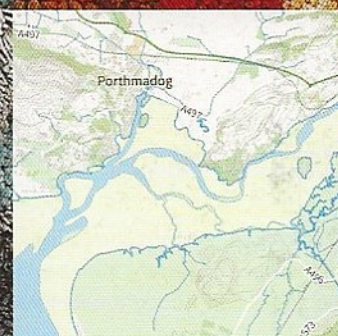
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From the Senior Editor ...



Welcome to *Maplines*! In this edition, we are examining the world around us through the lens of the United Nations Sustainable Development Goals (SDGs). We have another action-packed 32 pages of the different approaches to SDGs, the environment and how this influences the maps we make.

I am super-excited to announce that we now have an Editorial Team!

Please extend your warmest welcome to Alina and Cristina. Their profiles are on the opposite page. They will be joining me in curating the original content for *Maplines*. Alina works in the water and utility sector, but her passion is space, see her article on pages 8–9. Cristina is a PhD student working in the field of AI and mapping the oceans, see her interview of the front-cover artist on pages 16–17. Our next edition is on COVID-19 and health mapping, so do send us your articles/maps to go in the next issue, see <http://bit.ly/2UqlBIP> for details. Have a good summer!

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Special thanks to our proof-reader:
Liz Bourne

How to get involved:

We are looking for submissions from all Members, Student Members, Corporate Members and Educational Members.

Tell us what you've been up to, your latest product or your latest adventure with maps in mind!

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See our website for photos:
www.cartography.org.uk/about/whos-who/

What's coming next?

Winter 2020 edition: COVID and Health Mapping

Request for articles:
Monday (14) September 2020
Article and photos: Friday (30) October 2020
Proof-reading: Friday (13) November 2020
Artwork date: Friday (27) November 2020
To publisher date:
Monday (7) December 2020
In post boxes: Monday (21) December 2020

Spring 2021 edition: Networking & Conferences

Publisher: Oxuniprint, Unit 10, Oxonian Park, Langford Locks, Kidlington, Oxon, OX5 1FP

Corrections

There have been no corrections for the last edition of *Maplines* – whoo hoo! If you spot something, then please let us know at: maplines@cartography.org.uk



Alina Vizireanu

Alina is passionate about exploring the world and the space beyond. She studied Geospatial Information Systems and Physical Geography to master's degree level at University of Bucharest, Romania, in 2010. She pursued her studies as part of summer schools' programmes provided by Romanian Space Agency (ROSA) focusing on Emergency Disaster and Black Sea Marine Environment. This experience gave her a thirst for working in multi-disciplinary teams.

Alina has been working for Affinity Water UK for five years.

The water utility company covers three different areas in England, serving parts of Bedfordshire, Buckinghamshire, Essex, Greater London, Hertfordshire, Surrey and Kent. Alina is part of the IT Service Delivery team. She specialises in design, analysis, implementation and application of geospatial projects, mainly focusing on the strategic goals of the organisation. As well as her full-time work, Alina also volunteers for various organisations that support her interests as Membership Manager at Space Generation Council for the

UN, and STEM Ambassador for Central England.

It is as STEM Ambassador that Alina empowers women and youth to follow STEM activities in their careers. She is a member of BCS, AGI, Women in Geospatial+ and the British Interplanetary Association.



Cristina Andra Vrînceanu

Cristina is a postgraduate research student with the University of Nottingham's Geospatial Institute, developing algorithms for the detection and mapping of natural hydrocarbon pollution offshore, using satellite data and a variety of new technologies.

Her background is in business and research, having previously worked as a GIS specialist on national projects in Romania, for a leading Romanian IT company. The company specialised in the development and implementation of software applications in various sectors including environment, transport, cadaster, government and e-health.

She has also worked as an Earth Observation Data Applications Engineer, at the European Space

Agency. Her main project was developing an automated method for detecting off-shore oil seepage using high-resolution SAR and optical satellite data.

Apart from her research, Cristina volunteers for several organisations: by promoting open geospatial solutions (charter member of OSGeo and geo-spatial.org); cartography (Romanian Cartographic Association Project Manager); space technologies in STEM education (Space Generation Advisory Council) and gender equity (Women in Geospatial+).

She collects antique maps, hikes, collects rocks and you can find out more about her interests from her blog: www.gisbits.wordpress.com.

Membership

Thank you to all our members who have renewed their membership for 2020. Your continued support for the Society is greatly appreciated.

We are also very pleased to welcome our new members who have joined us since the beginning of March.

Full: Rufus Sweetman, Louis Robinson, Samuel Bradshaw, Adriana Kolar, Kevin Edwards, Helen Cooper, Davinder Jhamat, Tim Goodfellow, Emily Barnes and Daniel Robinson.

Affiliate: Petro Michaelas, Dr Steve Watkins, Francesca Latz, Paul Hesp, Dr Lesley Pullen, Dr Vinicius Mariano de Carvalho and Erica Tucker.

Student: Mia Bennett, Rafidah Berudin, Euan Temporal, Rowan Rush-Morgan and Emma Redfern.

Our current membership fees are as follows:

Full members: £40 (Overseas £55)
Fellows: £60 (Overseas £75)
Affiliate: £20 (Overseas £35)
Student £20 (Overseas £35)
Educational £72 inc VAT
Small Corporate £120 inc VAT
Corporate £240 inc VAT

For more details see:
www.cartography.org.uk

Our subscription year runs from 1st January to 31st December. New members will receive all issues of *The Cartographic Journal* and *Maplines* for the year of joining (subject to availability).

To join or renew your subscription, please use the following methods:

- Website application at www.cartography.org.uk/members/

- Bank transfer to

Account Number: 06753868
Sort code: 55-50-23

Please include your membership number and surname in the reference.

- Cheque made payable to The British Cartographic Society. Please write your membership number on the back when renewing.

The BCS Administrator is happy to help members with issues or queries they may have related to the Society.

Please contact:
admin@cartography.org.uk

Gordon Petries – Obituary 1931 to 2020

Emeritus Professor of Topographic Science, University of Glasgow, passed away on 4 April 2020. Not only will I miss him as a past colleague, but as the person who truly introduced me to the world of maps and mapping. When in my final year (1962–3) studying geography at the University of Aberdeen, I have clear memories of his visit to the Department. I had not yet decided on my next move, but after meeting Gordon, and being both informed and enthused about new developments in mapping at Glasgow University, all uncertainties disappeared and my life in cartography began. In Glasgow, John Keates became my direct mentor, Gordon's constant enthusiastic guidance and expert technical knowledge enriched the lives of all students. His own very full life, engrossed in teaching and research has earned him many awards including the President's Medal by the UK Photogrammetric Society. I am just proud to have known him.

Michael Wood OBE

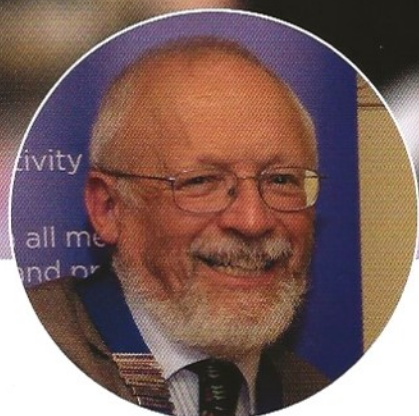
British Cartographic Society's Annual General Meeting

Date: Tuesday 24 November 2020

Venue: Online

Save the date!

More details to follow



From the BCS President ...

Usually at this time of year, I would be writing to you about the particular attractions of this year's conference and how (once *Maplines* had dropped on your doormat) there would just still be time for you to book a place.

Sadly – as you are aware – a global pandemic made holding events in person impossible this year. I'm sure that many of you have wondered at the ways in which aspects of the pandemic have been rendered

cartographically. I'm really glad therefore to be able to welcome Alan Smith OBE, the Head of Visual and Data Journalism at the Financial Times (FT) who will be presenting our autumn lecture this year in association with the AGM.

This will all be happening on Tuesday 24 November, and as the potential state of meetings is still so unsure, we have taken the decision to run these online. Full details will be coming to you from our administrator nearer the time.

A key item in this will be the call for nominations for elections to Council, including the Officers of the Society. I'll say more

about this in a further newsletter but do please take a few moments to consider whether this is a way you could help your fellow members and our wider community. As I will then have served the three years allowed by our constitution, an important element will be to choose a new President to take the Society forward.

So, let me close in wishing you well for the summer and autumn and I look forward to seeing you (virtually that is) for our AGM.

Richard Carpenter
BCS President

president@cartography.org.uk



**From the Chair,
UK Cartography Committee ...**

ICC2021, Florence

Ready for next year on 19–20 July 2020, hopefully the cartographic community will be able to physically come together again and celebrate our interests in cartography.

The venue is the 18th century Villa Vittoria, Palazzo dei Congressi located near the centre of the city and all its well-known historical sites and museums. The site is surrounded by centuries-old gardens, which will form an ideal backdrop.

Given the location, this may be an excellent opportunity for those who have not attended an International Cartographic Conference to engage with what is always an uplifting experience and have the opportunity to discuss our passion for maps with a global gathering of like-minded people. Early booking is recommended for accommodation.

Call for papers should be issued in September.

www.icc2021.net

Eurocarto2020, Vienna

University of Vienna is hosting Eurocarto2020 in September this year. Vienna is well known for hosting cartographic and GIS conferences and there can't be many cities with two universities offering excellent cartographic education.

Unfortunately this will now be a virtual event, from 21–25 September 2020, but the benefit is that registration will now be free. Without travel, accommodation and registration costs to consider, this should open participation much wider (the last Eurocarto in Vienna in 2015 had about 300 attendees).

Submission of abstracts is now closed and in the review process as I write this, but the full programme should be published in early August.

www.eurocarto2020.org

Petchenik Children's Map Competition

Discussions have recently taken place about the theme for the next two iterations of this international map design competition for children. After a poll, the overwhelmingly favoured topic was 'A map of my future world'. Our own Alex Kent (BCS Past-President) came second in the voting with 'Mapping for hope'. <https://icaci.org/selection-of-barbara-petchenik-competition-theme-2021-2023/>

Further details of the competition for 2021 will be circulated to national organisers in September,

with submissions by next March or April. If anyone would like to be kept informed or is interested in helping to promote or organise the competition within the UK please contact me.

e-Carto News

If you have some spare time during lockdown and would like some cartographic distractions, you could check out e-carto news which is a link to all sorts of map-related goings-on published monthly. You can find the link to the latest version on the ICA home page: www.icaci.org

David Forrest
Chair, UK Cartography Committee

david.forrest@cartography.org.uk

AWIGIS



UN SDG Goal 5: Achieve gender equality and empower all women and girls to

“Enhance the use of enabling technology, information and communications technology, to promote the empowerment of women.”

African Women in GIS (AWiGIS) is a community encouraging African women to pursue GIS-related careers. The level of unawareness in this field in Africa has led to a distinct lack of women in this tech sector.

Africa, in general, is lagging behind in the adoption of Geographic Information Science (GIS) and the industry and other STEM fields are dominated by men. African women are grossly under-represented when it comes to the GIS industry, not because they do not have the ability to take up career choices in this field, but because a typical African girl has been told that courses in STEM are reserved for

the male gender. Thus, some African girls are encouraged to take up courses in arts and humanities instead. This gender career mindset forms the need to create female-centered groups and organisations within the STEM and GIS ecosystem.



AWiGIS was officially established in October 2019 by Chidimma Chisom Umeogu from Nigeria (above) and Cyhana Lena Williams from Ghana (below).



The community was created for African women who study, work or are enthusiastic about the GIS fields. The AWiGIS platform aims to give African women the opportunity to be themselves, network, get career advice, gain mentorship, get GIS jobs, engage in GIS projects to improve their portfolios and showcase their work to the world. This and other allied platforms have been a source of motivation to other African women to take up career paths in GIS.

AWiGIS has members from across the world, mostly from African countries such as Nigeria, Ghana, Zambia, Zimbabwe, Malawi, South Africa, Egypt, Kenya and Cameroon. Supporting about 200 members, our community has the external support of about 3,000+ followers on LinkedIn as well as 300+ followers on Twitter.

These platforms help us showcase the works of our members to the world as well as provide jobs, events and project opportunities to the public. We also profile key African women who are doing great things in the related fields. This is done to help provide female African role models for the younger generation as well as for career beginners. Our community activities span volunteering opportunities with GIS-related companies, mentorship programmes, resource webinars as well as online courses offered by some members.

In summary, AWiGIS is a community that aims to introduce the younger generations to GIS careers and to increase the awareness of types of work in various sectors in Africa. We want Africa to benefit from the applications of GIS as well as bridging the gender gap in the African geospatial industry.

Chidimma Chisom Umeogu
Lecturer at Nnamdi Azikiwe University and
Co-Founder of African Women in GIS,
Nigeria © 2020 Photo by Michel Studio

Cyhana Lena Williams
GIS Technician and Co-Founder of African
Women in GIS, Ghana

SPACE AGE

On the 4 October 1957, humanity confirmed its commitment to the Space Age, as the Sputnik satellite became the first successful orbital satellite. From this moment onwards, this tiny sphere orbiting the Earth and enabled the new industry of space exploration.

The success of the Sputnik satellite led to the development of many future space missions. In the Earth Observation (EO) sector, the U.S. National Aeronautics and Space Administration (NASA), National Oceanic and Atmospheric Administration (NOAA), and European Space Agency (ESA) developed the scientific research tools required for better understanding the planet. From these missions, we can now freely access this important data set. NASA's Landsat Programme started in 1972 with the mission of monitoring Earth's land areas. Land cover and land use have been particularly useful in monitoring change detection, for example in agricultural or forest area management.

Old School

The Landsat programme paved the way for the new EO sensors and innovative technologies, in particular, SyntheticAperture Radar (SAR) and hyperspectral sensors developed in the 1980s. SAR technology has diversified the EO industry seeing new privately owned satellites being launched into space. Current available missions include TerraSAR-X or COSMO-SkyMed. Thanks to its capability of sensing through cloud cover during the day and night, emerging sectors have seen a steady development using SAR data; natural hazards such as floods, earthquake or volcanic activity and subsidence, ocean pollution and security applications are the first sectors to take advantage.

In 1999, the European Commission established the development of space activities in Europe through the Global Monitoring for Environment and Security (GMES), later changed to Copernicus Programme, in 2012 (ESA). Copernicus is there to provide a service "Achieving major societal goals, by EU for EU citizens" with its Sentinel satellites constellation. Sentinel data, such as SAR, multi-spectral or dedicated missions for atmospheric monitoring or weather forecasting are free of access, based on the data access graphical web portals or application programming interface (API) for development and operational use. Data access is available at scihub.copernicus.eu

Main image: CAPE BARREN – Vegetation fires
On Cape Barren Island, Australia, a vegetation fire started along the coast by Thunder and Lightning Bay (left). Active fires near Shag Rock (centre) continued until 6 December.
Location: Australia, 4 Dec 2016
Source: © 2020 PlanetScope

Democratising Space

NASA, in 2008, developed a policy for Open Data for the Landsat archive. Copernicus Sentinel data became open soon after, which enabled the commercial space sector to evolve towards the New Space Age. Consistent investment from governments has made space tech more accessible and enabled the next step in the evolution of innovation: small satellites.

Known under the name of Mini, Micro, Nano, Pico and more recently Femto satellites (<1kg), the small satellites are orbiting on Low Earth Orbit (LEO). The cost of building and launching a Small Sat has reduced considerably and this made the sector more appealing to start-ups. For a live space situational awareness, details of each space mission and satellite, access the satellite map prototype developed by Esri Applications Lab: <https://maps.esri.com/rc/sat2/>

The range of applications of this emerging technology gives us a clear understanding how satellite data can be part of any geospatial system. Orbital EOS, a Spanish satellite-based solution start-up, is challenging the maritime domain by performing environmental and coastal erosion monitoring; AgriBora, an African start-up, provides farm level intelligence supporting the precision agricultural sector; Planet Labs, after achieving their mission of daily imaging the Earth, with over 1,200 satellite images for

every place on Earth, are integrating Artificial Intelligence (AI including Machine Learning/Deep Learning ML/DL) mathematical algorithms to drive new insights from their constellations, enhancing our understanding about Earth; while OneWeb, Astranis, DiGiFi Korea or Starlink, envision enabling broadband connectivity globally.

Further use cases see the satellite data used for monitoring and reducing greenhouse emissions, for informed decisions in the construction and insurance sector or for helping decision makers in the emergency relief of humanitarian crises. Plus providing real-time satellite data and combining it with AI has the potential to develop the automotive sector for the next generation of driverless vehicles, developing precision agriculture and sustainable farming. Being able to analyse data on deforestation, drought management, water resources can bring tangible benefits.

Space4SDGs – collaboration for societal development

Rapid development in space technology has enabled United Nations Office for Outer Space Affairs (UNOOSA) to present space as one of the main industries in support of all the Sustainable Development Goals (SDGs). See: <https://www.unoosa.org>

Earth Observation data can be directly and indirectly applied as an operational tool for mapping,

monitoring and managing the Earth's resources. Sharing the same view and promoting change through collaboration and partnership, the UK Geospatial Commission, through the release of the Geospatial Strategy 2020-2025, "Unlocking the power of location", published in June 2020, is set to innovate the society by "building on our pioneering expertise in location technology for navigation, trade, and defence" – Lord True CBE, Minister of State. See: <https://www.gov.uk/government/publications/unlocking-the-power-of-locationthe-uks-geospatial-strategy>

By addressing global issues, climate change playing a major role, forecasting natural disasters and enabling sustainable economic and social developments, the UK's Geospatial Strategy outlines nine major opportunities in building a sustainable ecosystem. Satellite imagery acts as one of the primary data for all these missions, underpinning future innovative and complex technologies as needed.

Space explorations and technologies continue to provide benefits for humanity. By enabling a more sustainable society, we can create more responsive and predictive technologies, in which we can work collaboratively for the good of all in our society.

Alina Vizireanu

Editor, Geospatial, IT and Earth Observation professional. Space education and career outreach coach.

RENLAND, GREENLAND 2019

June 26th - 31st July 2019

Thomas Harding, Cameron Ree, Niall Newport, Neil Cox

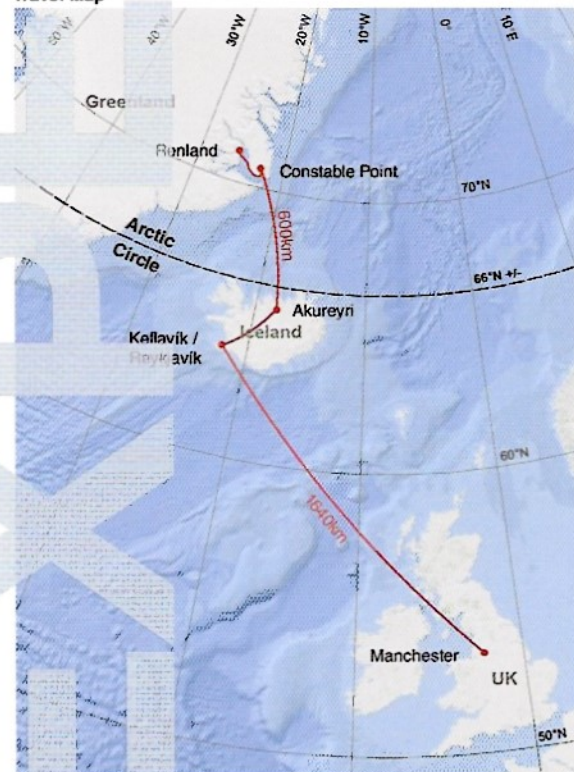
Final expedition map

A five-week mountaineering and climbing expedition to the remote Arctic peninsula of Renland on the East coast of Greenland. The team of 4 made 5 first ascents and climbed a number of long rock routes. Supported by: Arctic Club, Gino Watkins Memorial Fund, Mount Everest Foundation, British Mountaineering Council & Austrian Alpine Club

Legend

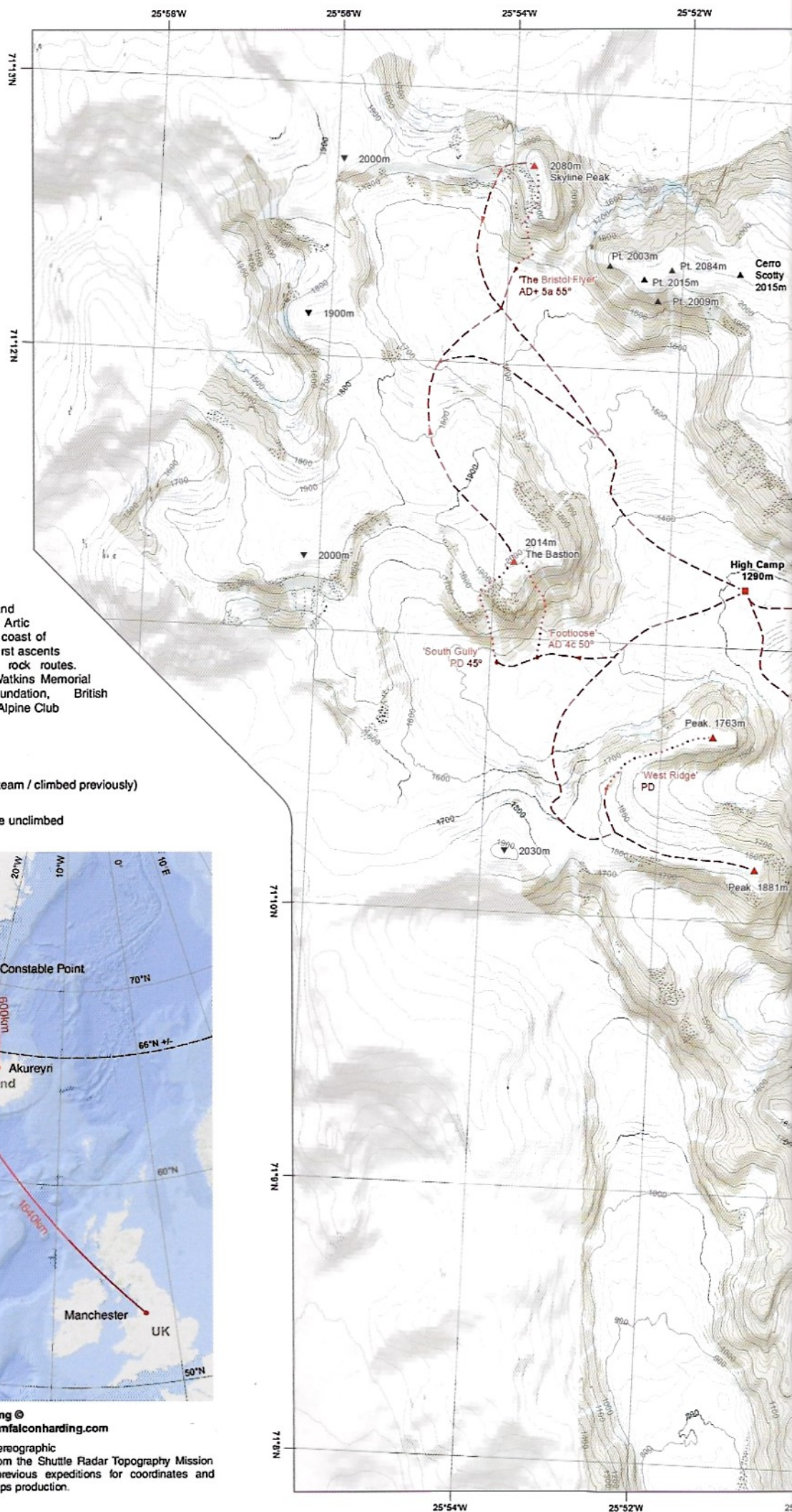
- Access route
- Climbing route
- ▲ Peaks (Climbed by team / climbed previously)
- Camps
- ▼ Peaks believed to be unclimbed

Travel Map



Map produced by Tom Falcon Harding ©
tom-harding@live.co.uk / www.tomfalconharding.com

WGS 1984 EPSG Greenland Polar Stereographic
Contours and hill shading derived from the Shuttle Radar Topography Mission captured in 2009. Thanks go to previous expeditions for coordinates and photographs that were used in this maps production.



Each year, small expeditions head out to the most remote

and little visited corners of the planet in search of appealing mountains to climb.

If you know where to look, there are still a staggering number of unclimbed peaks and the planning, logistics and red-tape cutting involved in reaching their summits can become a lifelong obsession.

In a world covered by countless topographic maps, it can still be surprisingly difficult to find reliable, recent or suitably detailed maps for many remote areas.

For example, expeditions to the Tian-Shan mountains of Central Asia still rely on Soviet era topographic maps. It's not uncommon for teams to find vertical cliffs where gentle slopes were expected, glaciers that have receded hundreds of metres or whole peaks that are simply missing. Creating new custom maps for small areas using a mash-up of freely available data sets can be the only option.

In 2019 I spent five weeks on the east coast of Greenland mountaineering. The existing mapping, as with many areas in Greenland, has

a scale of 1:250k, but I was able to create new maps at a scale of 1:40k. Elevation information comes from the Shuttle Radar Topography Mission (SRTM). QGIS was used to generate various contours, hill shading and spot heights from the original TIFF files.

The most time-consuming step is digitising the land features from available satellite photography. As the map is for non-commercial use, nearly any satellite imagery available can be used, in this case Sentinel, Google and Bing.

Individual vector layers for snow, glacier ice, moraine, rocky ground and crevasses are all created.

Photographs previously taken in the area are also used as a reference to confirm land feature. Finally, all these layers are brought together with appealing styling. Labelling such as previously climbed peaks and place names can be added as well as normal cartographic features such as useful graticules. The map is then both printed and tiled for use on GPS devices.

During the expedition, recording

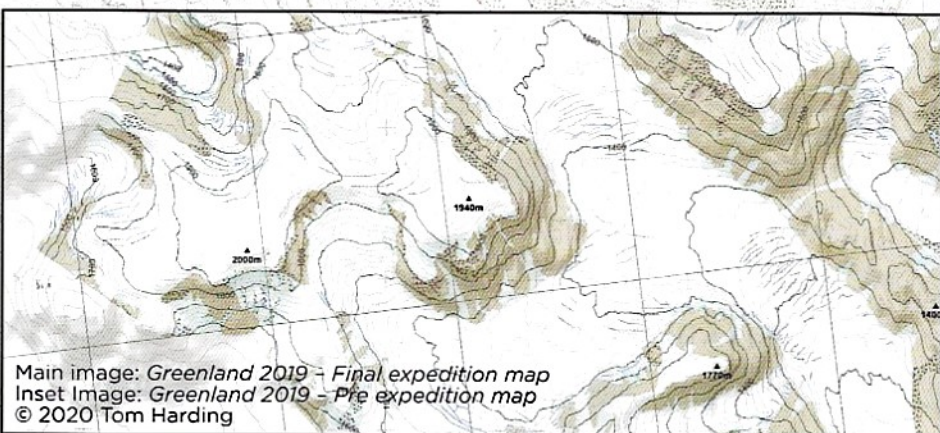
the heights and positions of any mountains climbed, particularly when it's their first ascent, is also important. It's common to use a satellite-based tracking device such as a Garmin InReach to receive weather forecasts and keep in contact with civilisation. One of their best features though, is the ability to record tracking information at set intervals. This is stored as GPX files and when paired with recordings from a handheld GPS it becomes a reliable method to record a team's journey and the location of summits. This data can also be cleaned up and added to your own custom mapping for use in final report writing.

In summary, creating custom maps for remote locations anywhere in the world can make the difference between success and failure in remote areas. It is time-consuming and you are reliant on available satellite data sets but the results can be a huge improvement on what would otherwise be available.

Tom Harding

Freelance cartographer
and aerial photographer.

www.tomfalconharding.com



SUPPORTS INDIGENOUS PEOPLE



Diana Mastracci's work with bridging indigenous people and geospatial technologies is innovative and brings about change in remote communities. With a multicultural background, Diana has degrees in social anthropology, the Russian language, Remote Sensing and GIS. She's dedicating her career to working with and learning from indigenous people.



Q. What is your experience with indigenous communities?

Nowadays, I am working with the GEO Secretariat and the GEO indigenous Alliance on setting up indigenous hackathons worldwide and through Space4Innovation, my consultancy, I am currently helping six indigenous tribes to incubate culturally relevant Earth-Observation (EO)-based solutions to tackle COVID-19.



While at the University of Oxford, I worked on a project examining the impacts of climate change among indigenous communities in the Circumpolar North. I travelled to the Russian Arctic and conducted participatory mapping among the Nenets reindeer herders. I spent over a month visiting remote villages in the Nenets Autonomous Okrug, and living with the Yamb-To

Nenets, the only community in the Arctic still following a nomadic lifestyle.

Moreover, I collaborated on a cyber cartographic Atlas of Nunavut at Carleton University, Canada, and joined NASA's Jet Propulsion Laboratory investigating EO-based tools for the Inupiaq community to assess ice conditions. During this project I have conducted six solo field trips in the Alaskan Arctic. At the European Space Agency, in Italy, I was focusing on future trends of data dissemination and discovery.



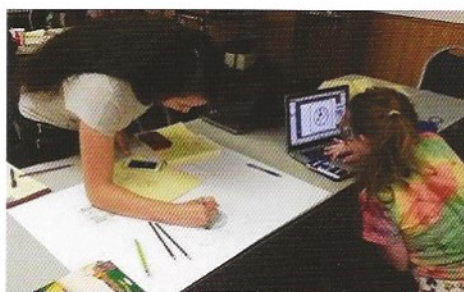
Q. How does technology help indigenous communities solve challenges?

Indigenous communities are facing societal threats and climate change. The communities I have worked with have always been open, merging their indigenous knowledge with technology to come up with innovative solutions. If co-designed by and with indigenous peoples, technology can be a powerful tool to address local challenges, to store, transmit and share traditional knowledge and to collect evidence of environmental threats in their ancestral lands.

Q. What change do you see?

In a sea ice citizen science project in the North Slope of Alaska, we

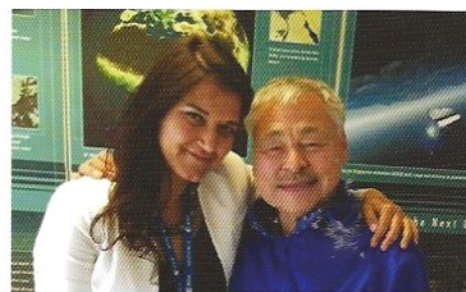
involved students taking *in situ* weather data while "breaking trails" on the ice (the "labour of love" as it's called by Inupiaq Whaling Captains). They used metal sticks to make the sea ice smooth and wide enough for two snowmobiles to pass. It's extremely dangerous, requiring constant assessment of conditions.



The students felt a sense of pride and confidence in being able to participate and combine traditional knowledge to make assessments of the sea ice. They're developing their knowledge in both the traditional and scientific world, by becoming experts in solving pressing societal issues.

Q. What methods do you use for linking technology and indigenous communities?

By co-designing indigenous hackathons, we are combining traditional knowledge with geotechnologies across cultural and generational lines. For example, the current pandemic is intensifying many of the issues that indigenous communities were already facing. The GEO indigenous Hack4Covid, however, is a testament to the indigenous people's ingenuity and resilience in times of need.



Q. What other issues arise when accessing geotechnologies?

Many indigenous communities live in remote locations with no affordable and reliable internet connectivity which impacts access to EO data. There are no portals designed specifically to address these needs. There is an urgent need to close the connectivity gap and to foster indigenous-driven innovation in data access.

Cristina Vrînceanu
Editor, University of Nottingham

Opposite, main image: Yamb-To Nenets girl playing in the frozen tundra, Russian Arctic, 2012. © 2020 Diana Mastracci.

Opposite, inset left: Diana Mastracci, delivering a statement on behalf of the GEO indigenous Alliance, to Stuart Minchin former Chief of the Environmental Geoscience Division of Geoscience Australia and Gilberto Camara, GEO. © 2020 John Pring.

Opposite, inset right: Diana Mastracci with April learning traditional knowledge of the sea ice, Alaskan Arctic, 2015.

Inset left: Mario Vargas Shakaim, indigenous Shuar leader lecturing hackers on the use and benefits of GEO technologies in the Ecuadorian Amazon during the GEO Week hackathon, Canberra, Australia. © 2020 GEO Secretariat.

Inset centre: Participants of the Arctic Science Hack in the North Slope of Alaska co-designing culturally relevant apps using traditional knowledge, 2015. © 2020 Diana Mastracci.

Inset right: Diana Mastracci with Inupiaq Whaling Captain Arnold Brower Jr. at ESRIN in Frascati, Italy, in 2018.

TO THE EXHIBITION

As long-established institutions, cathedral libraries

in England obviously have a considerable patrimony in terms of written documentation and works of art.

Henry VIII's dissolution of the monasteries (1536-1541) destroyed many collections, so those that remain have added value. From a cartographic perspective, the most famous map held by a cathedral is the Mappa Mundi of Hereford Cathedral, created c.1300 AD.

A recent exhibition showcased some of the cartographic treasures from the library of Durham Cathedral, presented within the impressive Open Treasure museum, sited in the renovated Monks' Dormitory.

As the largest *in situ* monastic library in the country, there is much material to choose from for display. 'Mapping the World' ran from 7 October 2019 to 18 January 2020, and included global and more local examples of mapping, demonstrating the value of maps for exploration, navigation and legal and social activity.

In the first display case titled 'What use is a map', the earliest work in the exhibition was shown: a parchment Map of Tursdale Beck,

used in a court case of 1430 AD raised by Prior Wessington (an ancestor of George Washington) against Sir William de Elmeden who planned to divert the beck, to the detriment of the priory's watermill.

Alongside was a sketch plan on paper of the burgages in Durham Market Place, dating from 1568. This map is notable for its incorrect transposed labelling of east and west – a fairly fundamental cartographic error, although presumably having little effect on the particular use of this map (locating plots and owners).

A further large-scale plan showing houses at Elvet, a locality in Durham on the opposite side of the River Wear to the cathedral, dates from the late 1430s; and this display case was completed with an 1855 military sketch map by Lord Cardigan, of the Battle of Balaclava.

A further example of local mapping on display was a 1754 map of Durham City, by Thomas Forster (surveyor) and J. Mynde (engraver). It is noteworthy that the perceived national hierarchy of settlement importance is reflected by the roads on this map. For instance, turnpike roads are labelled TO various destinations, such as New Castle, Stockton, Sunderland, whereas other major routes are titled as the turnpike roads FROM London.

Other large-scale urban maps in the exhibition included a 1739 atlas of 21 sheets comprising the imposing Plan de Paris by Bretez (engraved by Claude Lucas), and a volume of Schedel's 1493 Nuremburg Chronicle, open at a map image.

John Rudd (1498-1579) was a Prebend of Durham Cathedral and a keen cartographer, charged by Queen Mary with making a map of the whole kingdom of England. This massive task was actually completed by Rudd's apprentice Christopher Saxton, also a northerner, who became the pre-eminent Tudor cartographer, who published the first ever atlas of any country in 1579. The exhibition displayed the earliest printed map of County Durham (1576) by Saxton (A. Ryther, engraver).

Further local interest to Durham stems from its proximity of the birthplace of Captain James Cook. As the greatest-ever global British explorer, Cook was responsible for many discoveries and colonial claims. In the exhibition section marked 'Charting the Uncharted', one of the volumes relating an account of Cook's voyages, written (fairly poorly by all accounts) by Hawkesworth, was opened for the exhibition at an impressive chart of Tahiti, compiled by Cook in 1769.

Further cartographic treasures in this section included a map of Palestine, extracted from Thomas Fuller's 1647 book, *The History*

of the Holy Warre, which followed the route of the Crusaders to the Holy Land; and a map created by a respectable artist, extracted from Whishaw's 1815 book, *Journal of a Mission to the Interior of Africa*, representing Mungo Park's travels along the Niger River.

Global mapping was also well represented, with examples of primary cartographic treasures, used for the education of monks over many years. A first edition of *Ortelius' Theatrum Orbis Terrarum* (1570) was displayed in the same case as the posthumous copy of *The Theatre of the Empire of Great Britaine* by John Speed, published in 1676. A Hondius publication of Mercator's *Atlas Minor* from the collection, dated 1607, was also shown.

The impact of personalities far removed from Durham was evident: the role of Gemma Frisius in explaining cosmography and mapping is evident from his cartographic and illustrative contributions to Apian's fundamental textbook *Cosmographia*, re-published with Frisius' annotations in 1529, and his own later works.

The world view they espoused was certainly challenging to the accepted teaching of much established religion at the time, so one might imagine the conflict in the monastery when such views were made available, as may also have been the case with a slightly later (1562) edition of Ptolemy's *Geographia*, open

in the exhibition on the regional map of northern Europe.

The exhibition notes suggest that the maps which were acquired, "speak about a community that's not interested just in its own affairs but also the affairs of the world outside."

This was a small, but wide-ranging, well-documented, and excellently presented, sample of the treasures of an important cathedral library, designed to take visitors "on a journey of discovery, from the explosion of interest in world travel, to the unearthing of formerly uncharted territory, all in the quest to better understand the world."

The exhibition was only open for a short period (October 2019 to January 2020), but the treasures of Durham Cathedral Library are in the process of being digitised for online access (www.durhampriory.ac.uk/list-of-digitised-durham-priory-library-books). One hopes that, in due course, the cartographic treasures will also be made available.

Dr David Fairbairn
Visiting Fellow, Geospatial Engineering
Newcastle University

Background image: From the Turgot map of Paris (1739), displayed in the section devoted to urban mapping, 2019

© 2020 Durham Cathedral Library

OCEANS

Vanessa Barragão is as sunny as her native Portugal and a unique textile artist using ecological and traditional techniques for raising awareness of the sustainability of the textile industry and environmental issues.

Q. Vanessa, tell us a bit about how you started with textile design
I have been studying design at school but after I finished I knew

I didn't want to go into fashion design, rather pursue textile design and use the handmade techniques that my grandmothers passed to me when I was a child. I also decided to move to the north of Portugal and learn more traditional techniques. During this time I managed to develop my own projects and focus on sustainability and what I love.

Q. How do you reconcile your work with the preservation of the environment?

The textile industry is one of the most polluting. I was working with this factory producing wool rugs

and I understood how much waste they were producing and how I could be using that for my work. The yarns that I work with would otherwise be thrown away, not recycled, hence for me it is very important to save them and find a way to incorporate them into artisanal products.

Q. What is your main inspiration for your projects?

My main inspiration is the sea, especially threatened coral reefs. I grew up near the seaside in Albufeira, the ocean is very important here. Also, when I was young I used to travel with my family to the Caribbean



and it was there where I first saw the corals, a sight I never forgot. Seeing how coral reefs degrade and bleach is heartbreaking and I am very worried about the future. I really wanted to pass on the message about us being more ecofriendly.

Q. We first spotted your work with The World Map, tell us a little about it.

The World Map was a piece commissioned by Heathrow Airport and Kew Gardens. It was a special piece, very laborious. I usually don't draw my pieces, but for the map I had to actually look at the

cartography. It is a huge artwork and we tried to incorporate threatened species from all around the world: coral reefs and various plants.

Q. You also have other similar pieces, is this a trend for you?

All the tapestries I have created after The World Map were commissioned. The requests are to usually follow a similar piece that they liked, hence many are inspired by the work on The World Map. For Taiwan, I created one inspired by the island. For another exhibition I made a tapestry of the Caribbean Sea. They are all pieces of a greater puzzle and work in progress.

Q. Are these entities interested in the environmental awareness or just the display?

I actually like that the interest is genuine, not just a nice piece of tapestry on the wall, but they also look after the process, the environmental impact, and what my art and the message the piece conveys. See more of my work at www.vanessabarragao.com

Cristina Vrînceanu

Editor, University of Nottingham

Main and inset image: Botanical Tapestry at Terminal 2 of Heathrow Airport
© 2020 Heathrow Airport and Kew Gardens

SDGs



In 2015, the UN member countries adopted 17 Sustainable Development Goals (SDG) which include 169 targets and 244 indicators addressing environmental, economic and social issues around the world.

In order to monitor and report the progress (or regress) of all SDGs indicators, data plays a key role. The data revolution – which encompasses census data, Earth Observation (EO) satellite imageries, airborne (e.g. aerial photography,

LIDAR), ICT data, and *in situ* data, together with the emergence of artificial intelligence used in processing Big Data (process and analyse large datasets in real-time to reveal patterns, trends and interactions) – is already transforming society and generates human progress. Updated data for global, regional and national development policy-making is still lacking. Many governments of the poorest and under-developed countries still struggle with the need for adequate data on populating the SDG indicators.

Currently, only 40% of the indicators have regular data, whereas 29% of indicators have no data and 29% rely on outdated data. These include metrics ranging from forest

cover, which can be easily measured (e.g. via satellite images), to bribery and corruption, which is not. As the traditional data (e.g. census) can be acquired at an exorbitant price or it can be biased by the country's political instability, EO data provide a reliable, unbiased and cost-effective source of information.

In the PhD research "Translation of Remote Sensing into SDG indicators", funded by UKRI SCENARIO Doctoral Training, that I am currently studying at the Centre of Environment and Sustainability (CES), University of Surrey, UK, and in partnership with National Physical Laboratory (NPL), attempts are being made to critically analyse and optimise the potential of applying EO satellite-derived data to support



Of these 80, 25 in red have MMS values between 1 and 2 meaning that EO can provide, at best, weak support. The 40 amber indicators have MMS values between 2 and 4 indicating that EO data can partially contribute to populating the indicator and the 15 green indicators have MMS values between 4 and 5 indicating strong support from EO data. Grey was assigned to 152 SDG indicators due to the lack of reported EO contribution to the literature reviewed.

Besides this important work, I am exploring the capability of satellite data for indicators covering the social and economic dimensions of sustainable development as monitoring quality education (SDG 4), inequalities (SDG 10) and corruption (SDG16).

SDG indicators. The results of recent reports brought up 80 indicators that EO data could measure at three different levels, illustrated in traffic light colours, green, amber and red.

Monitoring sustainable practices from space might transform our ability to protect our planet for ourselves and for future generations.

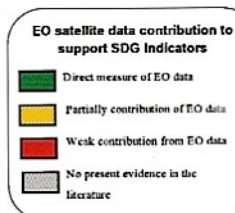
1. NO POVERTY										2. ZERO HUNGER									
1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	2.10
1.1.1	1.1.2	1.1.3	1.1.4	1.1.5	1.1.6	1.1.7	1.1.8	1.1.9	1.1.10	2.1.1	2.1.2	2.1.3	2.1.4	2.1.5	2.1.6	2.1.7	2.1.8	2.1.9	2.1.10
3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10
3.1.1	3.1.2	3.1.3	3.1.4	3.1.5	3.1.6	3.1.7	3.1.8	3.1.9	3.1.10	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.2.6	3.2.7	3.2.8	3.2.9	3.2.10
4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.10	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.10
4.1.1	4.1.2	4.1.3	4.1.4	4.1.5	4.1.6	4.1.7	4.1.8	4.1.9	4.1.10	5.1.1	5.1.2	5.1.3	5.1.4	5.1.5	5.1.6	5.1.7	5.1.8	5.1.9	5.1.10
6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	7.10
6.1.1	6.1.2	6.1.3	6.1.4	6.1.5	6.1.6	6.1.7	6.1.8	6.1.9	6.1.10	7.1.1	7.1.2	7.1.3	7.1.4	7.1.5	7.1.6	7.1.7	7.1.8	7.1.9	7.1.10
8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	8.10	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	8.10
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9.1.1	9.1.2	9.1.3	9.1.4	9.1.5	9.1.6	9.1.7	9.1.8	9.1.9	9.1.10	9.2.1	9.2.2	9.2.3	9.2.4	9.2.5	9.2.6	9.2.7	9.2.8	9.2.9	9.2.10
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10.1.1	10.1.2	10.1.3	10.1.4	10.1.5	10.1.6	10.1.7	10.1.8	10.1.9	10.1.10	11.1.1	11.1.2	11.1.3	11.1.4	11.1.5	11.1.6	11.1.7	11.1.8	11.1.9	11.1.10
12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	12.9	12.10	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8	13.9	13.10
12.1.1	12.1.2	12.1.3	12.1.4	12.1.5	12.1.6	12.1.7	12.1.8	12.1.9	12.1.10	13.1.1	13.1.2	13.1.3	13.1.4	13.1.5	13.1.6	13.1.7	13.1.8	13.1.9	13.1.10
14.1	14.2	14.3	14.4	14.5	14.6	14.7	14.8	14.9	14.10	15.1	15.2	15.3	15.4	15.5	15.6	15.7	15.8	15.9	15.10
14.1.1	14.1.2	14.1.3	14.1.4	14.1.5	14.1.6	14.1.7	14.1.8	14.1.9	14.1.10	15.1.1	15.1.2	15.1.3	15.1.4	15.1.5	15.1.6	15.1.7	15.1.8	15.1.9	15.1.10
16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8	16.9	16.10	17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	17.10
16.1.1	16.1.2	16.1.3	16.1.4	16.1.5	16.1.6	16.1.7	16.1.8	16.1.9	16.1.10	17.1.1	17.1.2	17.1.3	17.1.4	17.1.5	17.1.6	17.1.7	17.1.8	17.1.9	17.1.10
17.1	17.2	17.3	17.4	17.5	17.6	17.7	17.8	17.9	17.10	17.11	17.12	17.13	17.14	17.15	17.16	17.17	17.18	17.19	17.20
17.1.1	17.1.2	17.1.3	17.1.4	17.1.5	17.1.6	17.1.7	17.1.8	17.1.9	17.1.10	17.11.1	17.11.2	17.11.3	17.11.4	17.11.5	17.11.6	17.11.7	17.11.8	17.11.9	17.11.10

Ana Andries

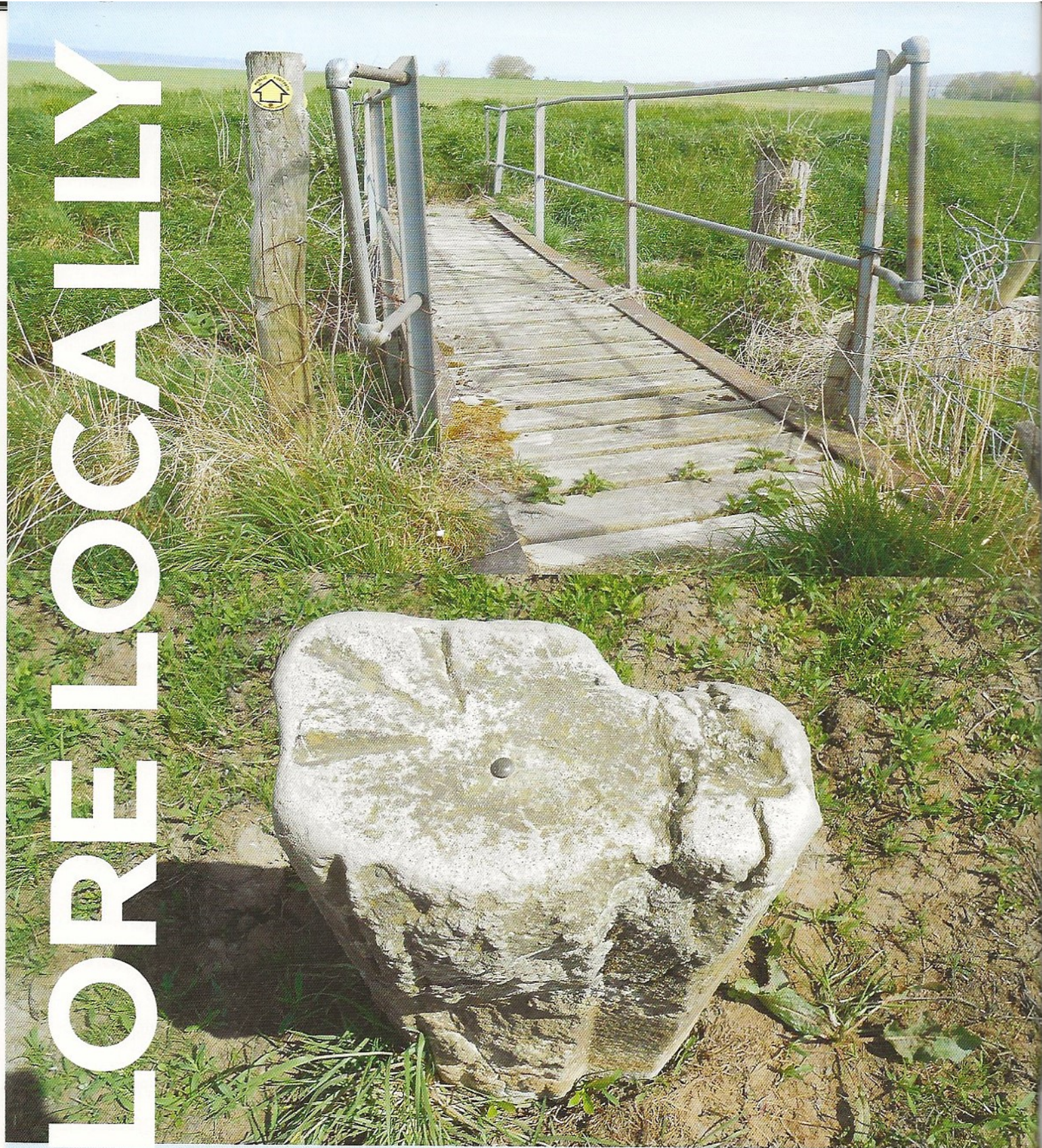
PhD researcher in Earth Observation and SDGs, University of Surrey

Main image: Sustainable Development Goals, by the UN

Inset image: EO satellite data contribution to support SDG Indicators, by Ana Andries



EXPLORE LOCALLY



Top image: The author's 'lockdown' landscape at centre of Sheet TR04.
 Middle image: OS Bench Mark on the Great Stour floodplain.
 Bottom image: The Wye Crown, celebrating the coronation of Edward VII (1902).

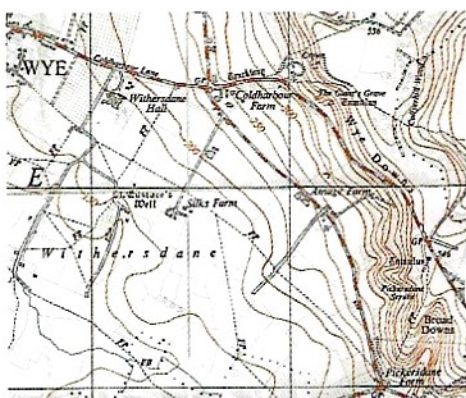
Opposite, left map: Crown and chalk pit east of Cold Harbour Farm, detail of OS Provisional Series 1:25,000 Sheet TR04.
 Opposite, right map: Bench Mark located immediately west of the footbridge (FB) in bottom left, see also Spider's Castle, detail OS Provisional Series 1:25,000 Sheet TR04.

Photos: © 2020 Peter Vujakovic
 Maps: © 2020 Ordnance Survey

Maps and memory – exploring place during COVID-19:

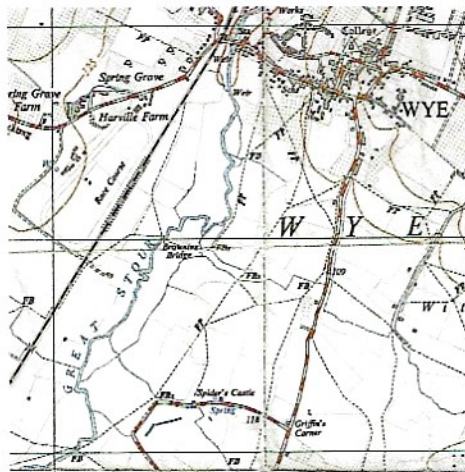
In 1987, Brian Harley wrote a fascinating article for *The Map Collector*, entitled 'The Map as biography: thoughts on Ordnance Survey map, Six-inch Sheet Devonshire CIX, SE, Newton Abbott.'

He suggested a map contains several layers of biography; the story of the map itself, that of its creators, and the map as a biography of the landscape and of his or her own 'sense of place'. His ideas have greatly influenced my engagement with landscape, in my case that contained in the 1:25,000 OS Provisional Series Sheet TR04 (Ashford, 1958); and I have lived in this area for a very long time.



Restrictions during COVID-19 have radically changed the way we engage with the world. I have walked across much of the hundred square kilometres of my map, including large stretches of the North Downs. Lockdown has caused my world to shrink to

about seven square kilometres of the low-lying gault clay. It has, however, created an opportunity to immerse myself in the detail of the map and the landscape. Harley's discussion focused on the townscape of Newton Abbott in Victorian times (surveyed 1885–6), his home for many years and where his wife and son are buried. My interest is the wider landscape – my 'taskscape'. I live and work here; I have run student trips to the area, and I have undertaken research here over many years.



The map has helped me to investigate the landscape as the congealed taskscapes of others before me, particularly through the scars they have left; the diggers of Iron Age ore pits and the chalk quarries along the ancient trackway skirting the downs, the drovers who wore deep holloways into the landscape, and the massive chalk carving of a crown cut by students of Wye College to celebrate the coronation of Edward VII in 1902. The map is a guide to biography, offering suggestions for exploration. What has happened to sites no longer named on more recent maps and the people who collected them? Filchborough, 'place of the polecats'

and Spider's Castle are both now little more than bramble patches, and the cress beds by Spider's Castle are just discernible as depressions in a ploughed field, if you know where to look (see *Maplines*, Spring 2012).

Harley makes the point that of all the biographies, that of the map's makers is least easy to unearth, but traces of their work, at least the surveyors, can be encountered. While not shown on the 1:25,000 map, their benchmarks, where they survive, can still be traced using larger scales. One such is shown here, a curiosity, a piece of old architectural stone buried in the floodplain of the Great Stour. Encountering this in the middle of nowhere provides a very tangible link to the biography of the map and its makers.

Like Harley, I also have family associations evoked by the map. My father, a 'displaced person' in WWII, worked as an agricultural labourer on the Olantigh estate. We would visit the area regularly when I was a child, and his ashes are scattered on the Downs. The map as biography offers a wonderful portal to engagement with the landscape and its peoples, past and present.

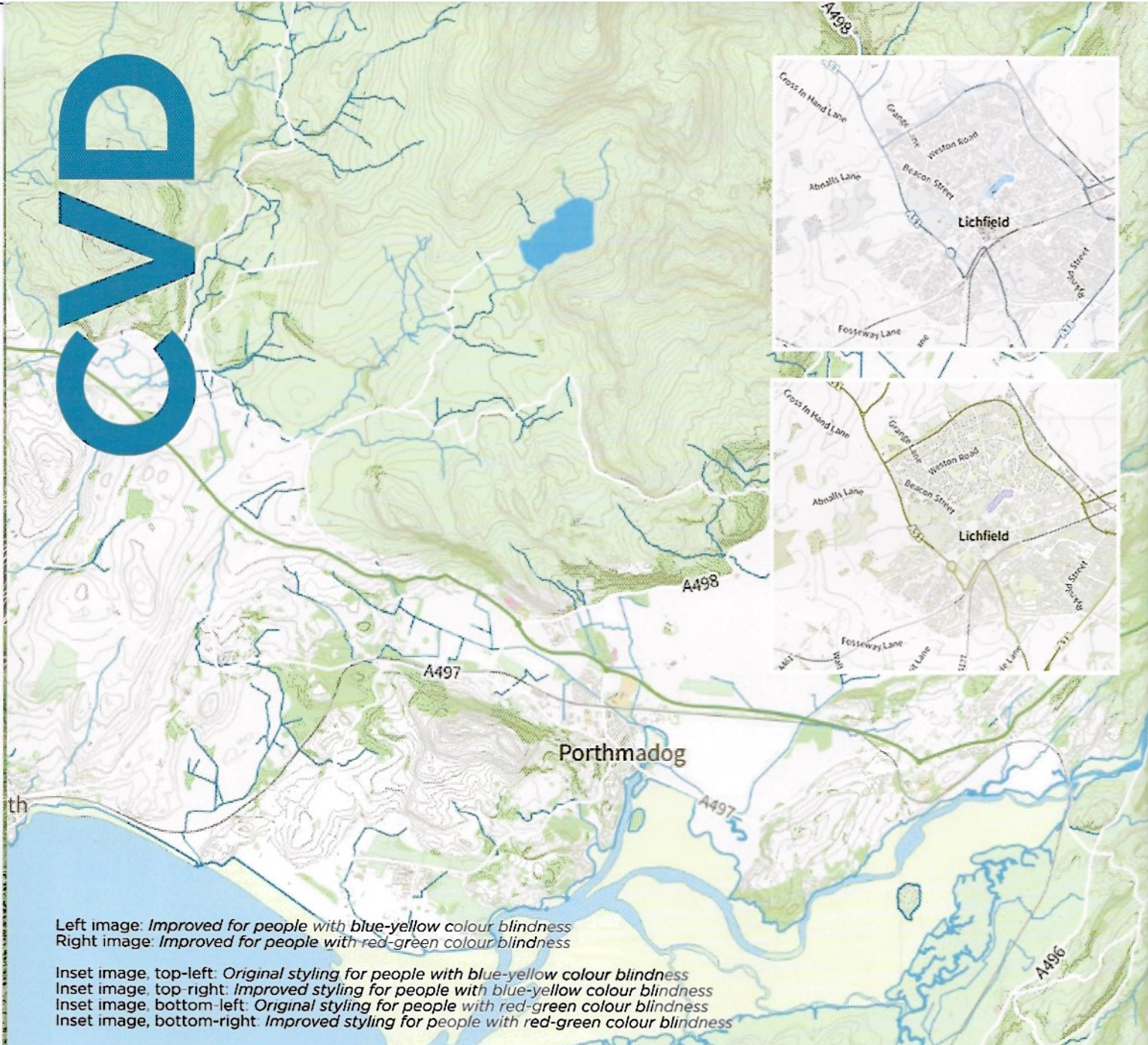
Harley's essay can be read at:

www.incasellc.com/z/harley/Harley_essay_layout-letter.pdf

Peter Vujakovic

Professor of Geography at Canterbury Christ Church University, and an Associate Editor of *The Cartographic Journal*.

CVD



Unless you're colour blind, you are unlikely to be aware of the problems which cartographic styles and colour schemes cause for those affected by CVD (colour vision deficiency).

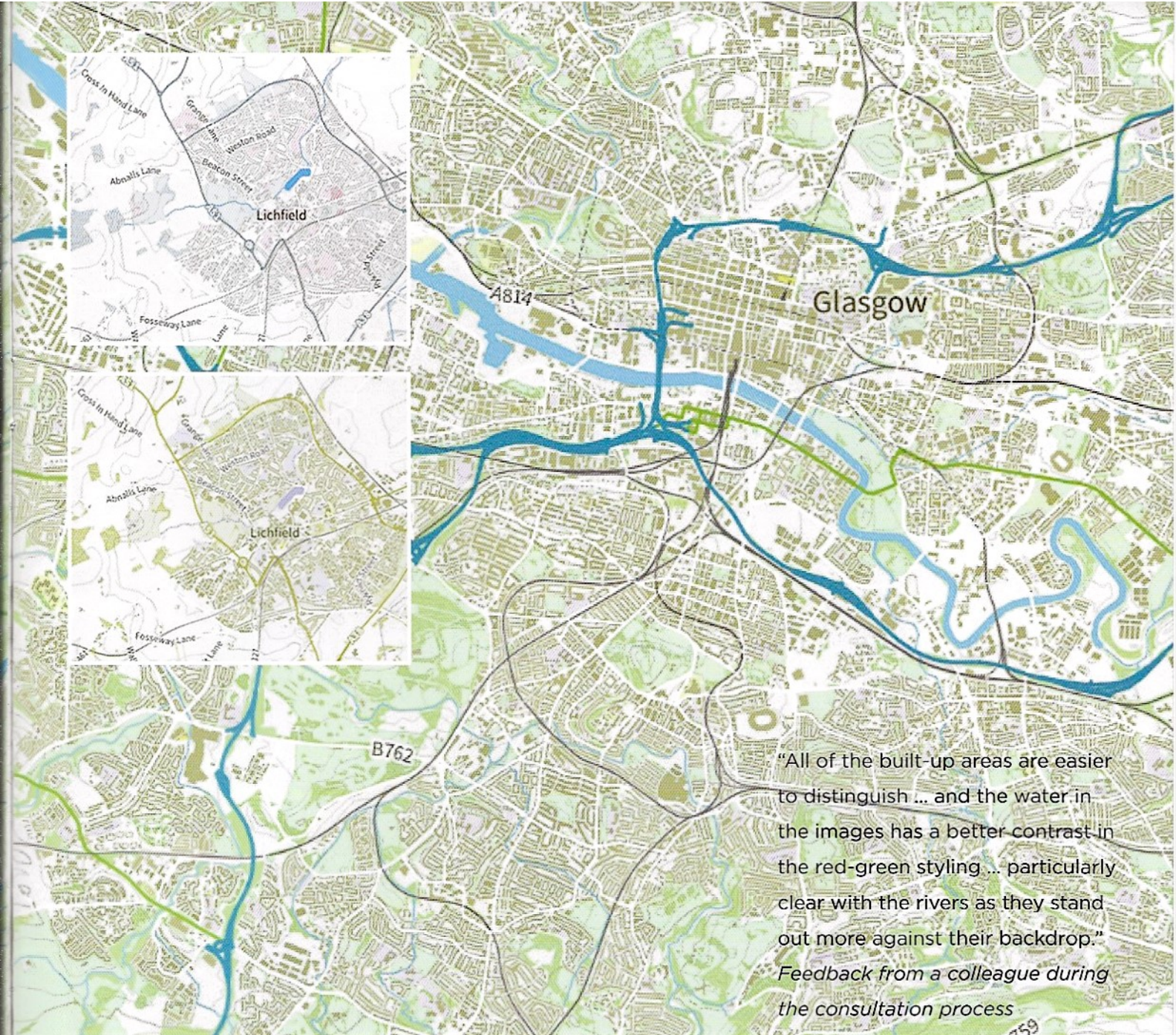
Colours usually easily distinguishable to the human eye, such as red and green, appear very similar and can make elements of map reading more difficult. The issue is often overlooked, with traditional spectral rainbow colour schemes kicking up several difficulties for those with colour blindness.

What is colour-blindness?

Colour blindness comes in several forms – meaning one colour scheme is unlikely to be suitable for all colour-blind people. The most common form – red-green

blindness (also known as deuteranopia and protanopia) – affects around 8% of men and 0.4% of women.

The gender imbalance is caused by the number of X chromosomes in men compared to women. People with this form of CVD have trouble telling red and green hues apart. Blue-yellow blindness (tritanopia) is much less common, affecting <1% of men and women. This makes it hard to distinguish between blue and green colours, as well as yellow and reds. Although this may seem like a small portion of the population, online maps are likely to



reach tens of thousands of people with CVD. We know that people depend on OS data and wanted to maximise accessibility and ease of use both for people with CVD, and those without. These styles were created with both groups in mind, making changes to the traditional styles we all know and love that will work much better for colour-blind people.

Creating CVD-friendly maps

I started the process by assessing the layers which could be easily confused. Key layers causing issues

included woodland and greenspace, as well as motorways and waterways – not ideal if mixed up! I tested several colourways alongside colour-blind colleagues, as I'm not colour blind myself. I found that increasing the contrast between layers worked well, as distinguishing between different contrasts of the same hue is something that those with CVD tend to manage.

These styles are available on GitHub in a variety of GIS formats, or if you would like to have a look at the different

versions, they are available as an online demo at www.labs.os.uk/public/cvd-zoomstack/

We would love your thoughts on these new styles – whether you are colour blind or not – so that we can continue to improve the quality and accessibility of our data.

Jessica Baker

Ordnance Survey, cartodesign@os.uk

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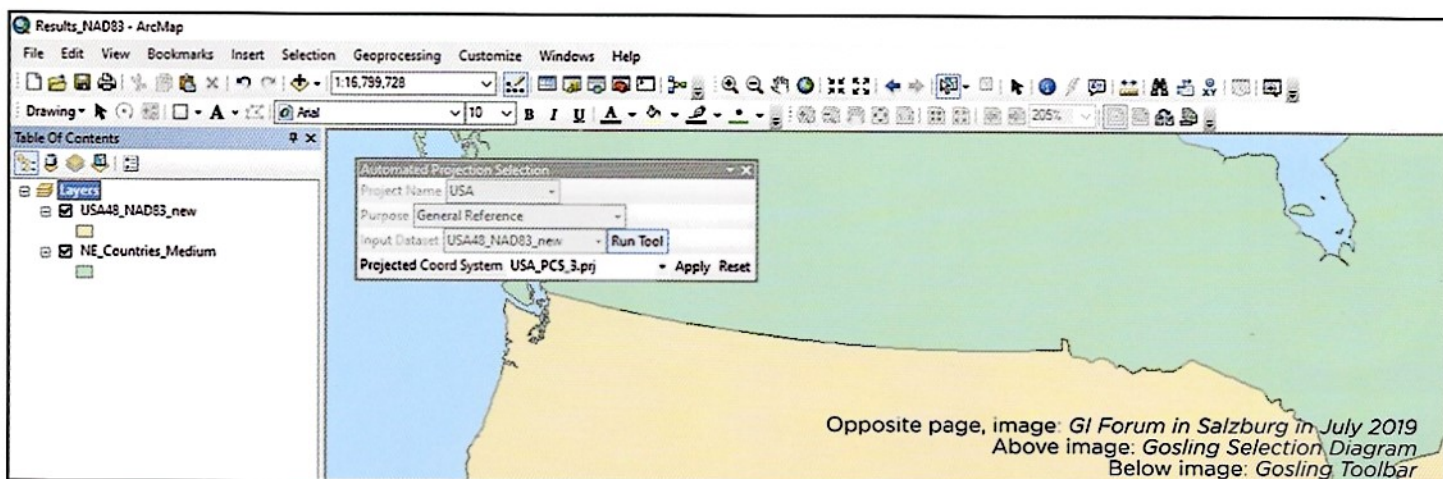
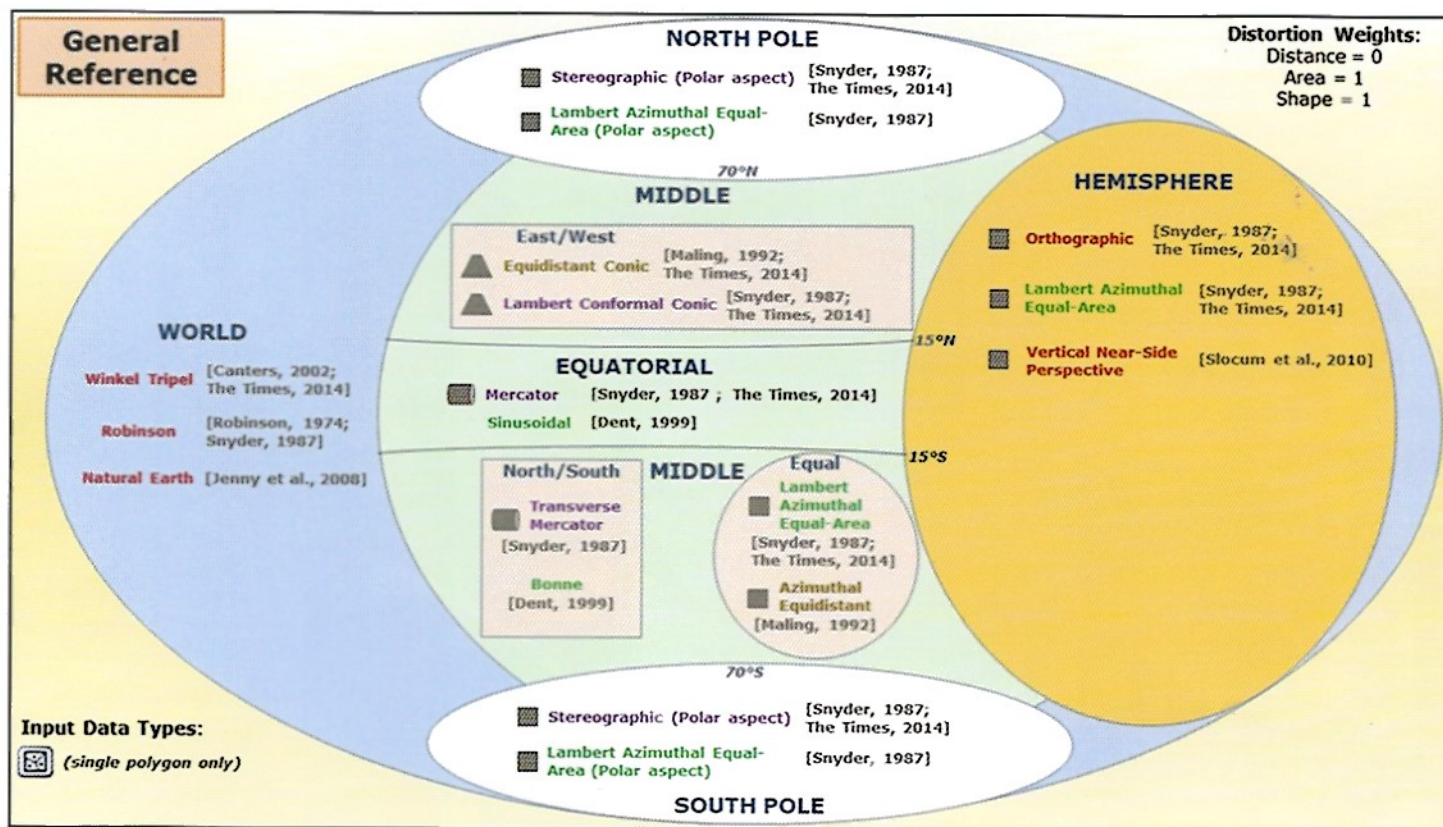


The selection of an appropriate map projection is a fundamental concern for GIS users, and the decision influences both visualisation and analysis of geographic information.

Seeking improvements in the selection process has seen numerous attempts over recent decades to create automated solutions.

Crucially, none of the existing solutions are directly accessible within GIS, and only one is easily accessible, i.e. the Projection Wizard at www.projectionwizard.org (see *The Cartographic Journal*, May 2016).

As a geospatial analyst working for the government, I was motivated to develop a new tool for ESRI ArcGIS software which we could use to create bespoke maps of different parts of the world, at a variety of scales. I am grateful to my employer for supporting my postgraduate studies which saw



me successfully complete an MSc in Geographical Information Technologies with UNIGIS.

The tool employs an original selection method conceptualised using diagrams for each purpose, listing projection choices determined for different geographical area characteristics, based on existing academic literature recommendations. Novel projection distortion measures which projections are also not currently available to GIS users. Those incorporated have their parameters optimised for certain

projections to further reduce distortion. A set of candidate projected coordinate systems are generated and the user can apply each one to their GIS project, enabling each option to be assessed both qualitatively, using GIS visualisation, and quantitatively, using textual distortion measures, before determining the final selection decision.

The new tool provides a straightforward application directly accessible to GIS users when making projection selection

decisions, and has the potential to enhance user confidence and improve understanding in the use of map projections.

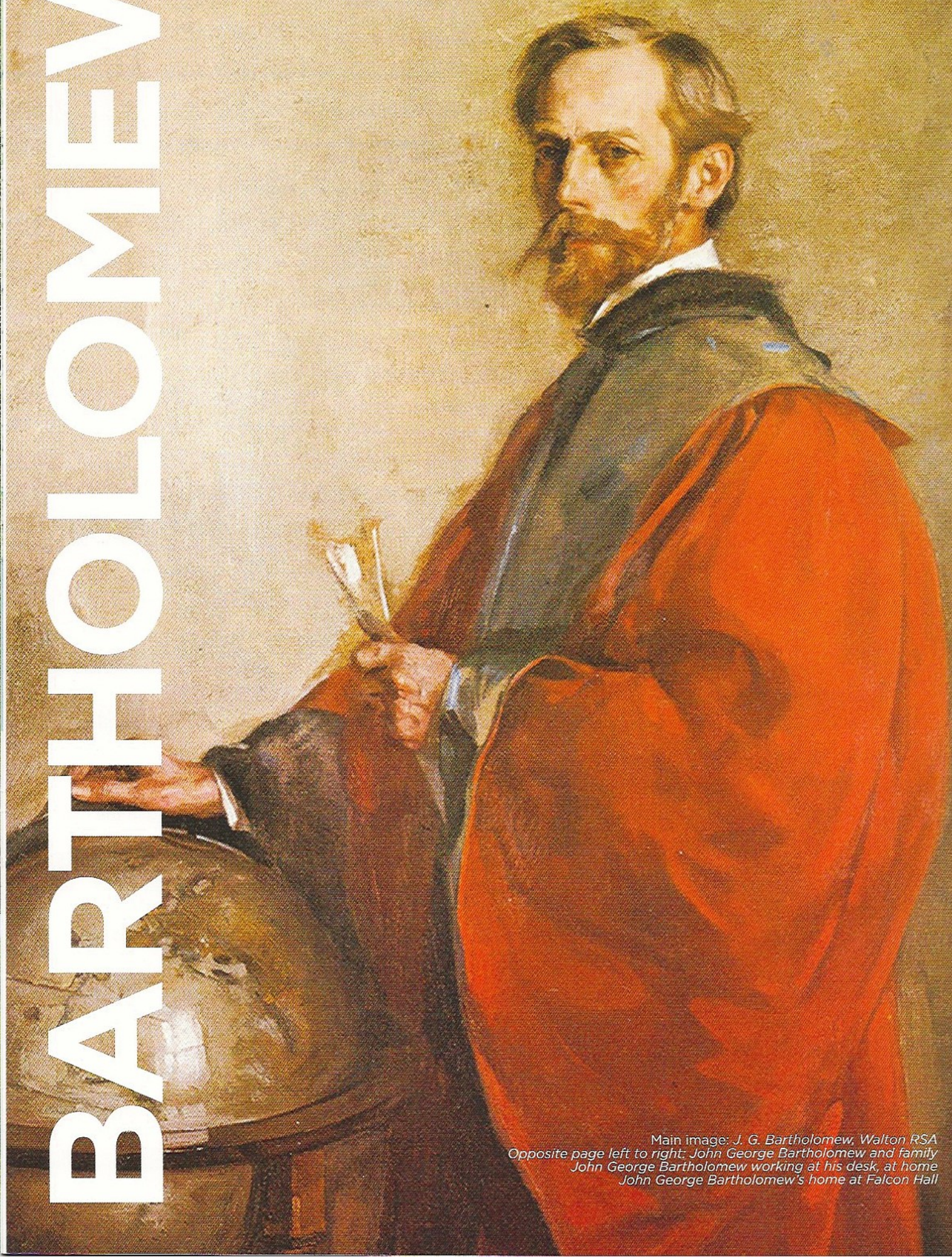
The Python Add-In for ArcGIS toolbar can be downloaded from: github.com/pcgosling/ArcGIS-ProjectionSelection.

Paul Gosling

Manchester Metropolitan University
www.github.com/pcgosling/ArcGIS-ProjectionSelection

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BARTHOLOMEW



Main image: J. G. Bartholomew, Walton RSA
Opposite page left to right: John George Bartholomew and family
John George Bartholomew working at his desk, at home
John George Bartholomew's home at Falcon Hall

John George Bartholomew:

Remembering a man who mapped the world

This year it is good to remember the modest but brilliant Scotsman: a cartographer who welcomed the greatest explorers to Scotland from all corners of the earth; and who, quite literally, mapped the world.



There was a time when the name Bartholomew was synonymous with excellence in map-making. Every proud motor-car owner had a Bartholomew's map tucked into their glove compartment, and posters displaying scenes of idyllic summer road trips assured the motoring public that 'Bartholomew's Will Keep You Right'. In 1860, when John George Bartholomew was born at 10 Comely Green Place, Edinburgh, his family's maps had been guiding travellers for two generations. By the age of 28, he had taken over the management of the company.



Recognising the huge popularity of cycling as a leisure pursuit, he simply invited members of the Cyclists' Touring Club of Great Britain to submit their detailed findings to him, in return for a generous discount on the price of his maps. Eyewitness accounts of the condition of Britain's roads started to pour into Bartholomew's offices, giving their road maps the vital advantage of newness and accuracy.

The late Victorian era was a golden age of exploration, with many travellers returning from previously uncharted regions to tell astonishing stories of adventure and discovery. John George Bartholomew saw the potential for Scotland's own geographical society, and in 1884, while walking on the beach at North Berwick, he suggested the idea to Agnes Livingstone Bruce, the daughter of David Livingstone.

Bartholomew's idea was met with the warmest approval: a prospectus was drafted that very day, and a significant number of Scottish peers, scientists and businessmen eagerly lent the fledgling Society their support. In this way, John George Bartholomew was both a spark and a guiding light in the

early days of the Royal Scottish Geographical Society. Bartholomew enjoyed close acquaintance with leading academics and travellers of the time, including Sir Ernest Shackleton, Dr William Bruce, H. M. Stanley and Cecil Rhodes, and he worked with many of them to represent their discoveries in map form.



Asked about what he feels is his great-grandfather's greatest legacy, John Eric Bartholomew, himself a cartographer, says, "Beyond a doubt, I have to say his perfection of coloured layer shading on maps, a technique for showing heights now adopted the world over by mapmakers." These maps were beautiful works of art, with soft greens and browns indicating low-lying areas, darker browns for high ground, and white for mountain summits; water depth was illustrated by carefully graduating tints of blue, a much-loved feature of his maps.

14 April 2020 marks the centenary of his death. A celebration had been planned in Edinburgh but has been postponed to 2021 due to the Coronavirus outbreak.

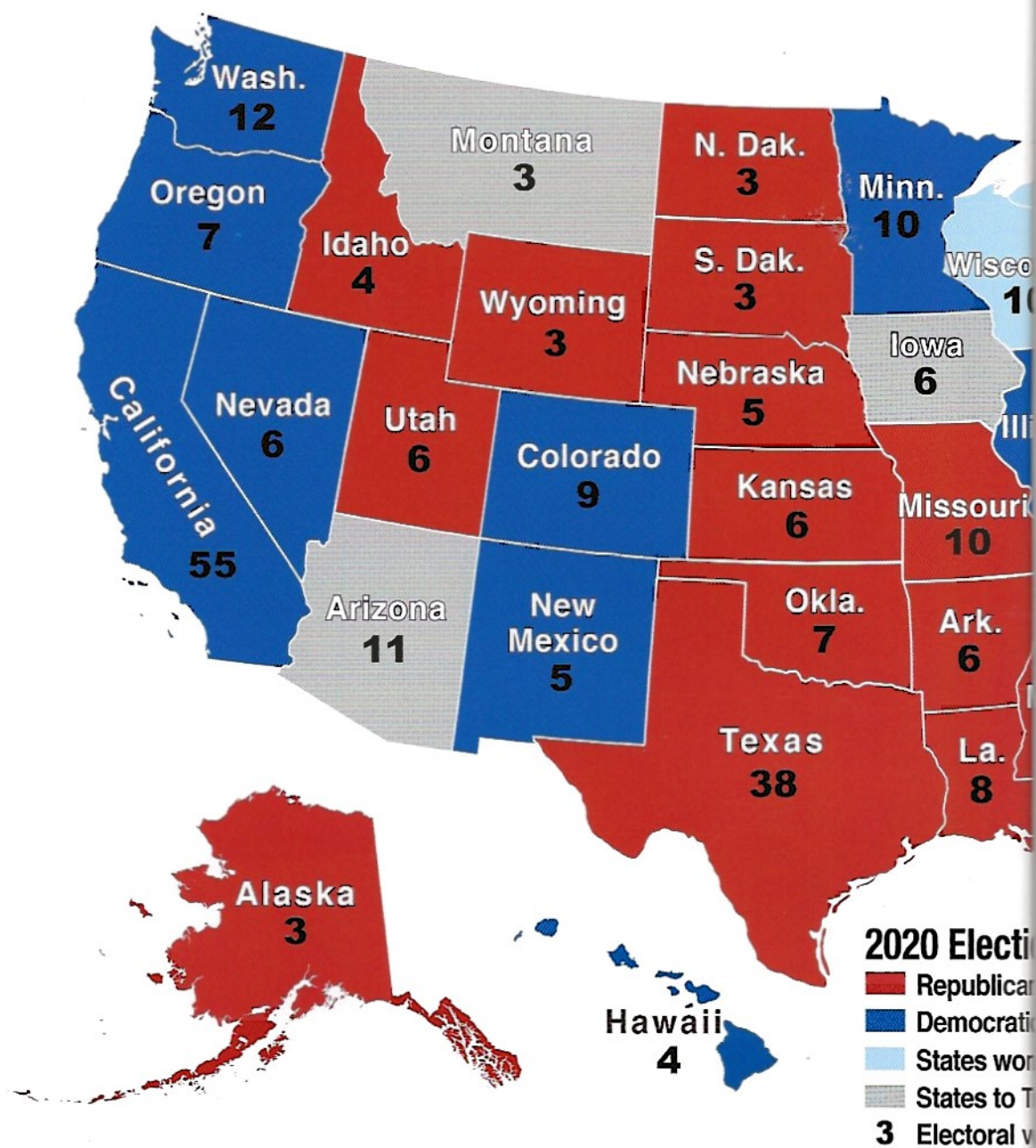
Jo Woolf

RSQS Writer-in-Residence

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NOTICE

In the summer 2016 *Maplines*, I made a prediction regarding the 2016 United States presidential election, which was correct on 47 states but wrong on three. British colleagues often ask how we, Americans, could have elected Donald Trump?

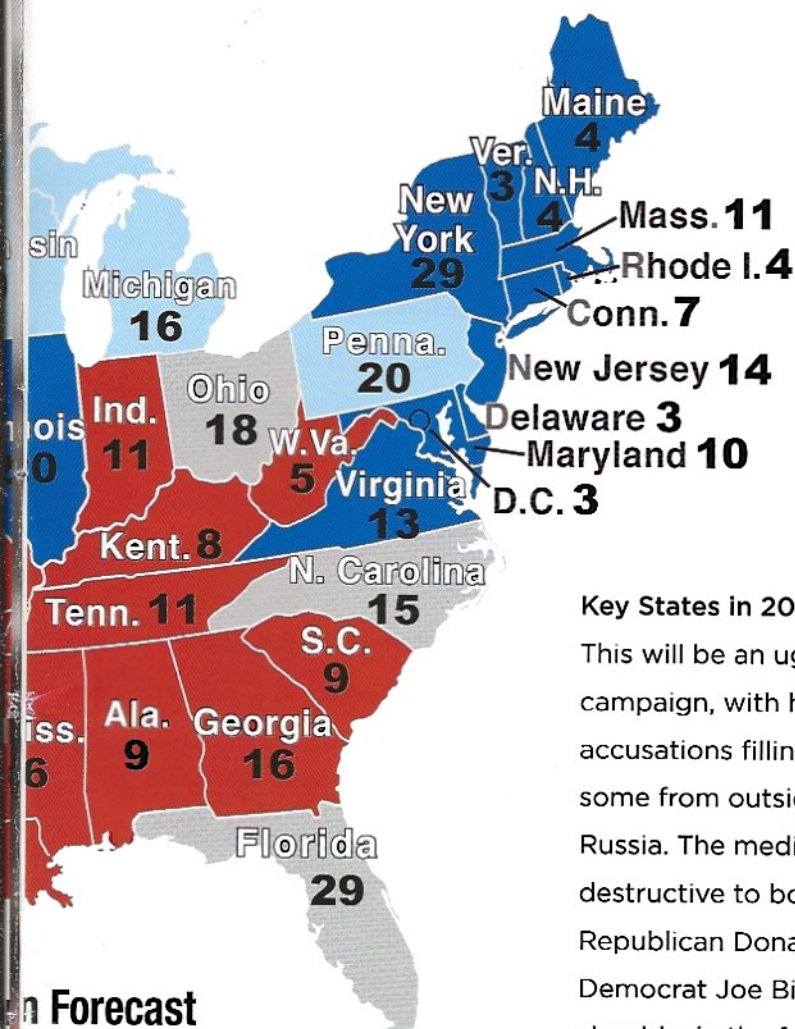


Well, one face-saving reply is that most Americans did not vote for Trump, who received 62.9 million votes. However, some 73.6 million voted for others, including Hillary Clinton, who received 65.8 million votes. Low voter turnout and third-party candidates gave Trump wins in key states.

Electors and Impeachment

Most nations elect presidents based on the popular vote, but the United States uses the so-called Electoral College, which means that 538 Electors choose

our president. Under Article II of the United States Constitution, states are allotted Electors equal to their number of Representatives, plus two Senators. The Electoral College preserves federalism, with the least populous states guaranteed three Electors and the most populous state, California, getting 55. In almost every state the winner of the popular statewide vote gets all the Electors. In 2016, Trump narrowly won Pennsylvania, Michigan and Wisconsin by less than 78,000 total votes to gain 46 Electoral votes — and the presidency.



Key States in 2020

This will be an ugly election campaign, with hyper-partisan accusations filling the media, some from outside actors, like Russia. The media storm will be destructive to both candidates, Republican Donald Trump and Democrat Joe Biden; but Biden should win the following key states:

Pennsylvania – Trump won this state's 20 electoral votes in 2016 with about 44,000 more votes than Clinton of the 6.1 million cast, by promising growth in jobs and coal. His unfulfilled promises gave Democrats victories in the 2018 elections, likely leading to a 2020 win for Biden, who lived in the state as a child.

Michigan – In 2016 Trump won by 10,700 votes out of 4.8 million, gaining 16 electoral votes. He reached out to Blacks (1.4 million) in the state and promised more manufacturing jobs. Manufacturing declined, and Trump alienated Black voters on healthcare

and racism issues. In 2018 Democrats easily won statewide elections, indicating a strong Biden win in 2020.

Wisconsin – Trump carried Wisconsin in a low turnout 2016 election by about 22,700 votes out of 2.9 million, claiming 10 electoral votes. Many blamed a new Republican Voter ID law for suppressing Democratic votes; others faulted Clinton for not visiting the state. Democrats rebounded in 2018 and April 2020 statewide elections with major victories, and Milwaukee is the site of the 2020 Democratic National Convention in August. These are all positive signs for Biden.

Mapping the 2020 Election

If Biden holds the states that voted for Clinton in 2016 (dark blue on map), which seems certain, he will have 233 electoral votes. Adding the three key states (light blue), will give Biden the presidency with 279 electoral votes (270 are needed to win). Trump (red) starts with only 177 near certain electoral votes. States (grey) are likely to be close and could go to either candidate. Of course, anything can happen but based on current trends and the Electoral College alignment, it looks like the Trump presidency is unsustainable.

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Forecast

(Trump) 2016 & 2020

(Clinton) 2016 & (Biden) 2020

by Trump in 2016 flip to Biden in 2020

ump in 2016—too close to call in 2020

by state

Trends can help identify key states and indicate their likely votes for 3 November 2020. Trends include some Americans referring to face masks as "submission muzzles" and calling the pandemic, racism, and impeachment "leftist hoaxes", indicators that Trump voters are drifting farther right, leaving centrists behind. Trump is the first impeached president to run for re-election. The Constitution's framers, remembering the pernicious rule of George III, added impeachment to constrain presidential power.



Ed Freyfogle and I met to discuss Geomob, the regular in-person meet-ups for “all people doing interesting things in geo”. The events have been affected by COVID-19 and forced to relocate into cyberspace.

Q: What was your drive for starting Geomob?

I had started my career in software development and gradually discovered geographical data, especially location data. I began a company focusing on geocoding, providing location-specific knowledge. This is how we got more involved in the community. A colleague initiated the GeoMob events and when he moved away from the UK, he asked if anyone wants to take over the series. So I volunteered.

Q: What is the core concept of Geomob? What has changed since the original events?

We started discussing ‘geo’ and ‘mobile’ in 2009, hence the name. Nevertheless, as we progressed, this shifted more towards ‘geo’. Generally, the concept has not

been altered, we are aiming for very simple meetings where anyone doing interesting work with geodata can present their application, product or initiative. This means it could be GIS, cartography, start-ups doing innovative work on the web, governmental organisations, academics, literally anyone that is doing something interesting with geodata.

Q: What is the profile of the Geomob participant?

Participants come from all different sectors; we only require that the person presenting is also the person involved in a practical part of the project. For example, we can have an academic being part of a project or a software developer, the founder of a start-up, or a product manager. It must be ‘a doer’.

Q: How are you selecting the presenters?

We used to invite people to present. Over time this changed, and many participants volunteered and now we mainly keep this format. Occasionally, if I come across something interesting online or on social media, I try to contact that person to ask if they wish to attend and present.

Q: What is the typical audience of Geomob?

The audience is the same group of people as the speakers, individuals with an interest in geo. We see it more as a meet-up and we have always asked the speakers to focus more on the ‘Why’ and not on the ‘How’.

Q: Are Geomob presentations limited to any topic? Where does cartography fit in?

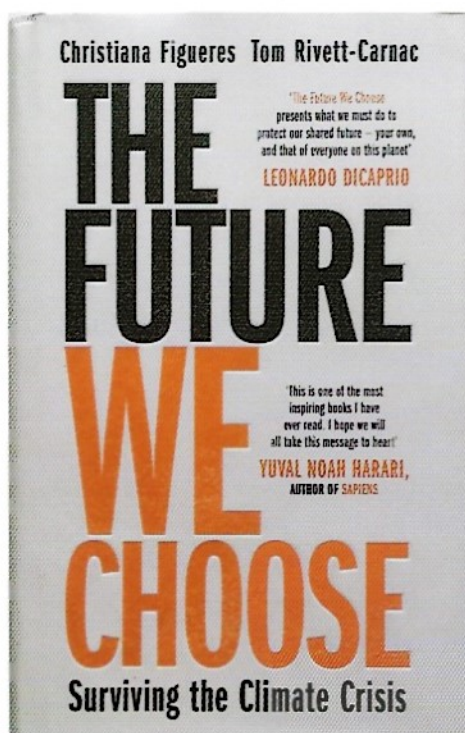
We are open to any topic related to geo data, but Geomob is not a technical development meeting or GIS meeting. Our aim is to explore the advantages we get from having access to a wealth of geo data, especially location data and what interesting ideas can occur from this. Hence, cartography is quite present. This relates of course to the diversity of the geospatial domain. We have had speakers that have presented about hand-drawn maps and obviously digital cartography. Duration of each presentation is down to 10–15 minutes, just enough for the speakers to talk about the idea and why it is interesting – a taster. After the talks we move towards a local place and we try to engage as a community and network.

Q: How regular are the Geomob meetings?

We have started our meetings in London and gradually expanded across Europe (e.g. Barcelona, Lisbon) and meet five to six times a year. Now that we are forced by the lockdown to switch to online meetings, we have a more regular, once-a-month schedule. We also do the Geomob podcast. Steven Feldman and I chat about the projects that we did or trends in geospatial. For more information see www.thegeomob.com

Cristina Vrinceanu
Editor

Logo: © 2020 GeoMob



The Future We Choose: Surviving the Climate Crisis

Christina Figueres
and Tom Rivett-Carnac
ISBN: 9780525658351,
225 pp., £12.99

With the planet warming, ice caps melting and mass extinction at an unprecedented rate, the real question is: what can we do about it? If you are new to reading about the climate crisis or even an old hand wondering what can we practically do, then this book is for you.

It is a gentle journey into the political situation which led to the Paris Agreement, 2016. The Paris Agreement came out of the Conference of the Parties, United Nations Framework Convention on Climate Change (COP21, UNFCCC)

and reaffirms the goal of limiting global temperature increase rate to below 2 degrees Celsius. To date, 189 out of 197 parties have signed up to the Convention. This should mean that we are all working towards a low-carbon, fossil-fuel-free living to mitigate the affects of man-made climate change.

The book explores three different mindsets: stubborn optimism, endless abundance and radical regeneration. We have collected so much evidence, suffered the impact of climate change such as forest fires, flooding and once-in-a-lifetime events, that we need to start working out where we are now and where we want to be.

We need to start changing our attitudes to where food, water, shelter and transport come from, so that we can get a societal shift to reach below the 2 degrees Celsius rate.

Furthermore, there are ten actions to help you on your way. We still have a choice between two 2050 world scenarios:

1. The world is on fire. The air is suffocating and deadly. Entire countries are under water.
2. The world is breathing. The air is fresh. Nature is thriving. Entire populations have a better quality of life.

It's our future, our choice. We can survive the climate crisis and this book shows us how. And if this all feels like a bit too much to handle, yes, it is too much to handle on your own, but this is why governments, institutions and geographers need to shine a light to help get us to option 2 in 2050. Well worth getting a copy, for friends or family.

Caroline Robinson
Senior Editor

Cover Design: © 2020 Nick Stern

European Space Agency (ESA)
Earth Observation Week (EO)
Φ-WEEK 2020

Dates: 28 September - 02 October 2020
Venue: <https://phiweek.esa.int/>

The purpose is to explore innovation in space industry as well as move towards a Digital Twin Earth: an AI-driven digital replica of our planet that converts the full power of AI, Earth Science and Modeling, cloud computing and Earth-scale environmental, societal and economical data into actionable insights for scientist, political and economic decision makers.

Get involved!

Cover image: Botanical Tapestry at Terminal 2 of Heathrow Airport
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