## THE JOURNAL OF NAVIGATION

VOLUME 75 • NUMBER I • JANUARY 2022



CAMBRIDGE UNIVERSITY PRESS

## THE ROYAL INSTITUTE OF NAVIGATION

Science

Technology

Practice

## THE JOURNAL OF NAVIGATION

Editor-in-Chief Prof. Anahid Basiri

Assistant Editors

Tony Blackman OBE FRAeS FRIN Admiral Sir Nigel Essenhigh GCB FRIN FNI

Dr. Gang Chen PhD Aalborg University, Denmark

Prof. Liang Chen PhD

Dr. Ashim Debnath PhD

Deakin University, Australia

Dr. Shaojun Feng PhD FRIN

Imperial College London, UK
Dr. Paul D Groves DPhil CPhys FRIN

University College London, UK Prof. Shuanggen Jin PhD FIAG

Shanghai Astronomical Observatory, China

Dr. Lawrence Lau PhD FRICS FRIN

University of Nottingham Ningbo China, China

Wuhan University

Prof. Izzet Kale University of Westminster, UK Captain Paul A Lanaghan BA FRIN Jillian Carson-Jackson MEd FRIN FNI

Associate Editors

Assoc. Prof. Simona Lohan PhD
Tampere University of Technology, Finland
Prof. Margareta Lützhöft PhD FNI MRIN
Western Norway University of Applied Sciences, Norway

Dr. Gene McCall AFRIN

Los Alamos, USA Dr. Xiaolin Meng FRIN University of Nottingham, UK

Dr. Erik Styhr Petersen PhD MNI MSNAME

Denmark

Prof. Roberto Sabatini PhD DEng FRIN

RMIT University, Australia Dr. Wolfgang Schuster

Atkins, UK

Dr. Rafal Szlapczynski PhD Gdansk University of Technology, Poland Christopher A Gash BSc FRIN Simon E Gaskin FRIN FNI

Prof. Peter J.G. Teunissen FRIN

 $\label{lem:curtin} \textit{Curtin University, Australia and Delft University of Technology, The Netherlands}$ 

Assoc. Prof. Jinling Wang FRIN FIAG University of New South Wales, Australia Prof. Adam Weintrit FRIN FNI Gdynia Maritime University, Poland Prof. Yuanxin Wu PhD

Shanghai Jiao Tong University, China

Editorial Board. The Editorial Board (for administrative matters) consists of the members of the Royal Institute of Navigation's Technical Committee.

Editorial Advisory Board. The Chairman of the Editorial Advisory Board (for academic matters) is the Royal Institute of Navigation Director (John Pottle, BSc MBA FRIN), the Secretary is the Journal Editor-in-Chief (Prof. Anahid Basiri) and it consists of the following members:

(Affiliation, Region)	Name	(Affiliation, Region)
Ryerson University, Canada	DrT Humphreys	University of Texas at Austin, USA
Arab Academy ST&M, Egypt	Professor K Jeffery	UCL, UK
Max Planck Institute for	Professor A. Kealy	University of Melbourne, Australia
Neurobiology of Behavior, Germany	Professor S. Kos	University of Rijeka, Croatia
Wuhan University, China	Professor H Kuusniemi	University of Vassa, Finland
University of Glasgow, UK	Dr J Momoh	Nigerian Space Agency, Nigeria
The Ohio State University, USA	Professor T. Moore	University of Nottingham, UK
Curtin University, Australia	Professor N Newcombe	Temple University, USA
Imperial College London, UK	Professor W. Ochieng	Imperial College, UK
	Professor OT Pleter	Bucarest Politechnic Uni, Romania
	Arab Academy ST&M, Egypt Max Planck Institute for Neurobiology of Behavior, Germany Wuhan University, China University of Glasgow, UK The Ohio State University, USA Curtin University, Australia	Ryerson University, Canada Arab Academy ST&M, Egypt Max Planck Institute for Neurobiology of Behavior, Germany Wuhan University, China University of Glasgow, UK The Ohio State University, USA Curtin University, Australia Imperial College London, UK  Dr T Humphreys Professor K Jeffery Professor A. Kealy Professor S. Kos Professor H Kuusniemi Dr J Momoh Professor T. Moore Professor N Newcombe

The Journal is published six times a year by Cambridge University Press. It contains original papers contributing to the science of navigation, including those presented at the meetings of the Institute. Papers should be submitted via the link <a href="http://mc.manuscriptcentral.com/nav">http://mc.manuscriptcentral.com/nav</a>. The Editor-in-Chief may be contacted via e-mail at journal@rin.org.uk. The current 'Instructions for Contributors' are available online or by e-mail. The views expressed in the Journal are not necessarily those of the Institute, or of any organisation or department to which the authors may belong. Crown Copyright may be reserved. Any facts stated or opinions expressed in this Journal are the sole responsibility of the contributors. Neither the Royal Institute of Navigation, the Editor nor the Publishers can be held responsible for any injury or loss sustained in reliance thereon.

The Journal of Navigation and all other Cambridge journals can be found at journals.cambridge.org.

The address of the Institute is The Royal Institute of Navigation, at The Royal Geographical Society, 1 Kensington Gore, London SW7 2AT (Telephone: 020 7591 3130 Fax: 020 7591 3131), website (www.rin.org.uk) e-mail (editor@rin.org.uk).