THE JOURNAL OF NAVIGATION

VOLUME 76 • NUMBER 4-5 • JULY 2023





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

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

Dr. Shaojun Feng PhD FRIN

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

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

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:

Name	(Affiliation, Region)	Name	(Affiliation, Region)
Professor A El-Rabbany	Ryerson University, Canada	DrT Humphreys	University of Texas at Austin, USA
Professor H Helal	Arab Academy ST&M, Egypt	Professor K Jeffery	UCL, UK
	Max Planck Institute for	Professor A. Kealy	University of Melbourne, Australia
Dr P Malkemper	Neurobiology of Behaviour - caesar	Professor S. Kos	University of Rijeka, Croatia
•	(MPINB), Germany	Professor H Kuusniemi	University of Vassa, Finland
Professor X Yan	Wuhan University of Technology,	Dr J Momoh	Nigerian Space Agency, Nigeria
	China	Professor T. Moore	University of Nottingham, UK
Professor A Basiri	University of Glasgow, UK	Professor N Newcombe	Temple University, USA
Professor D.G Brzezinska	The Ohio State University, USA	Professor W. Ochieng	Imperial College, UK
Professor A. El-Mowafy	Curtin University, Australia	Professor OT Pleter	Bucarest Politechnic Uni, Romania
Dr M Elhajj	Imperial College London, UK		

The Journal 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 http://mc.manuscriptcentral. com/nav. 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

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).