Continued from page 3.

From the Editors of the Special Issue on HF Skywave Radar

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half a dozen countries, along with several expressions of regret from people who wished to contribute but were prevented from doing so by government or corporate constraints. If most of the papers were to survive peer-review, then we would be on course for a double issue. After the rigorous two-stage peer-review process, we ended up with thirteen accepted papers.

We, as Guest Editors, have decided to arrange the resulting two-part Special Issue such that the first part contains the seven papers dealing primarily with HF skywave radar. The second part contains six papers, with the focus on HF surface wave radar and on hybrid systems. To reflect this organization, we have opted to call the first part Special Issue on HF Skywave Radar and the second part Special Issue on HF Radar, for ease of reference, but of course there is an extensive commonality of technology and scientific principles.

While we cannot claim to have achieved a truly comprehensive account of the global state of HF radar, this Special Issue contains papers from Australia, Canada, China, Germany, Singapore and the United States, with technical exposition and scientific results from some of the world's most advanced HF radar systems, written by the key researchers involved.

The papers in this first collection address a diverse range of issues that confront designers and users of HF radars. The opening article, by Anderson, is a cri de cœur for greater recognition of the need to employ physical models whose fidelity is commensurate with the dynamic range of modern HF radars. His argument is illustrated with examples from both skywave and surface wave radar systems. Next, Francis, Cervera and Frazer describe a methodology for designing a network of HF skywave radars, where the radar siting and system parameters must be optimized for the mission objectives, taking account of the propagation and noise environments. Not only must HF radars manage to achieve their objectives in a challenging interference environment, they must also be responsible citizens of the HF band. McKerracher, Moo, and Ponsford report on a new HFSWR system architecture that is 'cognitively enabled', defined as the capability to utilize spectrum knowledge obtained either by sensing the environment at the radar or from external sources to satisfy all requirements. The next paper, by Riddolls, examines the problem of auroral clutter in HF skywave systems, a very serious problem at high latitudes, and shows how adaptivity applied to '3-D' radars can mitigate this threat. Barnes and Earl then analyze the impact of noise on the radar receiving and processing system, emphasizing the need for, and design of, a database tailored to support receiver specification and resultant performance prediction. In the following paper, Frazer describes experimental results obtained with a MIMO skywave radar, showing that multiple-input multiple-output radar techniques can be used to construct, after reception, the required multiple simultaneous adaptive range-dependent transmitter beams, thereby achieving a propagation mode selection capability which can greatly improve detectability of slow targets, especially in maritime applications. Finally, Zhang, Jiang, Li, Li, and Ji describe an interacting multiple model adaptive strong tracking filter (IMMASTF), developed in the HFSWR context but of wider potential application. The filter combines the strong tracking filter (STF) and the Saga-Husa adaptive filter with the well-known interacting multiple model (IMM) algorithm, with the goal of improving the stability and precision of target tracks.

We conclude this editorial by expressing our sincere gratitude, first to the authors who engaged fully with our endeavour despite their many competing priorities, and second, to the small group of HF radar experts across the world who devoted their time and expertise to the review process. Their time and dedication has ensured the high standard of this Special Issue. We can truly claim that this has been a community effort.

Enjoy your Special Issue on HF Radar. ◆