

universally used for commercial marine navigation radars, of typically 1 degree per 100 MHz frequency change at x-band. However, this is unlikely to affect the visibility of SART transmissions at ranges at which obscuration due to sea clutter is likely to be a problem.

3. CONCLUSION. In conclusion, it is recommended that serious consideration be given by the marine community to the provision of a frequency off-set facility in commercial, x-band marine navigation radars, in order to improve the radar visibility of replies from Search And Rescue Transponders (SART), which otherwise might be obscured by echoes from sea clutter.

#### KEY WORDS

1. Radar.
2. Search and rescue.
3. Transponders.

## ‘A Voyage of Navigational Investigation’

From W. G. L. Randles

The paper by Michael Richey in the September 1995 issue of the *Journal*<sup>1</sup> raises a number of points which underline a general divergence of views between historians and practical seamen concerning the use or otherwise of nautical astronomy in early Portuguese voyages. However, I should start by acknowledging that Richey’s account of the content of my *Imago Mundi* paper<sup>2</sup> is very fair and strictly impartial.

The problem, as I see it, turns upon the difficulty of communication between professional historians and professional seamen. The historian, as I see it, can only speak about what he finds in dated documents and this was the point of view of distinguished Portuguese historians like Luís de Albuquerque and Damião Peres. Portuguese seamen such as Commander Fontoura da Costa, Commander Moreira Campos and Commander Estácio dos Reis have argued and do argue that their nautical experience demands that the Azores, whose presence appears on early dated charts, could only have been reached and returned to, using some form of nautical astronomy.

Gabriel Valsequa’s Majorcan chart of 1439 carries the legend that Diogo de Silves discovered the Azores (*foram trobades*) in 1427. (I leave in parentheses Waters’ claim that they were discovered before in the 14th century.) The first text referring to the use of a graduated nautical instrument, the quadrant, is dated 1460–2. There is no text that I, or the Portuguese historians know of, proving that nautical astronomy was practised with an instrument in that part of the Atlantic between 1427 and 1460–2. Can a historian assume that it was? I think not.

Richey says on page 350 (quoting Waters) that ‘the study of early Genoese portulan charts shows that about 1370 Atlantic Moroccan coastlines were delineated true so that the Portuguese discoverers *must* also by then *have known* of magnetic variation, one *must assume* by observations of the North Star [my italics]’. I am afraid that I find that I cannot bring myself to share the conclusions inferred from the evidence provided and most of my Portuguese colleagues feel the same. I cannot speak for Luís de Albuquerque for, alas, he is no longer with us.

On page 351 Richey writes: ‘In the fourteenth century when astronomical navigation was [sic] [my italics and my sic] developed [...] a rule was introduced using the two Guard stars in the Lesser Bear, which rotate anti-clockwise about the North Star, as a form of

clock hand'. The first appearance of the rule for the North Star or *Roda do Norte* illustrated by an imaginary figure in the sky, is dated by Professor Luís de Albuquerque to between 1455 and 1475 (let alone the fact that the diagram in Richey's Fig. 2 first appears in a book published only in 1518).

On page 353 Richey notes that Waters had 'suggested that some light might be thrown on the controversy in which he had become involved by a seagoing investigation of the navigational difficulties carried out in a craft with similar sailing characteristics to that of a caravel'. On pages 9 and 10 Richey describes the crucial trip he made from Porto Santo to the Azores and back to the Channel. He admits making altitude observations with an instrument. As I read it, I find nothing here to show that he *could not* have reached the Channel without taking altitude observations. And surely this is the issue that divides the seamen from the historians!

#### REFERENCES

- <sup>1</sup> Richey, M. W. (1995). A voyage of navigational investigation. *This Journal*, 48, 349.
- <sup>2</sup> Randles, W. G. L. (1993). The alleged nautical school founded in the fifteenth century at Sagres by Prince Henry of Portugal, called the Navigator. *Imago Mundi*, 45, 20.

#### KEY WORDS

1. History.
2. Astro navigation.