

*On Irregularities observed in the Direction of the Compass Needles of H. M. S. Isabella and Alexander, in their late Voyage of Discovery, and caused by the Attraction of the Iron contained in the Ships. By Captain Edward Sabine, of the Royal Regiment of Artillery, F.R.S. &c. Read February 18, 1819. [Phil. Trans. 1819, p. 112.]*

In this paper Captain Sabine shows in what respect the effects of local attraction in the above-mentioned ships were conformable to observations made in previous voyages; and how far the errors found to take place on different courses, and under different dips of the magnetic needle, corresponded with those rules for calculating corrections recommended by Captain Flinders, who found that in every ship a compass would differ very materially from itself on being removed from one place to another, and this was found to be the case in the *Isabella* and *Alexander*.

As the ships ascended Davis's Straits, the binnacle compasses, in consequence of their construction, became nearly useless; accordingly, a standard compass was placed in the *Isabella* exactly amidship between the main and mizen mast, on a stout cross-beam, about nine feet above the deck; and in the *Alexander* amidship, on a box of sand five or six feet above deck. Captain Sabine next describes the methods by which the points of no error in these compasses were determined, and which were not in either ship coincident with the magnetic meridian.

Captain Flinders has shown that the maximum of error in the same compass, and confined to the same spot, is different in different parts of the world; and by multiplying the observations, and comparing the series, he was led to trace a connection between the amount of the errors and the dip of the needle, observing that the influence of local attraction on the compass needle increased with the dip. This increase, however, says the author, was a relative one, being in comparison to the directive power of magnetism, the diminution of which is sufficient to account for the effects observed; as will be evident upon reflecting, that though the magnetic force is greatest at the pole, its directive power must there have ceased: hence the inadequacy of the rule proposed by Captain Flinders, whereby the amount of error under any known dip being ascertained, the amount of error for any other dip may be calculated, by using as a multiplier the decimal expression of the proportion which the error in the one ascertained instance may have borne to the dip. In the observations made in the *Isabella* at Shetland, where the dip is  $74^{\circ} 21\frac{1}{2}'$ , the maximum of error was  $5^{\circ} 34'$  easterly of the true variation, with the ship's head at E.S.E., and  $5^{\circ} 40'$  westerly at W.N.W., making an extreme difference of  $11^{\circ} 20'$ . By Captain Flinders's rule, the common multiplier for this compass would have been about one twelfth, making the extreme difference  $15^{\circ}$ , whereas it was really more than  $10^{\circ}$ . By a similar reference to the observations made by the *Alexander* in Baffin's Bay, another proof is afforded of the inadequacy of Captain Flinders's rule.