Seasonal and spatial distribution of the Antarctic Tern in South Africa

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The Antarctic Tern, Sterna vittata, *is a regular winter visitor to South Africa, being present from May to October. Twelve day-roosts were located in the southernmost part of South Africa, containing a total of 2 148 birds. Most of the roosts were situated on rocky headlands along the mainland coastline, and two were on offshore islands. An old South African breeding record needs verification.*

Die grysbors seeswael, Sterna vittata, *is 'n gereelde winterbesoeker aan Suid-Afrika vanaf Mei tot Oktober. Twaalf dag-rusplekke, met 'n totaal van 2 148 voëls is in die mees suidelike gedeelte van Suid-Afrika aangetref. Die meeste rusplekke kom voor op klipperige kape van die vasteland; twee was op naasliggende eilande. 'n Vroeëre waarneming van teling moet nog bevestig word.*

Introduction

The Antarctic Tern, *Sterna vittata*, has a circumpolar breeding distribution on subantarctic islands and some birds migrate northwards in winter to warmer, more temperate conditions (Watson, 1975). The species has recently been reported for the first time to breed at Marion Island (Berruti & Harris, 1976). However, the population wintering in South Africa is considered to belong to the race *tristanensis* which breeds on Tristan da Cunha (Liversidge, 1957).

This paper deals with the seasonal occurrence and numbers of Antarctic Terns seen at day-roosts in South Africa during the period 1971–1976.

Methods

The mainland coastline between St. Helena Bay and Quoin Point was searched systematically for tern roosts during August 1976 (Fig. 1). Roosts of Antarctic Terns east of Quoin Point and on several offshore islands were recorded as well, but these areas were not searched completely. Counts of all terns at Dassen Island were made during 1971 and 1972, and at Kommetjie during 1975 and 1976, at approximately 2-week intervals (Fig. 1). The terns were recognized by their red bills and grey underparts with white rumps in adult plumage and by the presence of heavy barring in juvenile plumage.

Results

Antarctic Terns first arrived in South Africa in mid-May and departed in mid-October (Table 1). The population

Table 1

Approximate arrival and departure dates of Antarctic Terns in South Africa.

Roost site	Year	Date first seen	Date last seen
Dassen Island	1971	30 May	1 October
Dassen Island	1972	15 May	1 October
Kommetjie	1975	25 May	18 October
Kommetjie	1976	31 May	20 October

increased gradually until August when it rose suddenly to a peak and subsequently declined (Figs 2 and 3). The pattern was similar in both localities and in different years.

A total of 12 Antarctic Tern roosts was recorded from Bekbaai to Cape Recife (Fig. 1). A total of 2 148 birds was counted and the size of individual roosts varied from 10 to 1 200 birds (Table 2). There is a trend for roosts to be smaller in the eastern part of the species' range. Most roosts were on low-lying rocky headlands. Three roosts were on sandy beaches of which two were associated with low rocky outcrops (Table 2).

Antarctic Terns have been recorded at sea off Rooiels Lagoon and at Betty's Bay near Cape Hangklip in August 1975 (P. G. H. Frost, pers. comm.), 16 km offshore in Algoa Bay in August 1974 (J. C. Sinclair, *in litt.*) and off Bird Island in May 1972 (K. Z. Edwards, *in litt.*) (Fig. 1). A single juvenile bird seen on the Umgeni Estuary, Natal (29°49′S, 31°02′E) on 13 September 1976 (J. C. Sinclair, *in litt.*) was outside the normal range of the species. Liversidge (1957) lists eight museum specimens from South Africa, all from within the observed range of the species.

Discussion

The Antarctic Tern is a winter visitor to South Africa, no

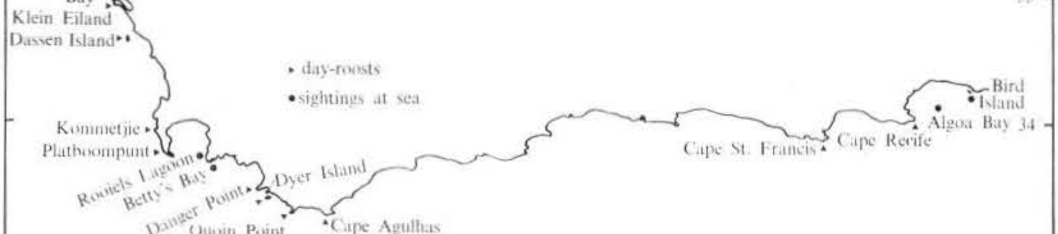

Fig. 1. The locations of known day-roosts (triangles) and sightings-at-sea (solid circles) of the Antarctic Tern in South Africa.

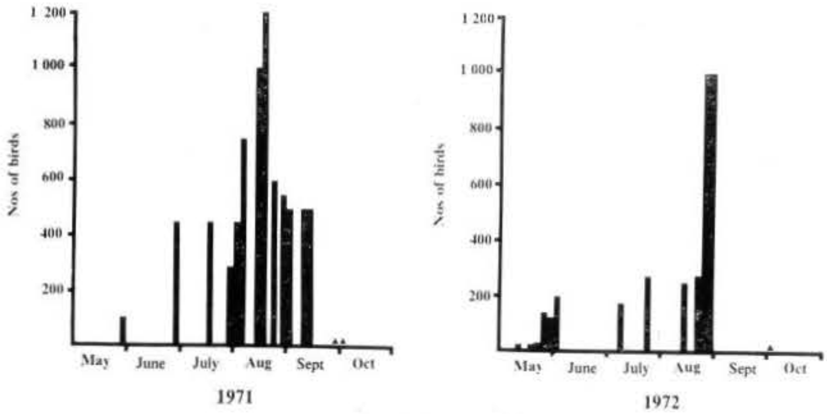

Fig. 2. Seasonal distribution of the Antarctic Tern at Dassen Island, 1971–1972. Triangles indicate birds were present but were not counted.

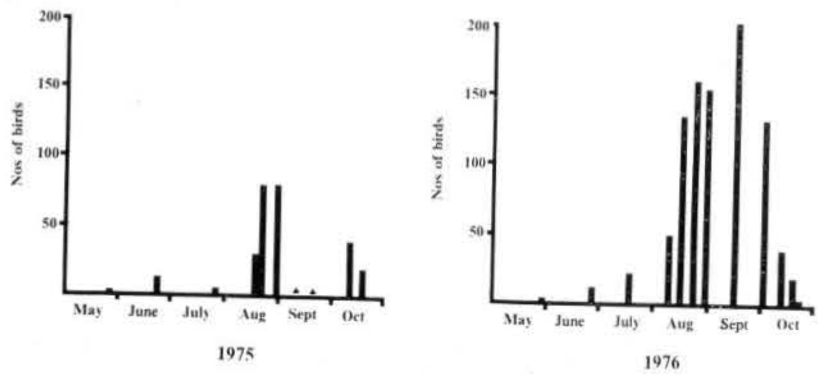

Fig. 3. Seasonal distribution of the Antarctic Tern at Kommetjie, 1975–1976. Triangles indicate birds were present but were not counted.

individuals having been observed locally in summer. Breeding on the Tristan da Cunha group of islands occurs from November to March, the birds arriving at their breeding grounds in September (Hagen, 1952). Overwintering individuals have, however, been reported (Elliott, 1957). The size of the population on Tristan da Cunha is not known, but it is thought to be large (Hagen, 1952; M. K. Rowan, pers. comm). It is possible that the majority of the population which breeds on Tristan da Cunha winters in South Africa.

The species' apparent preference for roosting on rocky ground may be a consequence of its preference for headlands as roosting sites. This may be related to the birds' habit of foraging well out to sea, rather than close inshore (pers. obs.). The restricted range of the Antarctic Tern in South Africa (generally south of 33°S), and its occurrence in greatest numbers on the cold waters of the west coast, might be expected in a species of mainly subantarctic distribution (Watson, 1975).

Table 2

Known day-roosts and numbers of Antarctic Terns in South Africa

Roost site	Co-ordinates	Roost type	Maximum number	Date	Observer
Bekbaai	32°49'S, 17°53'E	beach near low rocks	192	31.8.76	J.C.
Danger Bay	33°01'S, 17°54'E	beach	50	30.8.76	"
Klein Eiland	33°09'S, 18°00'E	beach near low rocks	101	29.8.76	"
Dassen Island	33°25'S, 18°05'E	low rocks	1 200	17.8.71	"
Kommetjie	34°08'S, 18°19'E	"	202	16.9.76	"
Platboompunt	34°20'S, 18°27'E	"	150	28.8.76	"
Danger Point	34°38'S, 19°17'E	"	146	7.8.71	"
Dyer Island	34°41'S, 19°25'E	"	10	11.8.76	"
Quoin Point	34°47'S, 19°39'E	"	43	29.8.76	W.R. Siegfried, pers. comm.
Cape Agulhas	34°50'S, 20°01'E	"	14	19.8.73	J.C. Sinclair, *in litt.*
Cape St. Francis	34°12'S, 24°51'E	,	15	15.8.73	J.C. Sinclair, *in litt.*
Cape Recife	34°02'S, 25°42'E	"	25	2.8.74	J.C. Sinclair,
Total			2 148		

The Antarctic Tern is not easily distinguished from some Palaearctic terns, and hitherto it has often been overlooked in South Africa. A specimen collected at Cape St. Francis on 23 July 1936 and stated to be a Common Tern, *S. hirundo*, (illustrated in Hewitt, 1937) has been identified as a juvenile Antarctic Tern (Liversidge, 1957).

Another early record, by Courtenay-Latimer (1957), is confusing and incomplete, and her report of the Antarctic Tern breeding in South Africa on Stag Island, Algoa Bay, in the winter of 1940 has been accepted by modern texts (McLachlan & Liversidge, 1970; Watson, 1975). The breeding record is open to doubt, since, apart from the apparently abnormal breeding season, adult Antarctic Terns moult while in South Africa (pers. obs.) and it is unusual for terns to breed while moulting. Elsewhere in its range the bird is strictly a summer breeder (Berruti & Harris, 1976; Hagen, 1952; Parmalee & Maxson, 1974) The record has never been subsequently verified.

Acknowledgements

I thank K. Z. Edwards, P. G. H. Frost, P. A. R. Hockey, J. S. Pringle, W. R. Siegfried, J. C. Sinclair and R. W. Summers for observations of Antarctic Terns in South Africa. The Projects Fund of the South African Ornithological Society gave financial assistance to J. S. Pringle, enabling seasonal counts to be made at Kommetjie. I acknowledge financial and other support from the Sea Fisheries Branch, the South African Nature Foundation and the South African National Foundation for the Conservation of Coastal Birds, during 1971 and 1972, and the University of Cape Town for financial support during 1975 and 1976.

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(Received October 1976).

A note on the daily variation of the geomagnetic vertical intensity at Marion Island

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Significant phase shifts occur in the daily variation of the geomagnetic vertical intensity at Marion Island. These phase shifts are not due to the 'island effect', as previously reported, but are brought about by the $L_2(Z)$ variation and are functions of the lunar phase angle.

Beduidende faseverskuiwings kom voor in die daaglikse variasie van die geomagnetiese vertikale intensiteit op Marion Eiland. Dié faseverskuiwings is nie te wyte aan die 'eiland-effek' soos voorheen vermeld nie, maar word teweeggebring deur die $L_2(Z)$ variasie en is 'n funksie van die maan se fasehoek.

Introduction

The daily variation of the geomagnetic vertical intensity Z at inland observatories on quiet days consists essentially of the solar quiet day variation $Sq(Z)$ plus a small perturbation due to the lunar daily variation $L(Z)$. However, the daily variation at coastal and oceanic island observatories is sometimes significantly modified by other factors. Malin (1969) reported an anomalously large value of the lunar semi-diurnal variation $L_2(Z)$ at coastal observatories and ascribed it to the generation of electric currents in the sea due to tidal movements of the conductive water across the geomagnetic field. The anomalous behaviour of the magnetic vertical intensity on oceanic islands, known as the 'island effect', has been reported by Mason (1963), Voppel (1964), and Sasai (1967).

Since an island acts as a region of low conductivity in a sheet of high conductivity, currents induced in the ocean are compelled to flow around the island; consequently the vertical component of the magnetic field produced by the induced current will be in opposite senses on opposite sides of the island. Numerous workers (Mason, 1963; Voppel, 1964; Sasai, 1967) have reported a complete reversal in sign for short-period disturbances of one hour or less, while Mason (1963) found phase shifts of up to 70° in the daily variation. Sasai (1967) concluded that the island effect, which is observed for the short-period range, vanishes at a period ranging from 8 to 24 hours. Rikitake (1970) confirmed theoretically that the phase shift is a function of the frequency of the variation. Kühn and Sutcliffe (1972) however, presented evidence of a phase reversal in $Sq(Z)$ at Marion Island (46°52',5S, 37°50',8E) and attributed it to the 'island effect'. In this note we show that substantial phase shifts are observed in the daily variation of Z at Marion, but that these can be explained without requiring the inconsistency of the frequency dependence of the island effect as suggested by Kühn and Sutcliffe (1972).

Data selection and analysis

The observations on which Kühn and Sutcliffe (1972) based their conclusions were made with a BMZ on 10 and 11 May 1971. Subsequently, a magnetic observatory was established on Marion Island and hourly mean values for the period 1 June 1973–31 May 1975 are available. Sutcliffe (1977) utilized these data to study Sq at Marion. He found that the range of the mean $Sq(Z)$ is anomalously small, especially during equinoctial and winter months, but found no evidence of a phase reversal.

Provided there is no significant magnetic activity present, the daily variation observed on any specific day will consist of Sq modified in a regular way, with a period of half a lunar