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OCEANIC FLIGHTS OF THE NORTHERN ROYAL ALBATROSS *Diomedea epomophora sanfordi* USING SATELLITE TELEMETRY

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In November 1993, an opportunity arose to test new sensors which had been developed and incorporated into satellite tracking transmitters, ARGOS PTTs, to study further the oceanic behaviour of the Wandering Albatross *Diomedea exulans* (Nicholls *et al.* 1992). The PTTs were deployed on Northern Royal Albatrosses *D. epomophora sanfordi* at the Taiaroa Head colony near Dunedin, New Zealand.

METHODS

Bird species

Two mature Northern Royal Albatrosses (over 10 years old) were used. One, a female, was a mature breeder on egg, and the other was a male initially holding a territory with a young female who laid on 12 November 1993 during the time the transmitter was operating.

Transmitting data

The ARGOS PTTs were made by Microwave Telemetry Inc. USA and were Model 1993 100 fitted with a SENSYN barometer, solid state transducer, and a thermistor to record the temperature of the barometer. These were both calibrated by the Physics Laboratory of the Bureau of Meteorology, Melbourne over a range of pressures (950–1 030 hectopascals, hPa) and temperatures (10°–30°C). In addition, mercury switches to detect activity in roll and pitch planes and a battery voltage sensor (±0.05V) were incorporated.

Receiving data

The CLS-ARGOS system gave 8–10 geographical positions daily with a minority of readings giving an accuracy of +1 kilometre, and the accuracy of other readings (class 0) was indeterminate (Anon. ARGOS Manual). More than 40 readings per day were received from each sensor.

Packaging

An aerodynamically shaped package was designed and made to lie flat on the down feathers beneath the body contour feathers of the lower back. It was anchored with tapes glued to the down and body feathers with a fast-setting epoxy resin.

Interpretation of locality data

The data presented are a weighted running mean of three which reduces ARGOS locality errors and gives a representation of the probable flight.

RESULTS

Female (band — WO, PTT — No. 580)

The PTT was attached on 6 November 1993 after which she made two flights (Table 1, Fig. 1a). The first flight commenced on 6 November and was over and then along the edge of the continental shelf, returning on 11 November.

The second flight, which commenced on 16 November, was over the continental shelf edge and eastwards towards the Chatham Islands (Fig. 1b). When the bird was about 713 kilometres north-east of the colony the PTT failed. A premature decline in the battery voltage indicated an impending failure of transmission. The PTT was retrieved when the bird returned on 29 November, and it was found that water had leaked from around the barometer vent and penetrated to the battery circuitry.

Male (band — WY, PTT — No. 581)

The three flights made are summarized in Table 1 and Figure 2. Flight 1, which commenced on 9 November, was directly offshore to over the continental shelf and then parallel to the shelf edge in a southerly direction (Fig. 2a). The bird returned on 12 November to incubate the egg. Flight 2 commenced on 18 November and finished on 20 November. The bird flew east over the shelf and seawards for about another 50 kilometres before returning for a nest changeover (Fig. 2b). Flight 3, which commenced on 22 November and lasted 6 days, was again directly over the shelf and then northerly along the edge (Fig. 2c).

Sensors

Figure 3 shows the barometric readings of the sensor on the male (PTT — No. 581) when incubating and the nearby weather station at Taiaroa Head. The latter readings are corrected to sea level. A good agreement can be seen

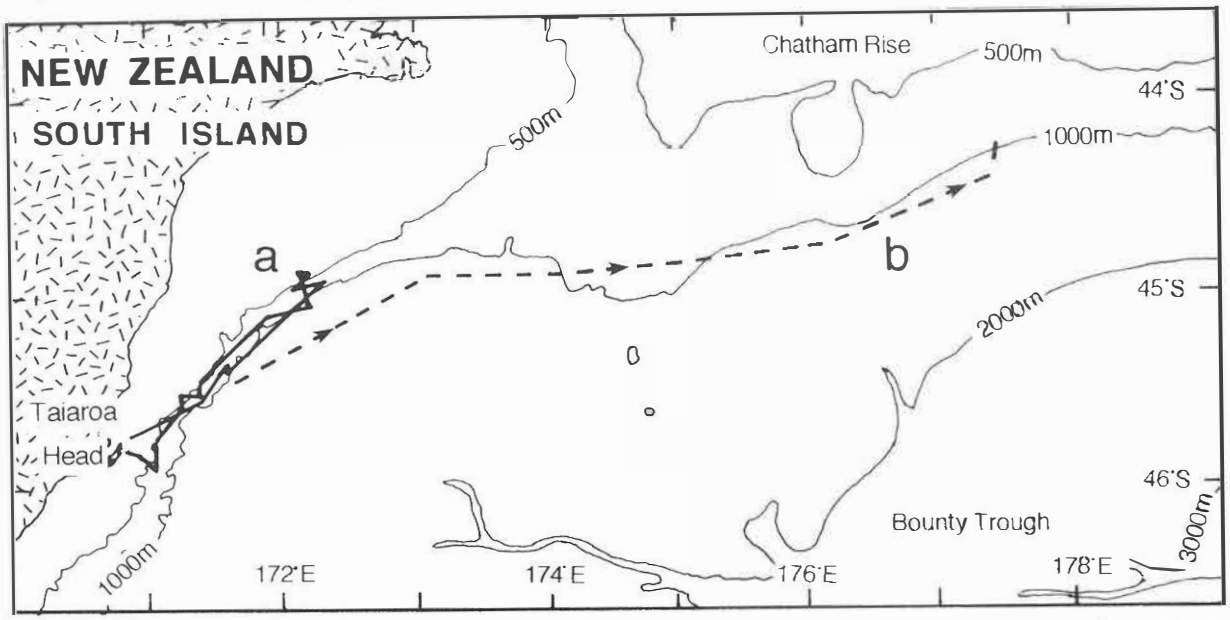

Figure 1. *Two flights of a female Northern Royal Albatross from the breeding colony at Taiaroa Head, New Zealand.* **a** — *6 to 11 November,* **b** — *16 to 18 November 1993, when contact was lost. Bathymetric contours given in metres.*

between the readings of atmospheric pressure changes. The parallel displacement of the barometer measurements on the bird indicates that its nest and territory in the colony were above sea level (asl). The displacement was 16 hPa, equivalent to 133 m asl. The nest was at 65 m asl. The reason for the additional constant displacement has yet to be resolved.

The data from the roll and pitch meters gave a relatively consistent pattern between those times when the birds were at sea and on land. The latter were compared to the observed behaviour of the bird. These data will be discussed in full elsewhere.

DISCUSSION

The potential value of additional sensors was shown. The decline in voltage indicated impending battery failure and led to the resolution of a packaging problem. The barometer, with associated thermistor, was accurate in recording changing barometric pressures, and consequently can be expected to give reliable data on oceanic flights. It also gave data on altitude.

These preliminary data suggest that the flights of the Northern Royal Albatrosses breeding at Taiaroa Head are shorter and slower than those of the Wandering Albatross *D. exulans* which at

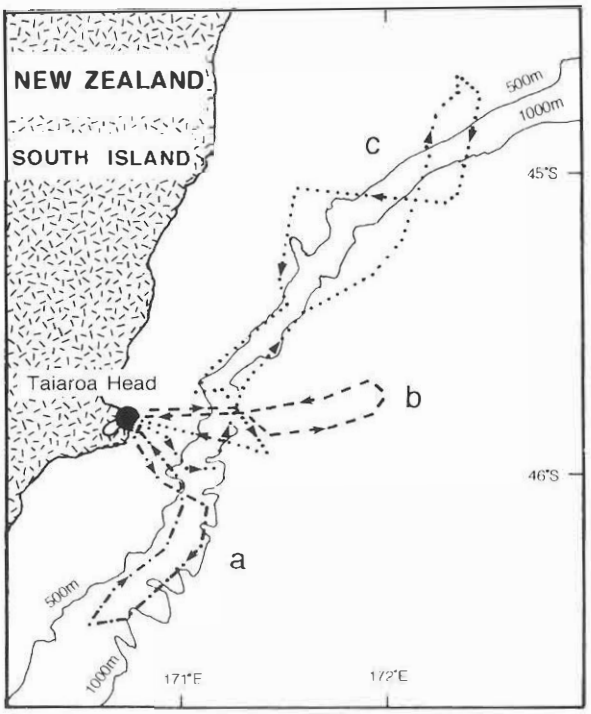

Figure 2. *Three flights of a male Northern Royal Albatross from the breeding colony at Taiaroa Head, New Zealand.* **a** — *9 to 12 November,* **b** — *18 to 20 November,* **c** — *22 to 28 November 1993. Bathymetric contours given in metres.*

TABLE 1

Tracked flights of two Northern Royal Albatrosses from Taiaroa Head, New Zealand, giving the duration, distance and maximum km/h calculated similarly to previous reports on albatross flights (Weimerskirch *et al.* 1993).

Bird band	Flight No.	Date	Time h:min.	Duration h:min.	Distance approx. km	Max. speed km/h
WO	1	6 Nov.	8:00			
		11 Nov.	5:48	117:48	593	33
	2	16 Nov.	5:48			
		18 Nov.	2:42	31:35	713*	57
WY	1	9 Nov.	19:58			
		12 Nov.	9:10	61:12	398	57
	2	18 Nov.	4:25			
		20 Nov.	5:40	49:15	287	35
	3	22 Nov.	18:39			
		28 Nov.	17:10	143:31	739	34

*Battery failure at this distance from colony. **Mate lays egg.

the early incubation stage of the breeding cycle (the nearest available comparison) are 4–53 days and cover 1 282 to 15 200 kilometres (Tickell 1968; Jouventin and Weimerskirch 1990; Weimerskirch *et al.* 1993). Furthermore, they suggest that waters between 500 and 1 000 metres along the continental shelf edge are of importance to Northern Royal Albatrosses early in the breeding season at Taiaroa Head.

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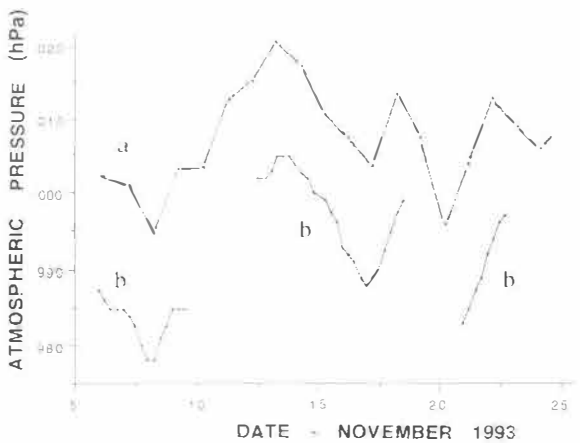

Figure 3. *Comparison of measurements of atmospheric pressure.* a — *nearby weather station at Taiaroa Head.* b — *sensor incorporated into PTT on lower back of Northern Royal Albatross (WY). Only the data from the PTT when bird was incubating are shown.*

REFERENCES

Anon (1993). Guide to the Argos System. (CLS Argos: Toulouse.)

Jouventin, P. and Weimerskirch, H. (1990). Satellite tracking of the Wandering Albatross. *Nature* **343**: 746–748.

Nicholls, D. G., Battam, H., Brothers, N., Butcher, E., Hildebrandt, M., Moors, P., Murray, D. and Robertson, G. (1992). Preliminary results of satellite tracking of the Wandering Albatross around and from Australia. *Corella* **16**: 134–136.

Tickell, W. L. N. (1968). The biology of the great albatrosses *Diomedea exulans* and *D. epomophora*. *Antarct. Res. Ser.* **12**: 1–55.

Weimerskirch, H., Salamolard, M., Sarrazin, F. and Jouventin, P. (1993). Foraging strategy of the Wandering Albatross through the breeding season: a study using satellite telemetry. *Auk* **110**: 325–342.