

Program changed

- OA-09: Blanchet Marie-Anne <-> PA-08: Baylis Alastair
- OB-28: Loretto Matthias-Claudio <- PB-78
- OB-35: Åkesson Susanne <-> PB-55: MacIntosh Andrew
- OD-01: Mulero Margarita <-> OD-06: Metcalfe Julian

Title changed

- PA-47: Heerah Karine – From high-resolution to low-resolution dive datasets: a new index to quantify the foraging effort of marine predators.

Presenter changed

- OA-06: Prudor Aurélien <- Weimerskirch H
- OB-24: Thiebault Andréa <- Tremblay Y
- OD-09: Shorter Alex <- Mooney A
- WS1: Henry Pierre-Yves <- Vuarin P

Presentation cancelled

- OB-28 Norman B
- PA-33 Patterson T
- PA-42 Biermann L
- PA-51 Mantyla E
- PA-57 Moxley J
- PA-59 Singh N
- PA-61 Kirschel A
- PB-09 Lowther A
- PB-11 Meier R
- PB-22 Goldbogen J
- PB-23 Hazen E
- PB-65 Hernandez PJ
- PB-72 Afonso P
- PB-76 Hastie G
- PC-10 Kawabe R
- PD-11 Kawabata Y
- PD-17 Nakayama S
- PD-19 Kirschel A
- PD-37 McKnight J
- PD-39 Hunter E
- PD-41 Thomas A

Sponsor and exhibitor added

- Oxford University Press
- North Star



Added poster presentation

PA-47

From high-resolution to low-resolution dive datasets: a new index to quantify the foraging effort of marine predatorsHeerah Karine^{1,2}, Hindell Mark², Guinet Christophe³, Charrassin Jean-Benoît¹1: LOCEAN, Université Pierre et Marie Curie, France (karine.heerah@hotmail.fr)

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Dive profiles recorded by Satellite Relayed data Loggers (SRDLs) are in a highly summarised form, from which it is difficult to make the sorts of important behavioural inferences that are possible from higher resolution data. The main objective of this study was to adapt a method developed for high-resolution dives to detect and quantify within-dive foraging periods to low resolution dives. Two southern elephant seals were fitted with a head mounted TDR (recording depth at 1 Hz) and an accelerometer (recording 3 axes of acceleration at 16 Hz) from which prey capture attempts were estimated (PrCA). A Weddell seal was also fitted with a simple TDR (1 Hz). High-resolution dive profiles were used to: (i) calculate an index of foraging effort based on the detection of vertical sinuosity switches (i.e. huntinghighres time), (ii) produce a SRDL equivalent low-resolution dataset, (iii) then, a set of candidate foraging effort indices were calculated for each low-resolution dive. Huntinglowres time, which is the total time spent in decreased vertical velocity segments of the dive, was the best correlated with huntinghighres time. 71% of PrCA in SES occurred in huntinglowres segments, also associated with four times more PrCA than transitlowres segments. We found a low-resolution index which indicates within-dive foraging activity and which identified most PrCA, despite degraded information transmitted by SLDRs.

PA-67

Use of eddies and associated structures by diving top predators: macaroni penguin in the Crozet islandsBon Cécile¹, Della Penna Alice², D'ovidio Francesco², Bost Charles-André¹1: Centre d'Études Biologiques de Chizé, CNRS UMR7372, Université de La Rochelle, France (cecile.bon@cebc.cnrs.fr)

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In the open ocean, sub and mesoscale structures (eddies, fronts and filaments) have strong influences on the foraging activities of top-predators through the enhancement of marine productivity. Thus eddies' dynamic controls the repartition of zooplankton and fish communities at mesoscale. Investigating how these predators find and use eddies and associated dynamic structures are crucial to better understand their at-sea distribution. This especially concerns central place foragers, such as penguins, which are limited in time and space for foraging duties during the breeding period. In this work, we focus on the role of sub-mesoscale structures in the at-sea distribution of the largest consumer across all marine birds of the world: the macaroni penguin. The study was performed in the surrounding of the Crozet Archipelago (46.42 S; 51.86 E) South Indian Ocean. Using altimetry data and tracks locations of 15 birds (6 females and 9 males) derived from GPS data, we firstly calculated the heading velocity computed as the difference between the birds' track and current velocities. Secondly, we used a Lagrangian method, the finite-size Lyapunov exponent (FSLE), to locate coherent structures at the surface of ocean over the 3 first breeding months of macaroni penguins (November 2012 to January 2013). By comparing the positions of birds and FSLE locations, we demonstrated macaroni penguins are associated with the FSLE ridges of different ways: firstly, passive displacements are observed when they are in these structures. Secondly, they adopt a more sinuous behavior, indicating an intensive foraging behavior. Moreover, males and females adopt different foraging paths and so, use structures with different properties. We hypothesized that macaroni penguins target these structures to find large patches of their main preys. More, they seem to use currents to move between patches, which could be a way to minimize costs of displacement in favor of foraging behavior as diving activity, pursuit and capture of preys. The difference in foraging sexes can be related to different breeding requirement. We discuss the use of currents and eddies by macaroni penguin with respect to other studies on marine predators.

PA-68

Estimating resource acquisition and at-sea body condition of a marine predator

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An understanding of how body condition changes at fine spatial and temporal scales as a result of interaction with the environment provides necessary information about how animals acquire resources. Comparatively little is known about intra- and inter-individual variation of body condition in marine systems. We used a state-space model to estimate the body condition in two closely related species of marine predator that occupy different hemispheres: northern elephant seals (*Mirounga angustirostris*); and southern elephant seals (*Mirounga leonina*). We found that physiological condition significantly impacted lipid gain at two time scales - daily and at departure from the colony, that foraging location was significantly associated with lipid gain in both species of elephant seals, and that long-term behavioural phase was associated with positive lipid gain in northern and southern elephant seals. Southern elephant seals performed fewer drift and gained lipids at a lower rate. This modeling approach accounts for uncertainty at many levels and has the potential to integrate physiological and movement ecology of top predators. The observation model we used was specific to elephant seals, but the process model can be applied to other species, providing an opportunity to understand how animals respond to their environment at fine spatial scales.

PA-69

Foraging strategies of Adélie penguin (*Pygoscelis adeliae*) throughout the breeding season and with changing sea-ice conditions

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Antarctic marine ecosystems are affected by strong and fast environmental changes. Studying animal behavior and habitat use in their natural changing environments is crucial if we are to lead conservation programs. Adélie penguin (*Pygoscelis adeliae*) is known as a creature of the sea ice. Their foraging behaviors are demonstrated to be strongly associated with sea-ice distribution in the vicinity of Dumont d'Urville colony throughout the incubation and guard phase of the breeding season. The first trips undertaken by females during the incubation phase were longer than males and correlated to a northern limit of the sea-ice extent. During guard phase, birds highly depend on a polynya which is a key feature in Antarctic marine ecosystem. This ice-free area opening was synchronous in the season with the hatching and increase of food requirement to feed the chicks. Moreover, a sex-specific behavior was observed at sea after hatching, explained by a discrepancy in equal investment, suggesting females having a crucial role on feeding whereas males played an important role on land. The important intra-individual variability we observed calls for future investigations as it may be driven by other parameters than sex alone such as bird's experience or physiological conditions. The habitat use provided in this study is proposed to serve as a scientific foundation for the establishment of Marine Protected Area for the Dumont d'Urville region.

PB-88

Circadian behaviour of the tropical gastropod *Trochus niloticus* L. characterized by accelerometry

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In this study, we equipped the commercially important gastropod, *Trochus niloticus*, with accelerometers to describe activity rhythms at two sites in the South West Pacific with different temperature regimes, New Caledonia and Vanuatu. The described activity was based on a 24-hour cycle, beginning at twilight and gradually stopping during the night, before sunrise. This nocturnal behaviour was characterized by short (duration <30 s) and low intensity (acceleration <0.12 g) movements and was most probably associated with foraging behaviour. A size effect was also highlighted by the study of two size groups in Vanuatu (80-90 mm vs. 120-140 mm). Smaller specimens exhibited greater activity levels and also performed, at night, migration to the edge of the reef characterized by more intense longer movements. Foraging during night-time, when competition was minimal or absent, reduced energy allocated to locomotion that was consistent with studies on the energetics of herbivorous gastropods. Thus, the use of accelerometers coupled with other sensors (in the present study, light and temperature sensors) provided detailed information on *Trochus* behaviour and physiology under natural conditions. This provides the base to identify potential changes in their fine-scale behaviour in response to environmental changes, which is essential in animal ecology and stock conservation.

PB-89

Spatial separation of seabird foraging areas

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The Farne Islands, which lie off the NE coast of the UK, is home to a large number of breeding seabirds (~100,000 prs) of various species. Many of these species forage for the same prey, namely sandeels. There is thus the potential for a high degree of competition between the species. To investigate the spatial overlap between the species, we monitored the foraging behaviour of four seabird species: the Atlantic puffin, *Fratercula arctica*; the European shag *Phalacrocorax aristotelis*; black-legged kittiwakes *Rissa tridactyla* and Arctic terns *Sterna paradisaea*. While there was overlap between the maximum and minimum foraging ranges of the different species, there was distinct separation between their main foraging areas. For example, Kittiwakes foraged furthest afield (up to 112 km) but with most of their foraging taking place between 20-60 km from the colony. Puffins, on the other hand, while they foraged up to 65 km from the islands, and thus overlapped with the kittiwakes, undertook most of their foraging within 20 km of the islands. This was also the case for the European shags and the Arctic terns and, as such, each of the four species had distinct separate foraging areas, which reduces direct competition between the species.

PD-51

The eyes have it: A new concept tag for assessing gaze direction in people

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Humans have vision as their primary sensory system so if there were a way to determine how people direct their gaze, we could allude to the behavioural rules behind the way people inform themselves about their environment. We present a new concept for a tag that is attached to a hat or similar in people moving freely outdoors (the Human-interfaced personal observation platform – HIPOP). This device uses magnetometry and acceleration data to determine the direction of the head and, after calibration in situ, has been shown to identify head orientation (heading and pitch) accurately so that, even accounting for the movability of eyes in the sockets, there is a 95% confidence limit error cone angle of ca. 8°. The HIPOP provides a suite of previously unmonitored data on head movement such as modal head pitch, head sweep angle, rate of change of head angle and fixation duration and has wide application in issues ranging from the positioning of marketing initiatives to how best to inform people navigating in environments cluttered with information such as cities.

PD-52

Conservation grazing: whither do you wander?

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Using large herbivores to increase plant biodiversity is an increasingly common tool for conservationists; with different species being perceived as having different functions. For example, cattle are deemed to be fairly indiscriminate and wide-roaming in their grazing (beneficial), while others such as goats are much more selective (detrimental). However, our studies to determine the benefits of conservation grazing have been inconclusive. GPS collars (loggers or transmitters) were used to determine the movements of cattle and wild goats and to link these movements to changes in the plant diversity in the areas. The results showed that the cattle grazed only in restricted areas, with large areas that were effectively avoided. The goats on the other hand, roamed much more freely and browsed on a wider range of plant species. Randomised placement of quadrats showed that there was limited impact of the cattle on plant biodiversity. However, if the quadrat placements were stratified relative to cattle grazing pressure then there was a significant link between the presence of the cattle and increased biodiversity. The overall conclusion is that, while large herbivores can influence biodiversity in a positive way, the animals need to be managed to make their impact most effective.