TITLE: Polar bears: Breath analyses

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DATA SET OVERVIEW:
To establish whether polar bears that follow the pack ice north of the continental shelf experience food deprivation, and to estimate their ability for prolonged adaptive fasting and skeletal muscle protein and strength retention in comparison with land-bound bears, our goal was to sample individuals at the beginning of the ice-retreat period in the summer, and shortly before annual ice is re-formed. In the Beaufort Sea, the ice-retreat period extends from late-June to mid-July and new ice forms from mid to late-October.

This dataset contains stable carbon isotope and respirometry exchange ratio (RER) data for individual polar bears captured via helicopter darting using standard animal immobilization techniques (details in Durner et al. 2011).

During our research efforts from August 2008 to May 2010, a total of 110 polar bears were captured and sampled and 29 were recaptured on shore and on the sea ice. Spring captures occurred on the ice between Point Lonely and the US Canadian border within 160 km of shore. Summer captures occurred in the same area on shore. Fall captures occurred in the same area on shore, and on the sea ice from the Alaskan coast to 80°N and from north of Wrangell Island, Russia, to Banks Island, Canada. Ice captures were conducted from the USCG *Polar Sea*.

Project information and updates can be found at www.uwyo.edu/polarbear

INSTRUMENT DESCRIPTION:
Oxygen consumed and exhaled CO_2, used to calculate RER (O_2/CO_2), were measured with a Sable Systems FoxBox. The FoxBox is a field portable oxygen analyzer that includes a pump and mass flow meter (range 20 - 2000 ml/minute). For instrument specification see http://www.sablesys.com/products-prod_respsys.html?sub=specs.

DATA COLLECTION and PROCESSING:
From a subsample of polar bears, exhaled breath was collected through a one-way valve connected to a 25-liter Douglas bag (Harvard Apparatus, Holliston, Massachusetts; Whiteman et al. 2012). A sub-sample of 30 ml exhaled breath was collected into two evacuated vials containing magnesium perchlorate and cotton for analysis of stable carbon isotopes. The remaining breath was drawn through the FoxBox at 200 ml/min and percent O_2 and CO_2 were measured every two seconds for ≥ 5 minutes. Measurements were corrected for drift following standard protocols and RER was calculated using equations provided by Sable Systems (Whiteman et al. 2012). Values below 0.7 indicate lipid catabolism, between 0.7 and 0.9 use of protein, and above 0.9 reliance on carbohydrates.
    Breath vials were sampled via an autosampler (PAL, LEAP Technologies, Carrboro, North Carolina) linked to a gas bench (Thermo Finnigan GasBench II, Thermo Electron Corp, Waltham, Massachusetts) interfaced with a continuous flow mass spectrophotometer (Thermo Finnigan Delta^{PLUS} XP Continuous Flow Stable Isotope Ratio Mass Spectrometer, Thermo Electron Corp., Waltham, Massachusetts). Gas standards used for analysis contained CO_2 of known $\delta^{13}C$ values, which included two normalizers (-10.12‰ and -25.36‰) and one standard check (-10.96‰). For more detail see Whiteman et al. (2012).

DATA FORMAT:
Data file structure: Microsoft Office Excel (.xlsx), Comma delimited ASCII (.csv)

Data format and layout: Each variable is listed in a separate file. Headers provide variable names and units of measurements. To obtain data from multiple files select from the appropriate list.

List of parameters: Breath δ^{13}C, Breath RER.

Description of flags: For data protected under the threatened species status code is "UTSS".

Data version 1.0 date 01/12/13

DATA REMARKS:
To view and manipulate data use Microsoft Excel.

REFERENCES:
Durner, G. M., J P. Whiteman, H. J. Harlow, S. C. Amstrup, E. V. Regehr, and M. Ben-David. 2011. Consequences of long-distance swimming and travel over deep-water pack ice for a female polar bear during a year of extreme sea ice retreat. Polar Biology 34: 975-984.

Whiteman, J. P., K. A. Greller, H. Harlow, L. Felicetti, and M. Ben-David. 2012. Carbon isotopes in exhaled breath track metabolic substrates in brown bears (*Ursus arctos*). Journal of Mammalogy 93: 413-421.