Bornemann, Horst (2003) Dive, intermandibular angle (DIMA) - Description of parameter, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, hdl:10013/epic.26926.d001

Parameter

Dive, intermandibular angle [deg] *Abbreviation: DIMA* *Parameter no: 52560*

The intermandibular angle signifies the degree to which beaks or jaws of penguins or seals respectively or other vertebrates are opened. Data collected using IMASEN (Intermandibular Angle Sensor) data loggers manufactured by Driesen und Kern GmbH, Bad Bramstedt, Germany, follow this parameter configuration. The IMASEN is based on a Hall sensor, perceiving magnetic field strength from a rare-earth magnet. Magnetic field strength, decreasing with increasing distance from the magnet, can therefore be used to record changes in jaw-opening angle when the sensor and magnet are attached to the upper and lower jaw, respectively. The IMASEN includes a single channel logger with 8 MB flash RAM, 16 bit resolution housed in a titanium cylinder (140 x 20 mm) with a cable exiting at one end via an O-ring seal. The cylinder is filled with silicon oil to negate problems with hydrostatic pressure on air spaces via a special, O-ring-sealed opening. The Hall sensor (6 x 3 x 2 mm, KSY 10, Siemens GmbH, Germany) is coated in resin and connected to the logger by a 4-strand cable. The Hall sensor produced an output proportional to magnetic field strength intensity so that the proximity of a magnet can be well defined. A slightly-bent neodinium boron magnet (30 x 25 x 3 mm, Vacuumschmelze GmbH and Co, Hanau, Germany) is placed under the seal's lower jaw, behind the mandibular symphysis while the Hall sensor is placed on top of the upper mandible, behind the nose so that, after suitable calibration, jaw angle can be determined to allow examination of feeding behaviour. The accuracy of the system depends critically on the placement of the magnet with respect to the sensor, but resolution of seal jaw angle to within 3 degrees is typical. The IMASEN has to record at a minimum frequency of 5 Hz in order to be able to resolve prey ingestion events, leading to a maximum operational life time of its logging unit of 9.3 days.

As the IMASEN provides data on the intermandibular angle only, this information has to be interpreted in tandem with other data such as *Dive, Intermandibular angle [52560]*, *Dive, time depth profile [51217]* or swim velocity etc., providing the context for interpretation. These context data are registered by additional data loggers.

It is imperative to read the "Further details" section of each event label prior to data retrieval and analyses. The section summarizes the hardware configuration and the user-defined settings upon deployment. For technical specifications on hard- or software configurations of the different bio-logging units you have to consult the respective manufacturers.