time scales of the reaction lifetimes in the photolyses processes of HbCO, two kinds of piezoelectric transducers, a PVDF film and a PZT ceramic, are used as acoustic signal detectors. For evaluating the relative enthalpy change and the relative conformational volume change in the process, the quantum yield of the photolysis must be taken into account, which has been measured by pump-probe technique. The results show that the enthalpy and conformational volume changes of bar-headed goose are obviously smaller than that of its lowland relatives and human. Some analyses and discussions on the differences of the amino acid sequences of Hb, the tetramer structures, as well as the salt bridges between subunits of Hb and HbCO among them are presented.

3:20

4pAB5. Design of a home-made, low-cost system for studies of vibratory courtship signals on *Pardosa Sierra* (Areneae: Lycosidae) spiders. Eduardo Romero-Vivas, Emiliano Méndez Salinas, María Luisa Jiménez Jiménez, and Francisco Javier García De León (Centro de Investigaciones Biológicas del Noroeste, S.C., Mar Bermejo 195 Col. Playa Palo de Santa Rita, La Paz, BCS, 23090, México, evivas@cibnor.mx)

Spiders possess peculiarities that make them attractive for the study of evolutionary phenomena such as adaptation and specialization. Among these processes, reproductive behavior (particularly courtship) is a main factor, allowing or preventing recognition between potential partners. Spiders sense their environment and communicate using chemical, visual and acoustical/vibrational signals. The study of the nature, variation and content of these signals, provides useful information to understand the role of communication in the formation of species. Vibrational signals excel in importance in the majority of spider families and have been previously studied, especially in leaf-living spiders, using non-contact laser Doppler vibrometers or accelerometers (adding extra mass to the system) coupled to charge amplifiers. Unfortunately, cost and availability of this equipment have limited the widespread of studies in this area. This paper describes how to build an alternative low-cost system for the study of vibrational signals on spiders, and presents the analysis of the acquired vibratory courtship signals of Pardosa sierra, a rocky substrate-dwelling lycosid spider.

3:40

4pAB6. Intraspecific variation in vocal repertoire among dugong populations. Kotaro Ichikawa (Research Institute for Humanity and Nature, 603-8047, Kyoto, Japan, ichikawa.kotaro.dugong@gmail.com), Tomonari Akamatsu (National Research Institute of Fisheries Engineering, 314-0408 Ibaraki, Japan), Kanjana Adulyanukosol (Phuket Marine Biological Center, 83000, Phuket, Thailand), Giovanni Damiani, Janet Lanyon (University of Queensland, St Lucia, Queensland, 4072, Australia), and Hiroshi Nawata (Research Institute for Humanity and Nature, 603-8047, Kyoto, Japan)

Previous studies have demonstrated that vocal signals facilitate acoustic communication of dugongs. We recorded wild dugong calls from around Talibong Island, Thailand (n = 586) and in Moreton Bay, Australia (n = 331). We also recorded vocalizations of a newborn calf (n = 315) kept at Phuket Marine Biological Center, Thailand, a 19 year old female (n = 73) at Toba Aquarium, Japan, and a 7 year old female (n = 203) at Underwater World, Singapore. Dominant frequency, duration and coefficient of frequency modulation were compared across populations and age. Statistical differences were found for almost all pairwise comparisons ($p < 0.05$) except between the captive dugongs kept in Japan and also between wild dugongs in Thailand and in Australia. A negative correlation was found between variance of the dominant frequency and dugong age, and a positive correlation was found between variance of the duration and age. The average dominant frequency of wild dugong calls collected in Thailand and in Australia were 5205.4 and 5760.2 Hz, respectively. These acoustic characteristics ranged between those of the 7 and 19 year old female. Our results suggest that dugongs change their vocal repertoire as they grow.

4:00–4:20 Break

4:20

4pAB7. Analysis of passive acoustic recordings made during a three month survey of cetaceans off the Northern Mariana Islands in the western North Pacific. Thomas Norris (Bio-Waves Inc., thomas.f.norris@bio-waves.net)

Passive acoustic monitoring using was used to complement a line-transect survey of marine mammals for a large (~580,000 km2) study site centered on the Northern Mariana Islands in the western North Pacific. A two-element towed hydrophone array was used to monitor and record during daylight hours. Sonobuoys were deployed opportunistically on sightings and areas of interest. Extremely poor sighting conditions hindered visual efforts but not the passive acoustics effort. Over 70 days of survey effort was completed from mid-January to April, 2007. Approximately 220 'unique acoustic detections' were made, of which 155 (70%) were preliminarily identified to 14 different species. The most frequent whale detected was the sperm whale (65), followed by minke whales (30) and humpback whales (12), respectively. The first recordings of calls from Sei whales in this region are characterized. Post-processing of minke and sperm whales recordings resulted in approximately 30 and over 70 localizations, respectively. We present the first acoustic-based estimates for minke whales abundance in this region. Numerous unidentified odontocete whistles were analyzed using ROCCA, a semi-automated whistle classification program, with promising results. We provide recommendations for additional analyses and improvements to methods of collecting and post-processing passive acoustic data on marine mammals.

Invited Paper

4:40

4pAB8. The Lombard effect in humpback whales. Michael Noad, Rebecca Dunlop (University of Queensland, Gatton, Qld 4343, Australia, mnoad@uq.edu.au), and Douglas Cato (Defence Science & Technology Organisation, Eveleigh, NSW 1430, Australia, and Univeristy of Sydney, NSW 2006, Australia)

The Lombard reflex is an increase in the subject's vocal levels in response to increased noise levels. While it has been demonstrated in humans and a small number of mammals and birds including some whales, it has not been demonstrated in humpback whales. During their southward migration off eastern Australia humpback whales were tracked visually from an elevated land station. An array of calibrated hydrophone buoys was used to simultaneously track vocalizing whales acoustically and to measure ambient noise. Two hundred and ninety two social vocalizations were recorded and analysed from 15 passing groups of whales when there was no detectable boat noise or singing whales in the area. Vocalization source levels increased significantly by a mean of 0.75dB per 1dB increase in background noise (broadband 40Hz – 2kHz). Unlike most previous Lombard studies, however, the vocal level increased even though the background noise was much lower than the vocal level. Thus the whales maintained a signal excess of approximately 75dB which suggests that these social vocalizations may function as signals over distances of several kilometres.