Spatiotemporal distribution of Taiwan cetacean stranding

Ming-Wen Huang, Lien-Siang Chou, Pei-Fen Lee
Institute of Ecology and Evolutionary Biology, National Taiwan University

Study object
- Understanding spatiotemporal distribution of cetacean stranding events in Taiwan
- Studying the relationship between stranding events and natural environment.

Stranding definition
- Stranded cetacean is defined narrowly as having run aground and in a helpless position.
- If a cetacean gets lost in a harbor or river, it would strand potentially. In these case, therefore, it can be defined broadly as stranded.
- In this study, broad definition is accepted.

Methods
Data collection (from Dr. Chou’s Lab, NTU, and Taiwan cetacean society from Jan. 1994 to Mar. 2005)
Factors coding (• A whole year is separated into northeast and southwest monsoon period. • Taiwan coast is separated into 10 coastal categories.)
Analysis (stranding vs. factors [1. cold front, 2. typhoon, 3. lunar cycle, 4. ocean current])

Results
- 268 stranding events, 179 events occurred during northeast monsoon season, including 4 events in 2005, and 89 events occurred during southwest monsoon season (fig. 1, fig. 2).
- Stranding rate is higher in northeast monsoon season than in southwest monsoon season ($p<0.05$).
- In northeast monsoon season, dead stranding rate is higher than live stranding ($p<0.01$), and no difference between these two stranding types in southwest monsoon season ($p>0.05$) (fig. 3).
- 51 stranding events, 1/3 of all the events in northeast monsoon season, are recorded during and after the cold front (fig. 4).
- In southwest monsoon season, 31 stranding events, including 18 live strandings, are recorded during and after typhoon strike (fig. 5).
- There is no significant trend in comparison with stranding events and lunar cycle ($p>0.05$) (fig. 6, fig. 7).
- Stranding rate between the coast of Toucheng and Bei-Fang-ao is higher than other coastal types (fig. 8, 9, 10, 11 and fig. 12).

Conclusion
- Higher stranding rate in northeast monsoon season may be caused by ocean current and weather factors. The sea surface temperature decreases during and after the cold front and this may cause weakness or death of unhealthy cetaceans.
- Monstrous waves during typhoon strike may cause cetacean straying from its original group. In addition, decreasing ocean surface temperature may cause weakness or death of those unhealthier individuals.
- No significant trend in comparison with stranding events and lunar cycle.
- Mutual effects among cetacean population distribution, wind direction and ocean current are the causes of unequal distribution of stranding site in northeast monsoon season.