

CONSTRUCTING TRAVEL ROUTES FROM GPS DATA COLLECTED DURING FOCAL ANIMAL FOLLOWS OF JAPANESE MACAQUES IN YAKUSHIMA, JAPAN

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GPS has become standard equipment among primatologists for recording positions while carrying out field research, presenting new opportunities and challenges for behavioral GIS analysis. We analyzed GPS data collected during field research in the Yakushima study site of Japanese macaques (*Macaca fuscata yakui*) to assess the precision of GPS fixes during focal animal follows, and to develop techniques for linking GPS fixes to behavioral data and collating GPS data to construct travel routes. GPS fix quality was assessed using DOP, satellites in view, and fix variability when stationary or between successive locations. A GPS fix is strongly affected by physical conditions at the particular location of each fix, which changes constantly during field research, especially in the mountainous and heavily forested Yakushima study site. GPS fix success and quality varied among GPS devices when using multiple devices simultaneously. GPS fix quality varied in different parts of the study site and at different periods during focal animal follows but the variability could be controlled using filtering, averaging, and smoothing techniques. The GPS fixes were linked to behavioral data to map the behavior of focal follow animals and measure travel distances. Distance measures differed according to the scale at which routes were constructed. Routes tended to be shorter when constructed with points collated at larger time or space intervals or at major stop locations of the focal animal. Routes were longer when constructed from points including minor stop locations of the focal animal, or points close to the original GPS data.

Keywords: GPS, GIS, Yakushima, travel route