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INTRODUCTION

The Strait of Messina is the most important migratory bottle-neck along the Central Mediterranean flyway. During spring and autumn 2015-2017 we have been counting migrating raptors from two watch points, located on the continental side of the Strait and in the north-eastern Sicily. The visual observations were integrated with radar tracking.

During migration soaring birds select areas where they can successfully use atmospheric uplifts to gain altitude and reducing the amount of energy used for flapping flight. In this study we analyzed radar data collected on the Calabrian side of the Strait of Messina during the springs with the aim to identify environmental characteristics of the locations in which migrating birds of prey (especially Honey buzzard and *Circus* sp.) soar in order to predict suitable areas for the formation of thermals.

METHODS AND ANALYSIS

We used 3 different study areas:

- AS 1: SPA Costa Viola IT9350300 (Calabria)
- AS 2: Reggio Calabria district (urban area not included)
- AS 3: SPA Monti Peloritani ITA030042 (Sicily), which included also AS 2

The static components of the landscape were measured at two spatial scales, i.e. 20 m and 50 m. They were characterized in terms of elevation, terrain unevenness (calculated as Topographic Position Index), slopes, aspect, land cover (by the Enhanced Vegetation Index, EVI) and land use (by the CORINE Land Cover - CLC 2018). All these environmental layers were included as predictors in our statistical models after verifying the absence of multicollinearity, with the aim to set a distribution model (SDM, Species Distribution Model) to be applied along the whole migration front at the Strait. To estimate probability of uplifts occurrence, presence-absence data were analyzed with binary logistic regression, using the multi-model inference and the information theoretic approach. We compared the performances of the model based on the variance explained and the AIC (Aikake Information Criterion).

RESULTS AND DISCUSSION

The models with the lowest AIC value showed that altitude, woodlands and EVI were significant terms explaining the uplifts occurrence. The AUC of these models were 0.96 (AS1 50 m), 0.97 (AS2 20 m) and 0.98 (AS3 20 m) respectively, thus the accuracy of the models was excellent. Our results showed that uplifts formation usually occur between 700 and 800 meters and in areas of natural vegetation. Other landscape variables were found not to be important. According to other studies, we found that topography is important in determining the occurrence of soaring flight and that thermal soaring occurs in these areas which are likely to have good thermal uplift availability.

Study area	Alt	Alt ²	EVI	Woodlands	Orographic Uplift	AIC	AUC	D ²
AS1 20 m	3.206 ± 0.30	-3.687 ± 0.35		1.188 ± 0.17		687.2	0.93	54.9%
AS2 20 m			3.018 ± 0.42	2.476 ± 0.22	-4.303 ± 0.46	348.2	0.97	77.4%
AS3 20 m			3.586 ± 0.56	2.436 ± 0.22	-4.315 ± 0.46	299.9	0.98	80.6%
AS1 50 m	2.772 ± 0.35	-2.411 ± 0.40	3.024 ± 0.33	1.044 ± 0.19		518.7	0.96	66.3%
AS2 50 m	2.945 ± 0.40	-3.858 ± 0.44	4.451 ± 0.45	1.022 ± 0.20		360.1	0.98	76.8%
AS3 50 m	4.183 ± 0.48	-3.699 ± 0.42	3.788 ± 0.38	1.453 ± 0.20		347.3	0.98	77.5%

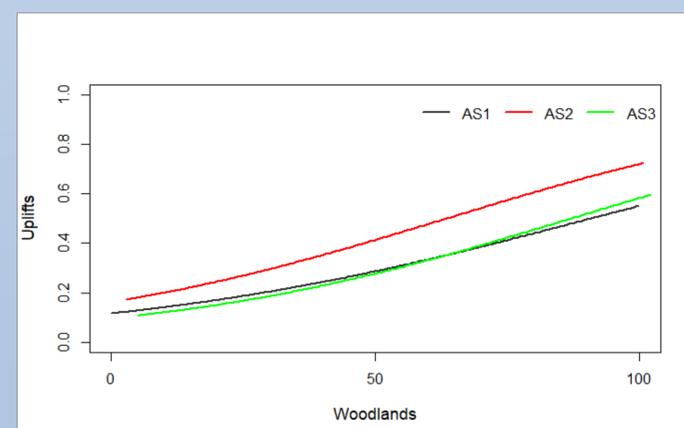
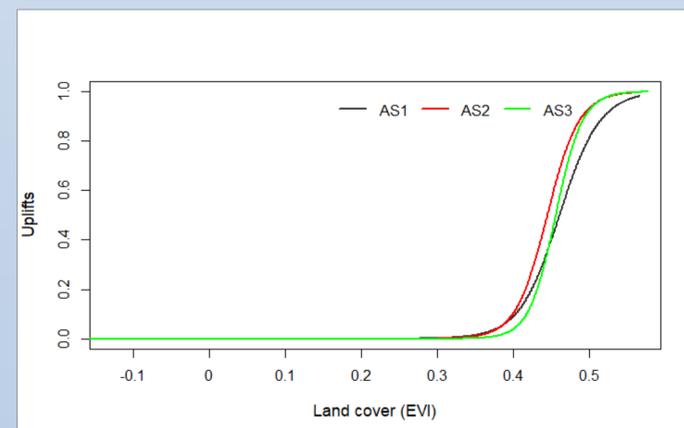
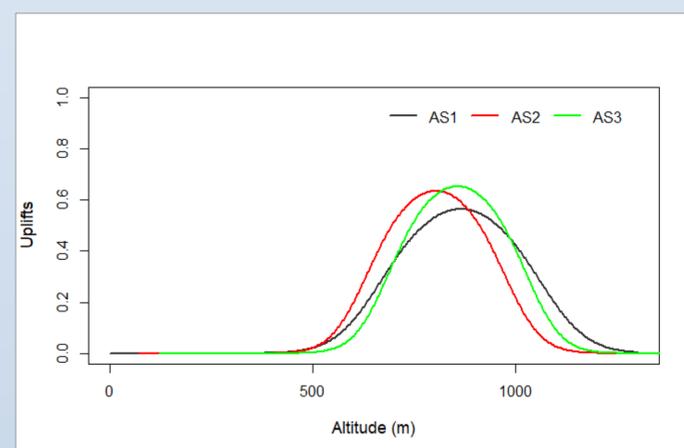
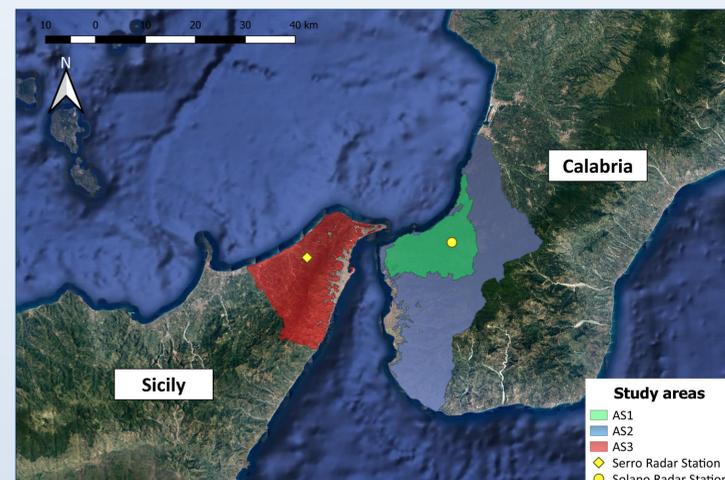
CONCLUSIONS

Studies about landscape use and environmental factors that influence raptor flight can help us to predict and mitigate effects of anthropogenic developments that can represent a risk of bird mortality. A prediction of the movements in different environmental scenarios, both current and future, may suggest new sites of eventual conservation interest.



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