

# Projection of post-moult area utilization by Humboldt Penguins in south-central Chile

## 1.- Introduction

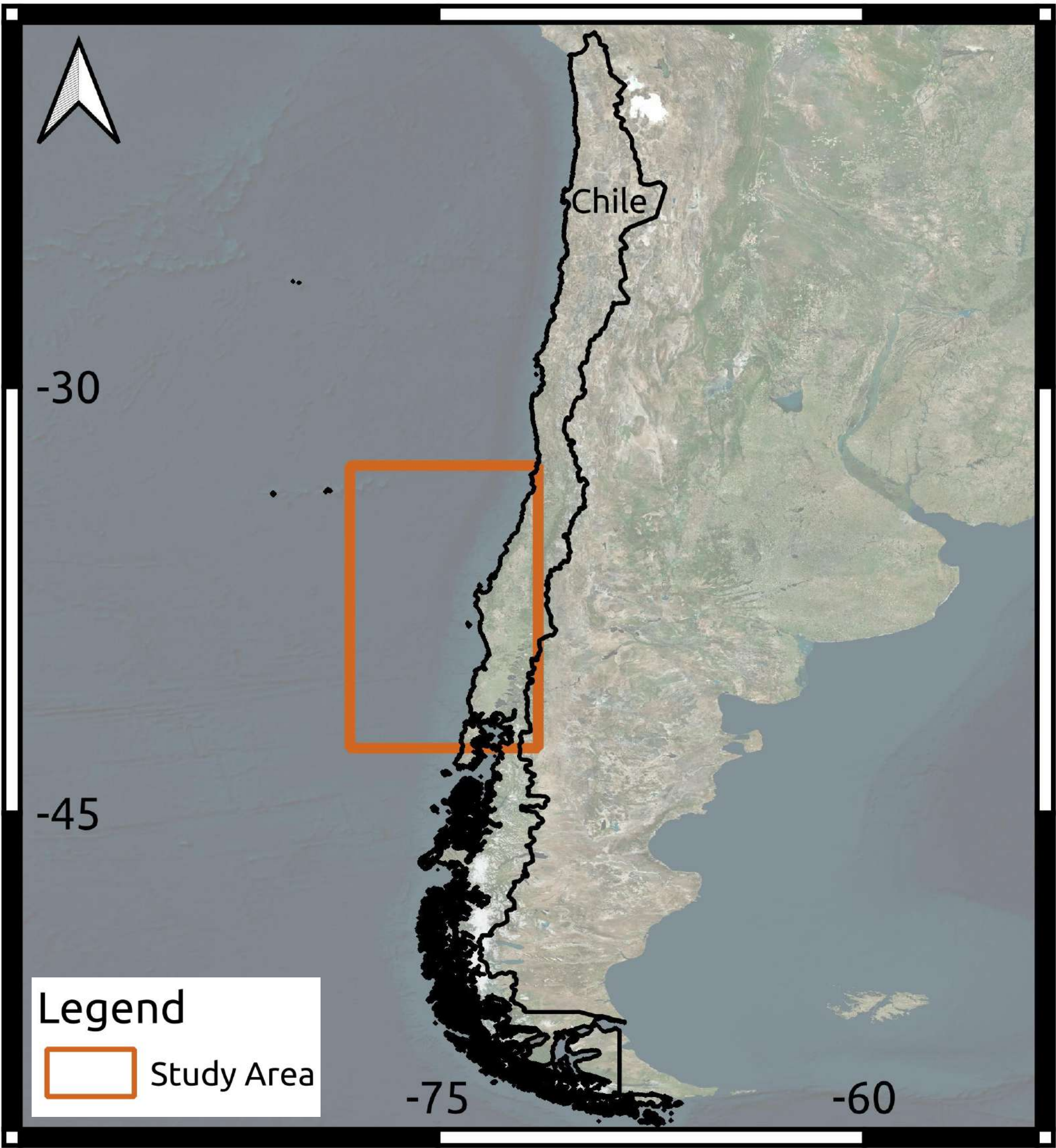
Analyzing the movement of animals is essential to apply the conservation measures implemented to prevent the extinction of species, preserve biodiversity and achieve ecosystem management of living resources[1].

Thus, we have decided to study the post-molting movements of Humboldt penguins in the south-central zone of Chile with data observed between March and May 2009.

## 2.- Methods

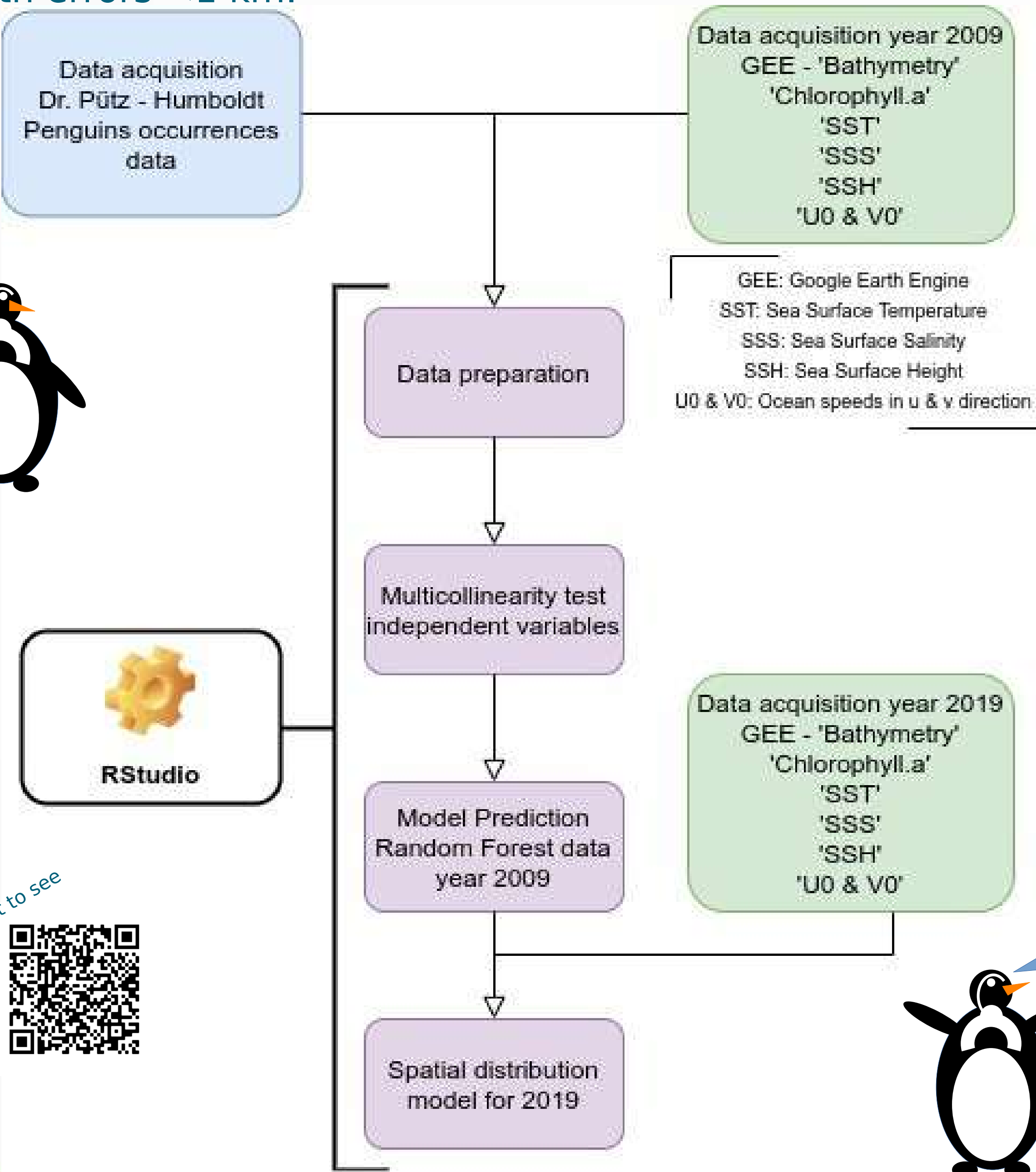
We have used the Random Forest (RF) regression Machine Learning method[2] to predict areas of suitability using the occurrence data and environmental variables[3]. By applying the method, we have generated background data for training and a set of tests, in order to obtain the precisions.

## 3.- Study Area



## 4.- Workflow

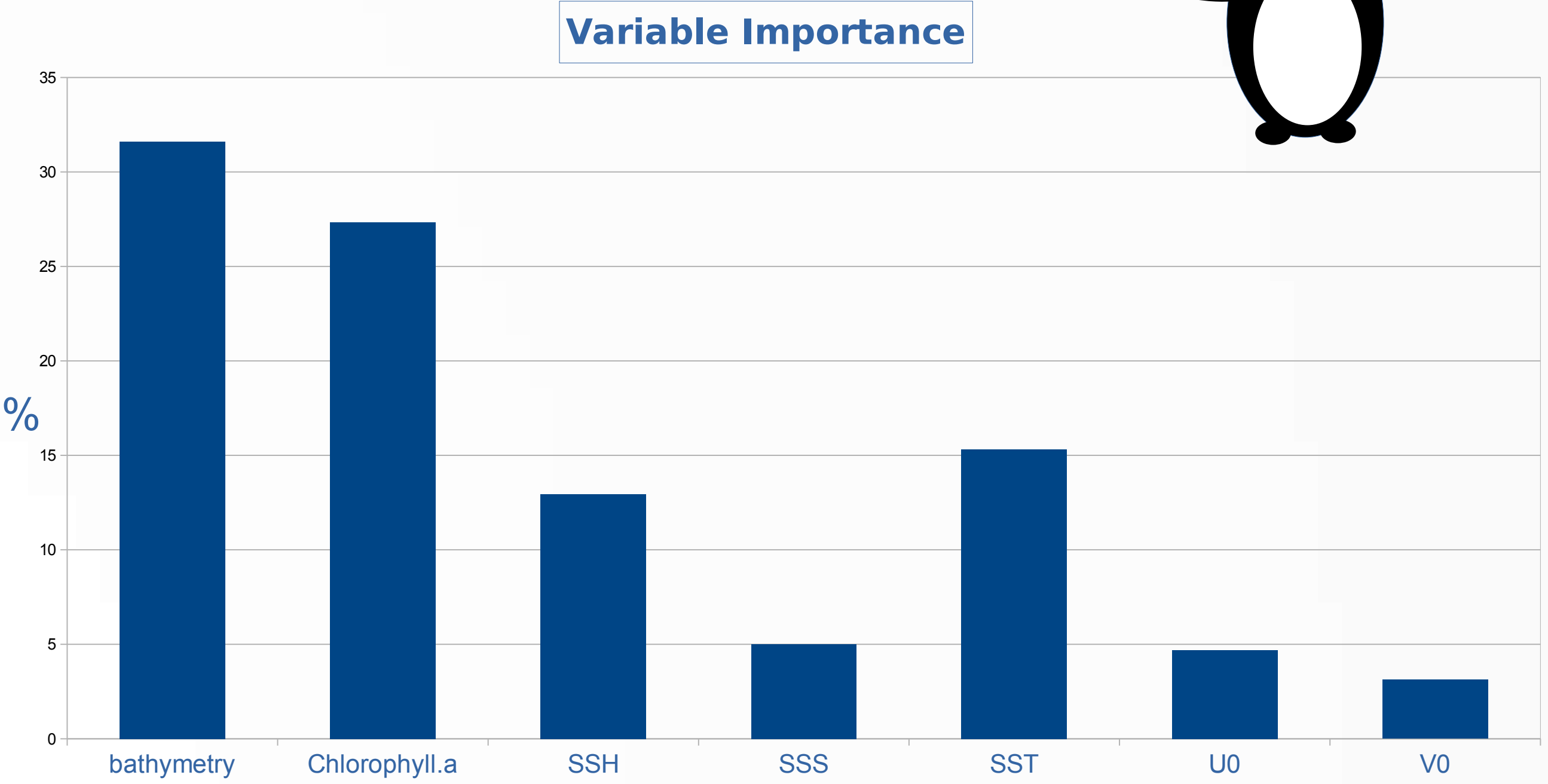
From the total amount of occurrence data collected, we decided to apply a filter on them following the precision of the machine used for data collection, ARGOS[4]. Thus, when considering the precision of the collection data, it was possible to make use of a total of 68% of positions associated with errors <1 km.



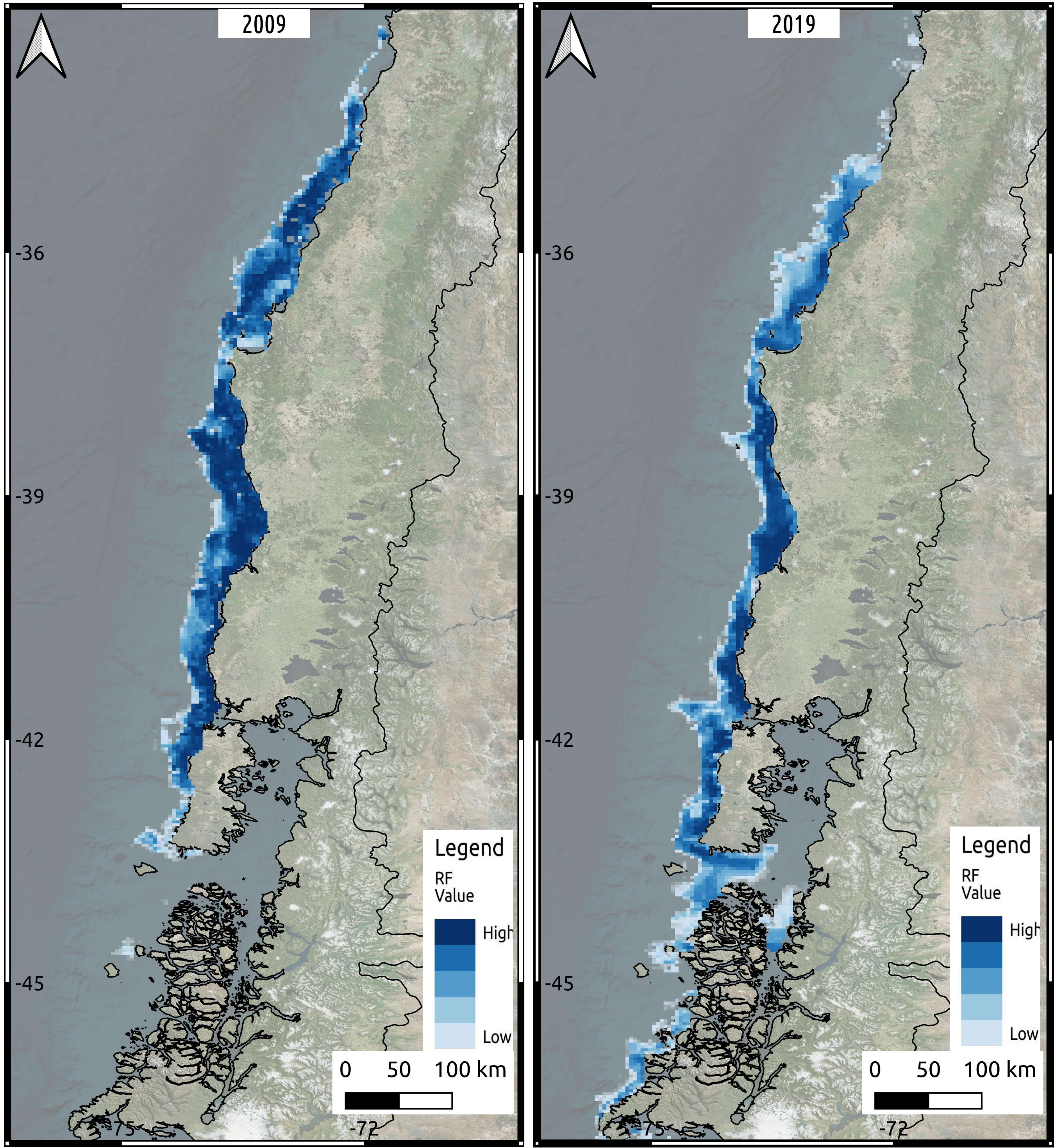
## 5.- Results

The precisions obtained applying the RF regression model were:

Mean of squared residuals: 0.01513539  
% Var explained : 93.53  
N° presences : 245  
N° absences : 145  
AUC : 0.99  
Cor : 0.97



## Comparison of area utilization in 2009 with predictions for 2019



## 6.- Discussion & Conclusion

- More fieldwork need to be done to increase the in-situ data in a higher temporal resolution to generate more **accurate models to predict** and thus be able to improve the conservation effort in the area not only for the Humboldt penguins but also for the other species in the regions.

- Comparing the predictive suitable areas model of 2009 and 2019, we can observe some changes in the suitable areas that are possibly attributed to **climate change**. This could lead to the changing of suitable areas in the future making the conservation effort a great challenge, especially given the few protected areas that exist in Chile[5].

- This type of data modeling provides us with important information in order to create, among others, a more **sustainable economy** using the mobility of species to increase tourism and find an ecological and economic balance worldwide.

## 7.- Acknowledgements

We are especially grateful to all those who contributed to this study, in particular Dr. Klemens Pütz & Dr. Alejandro Simeone who provide the data and many Papers to understand the incredible world of Humboldt Penguins. Many thanks to Jakob Wachter and Marius Witt, whose comments largely improved this Scientific Poster.