








# 1 AISAnalyze: an R-package to correct, interpolate, and 2 extract AIS data

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## Software

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## 7 Summary

8 AISAnalyze is an R-package developed to specifically correct GPS errors in AIS data, linearly  
9 interpolate the vessel positions at the desired times, and extract the locations and information  
10 of vessels around desired locations, at desired times. The advantage of this package is that  
11 the computation time is considerably reduced to perform these operations, enabling results to  
12 be obtained in few minutes to few hours depending on the size of AIS data and the number of  
13 points to extract. Furthermore, this package identifies the vessels from the base stations and  
14 aircrafts in the AIS data, based on the distance and speed travelled, allowing to filter only the  
15 first if desired. It extracts information on vessel length and type as well, by excluding errors  
16 on vessel length and type originally present in the AIS data. First, an all-in-one function was  
17 constructed to analyze, correct, and extract AIS data around desired locations, therefore:

- calculating the distance, time and speed travelled by each vessel;
- identifying base stations and aircrafts in the AIS;
- correcting GPS errors and GPS delays;
- interpolating the vessel positions at the customized times;
- extracting the vessel positions and their information around the desired locations, at the  
23 desired times.

24 However, each function is available individually as well. Second, a further function allows to  
25 linearly interpolate all AIS data at the desired temporal resolution, regardless of the location.  
26 Finally, a last function extracts the length and type of vessel per MMSI (Maritime Mobile  
27 Service Identity), removing the errors present in the AIS data. This information can later be  
28 added to the interpolated/extracted AIS data.

## 29 Statement of need

30 Human activities and their impacts on the ocean and their ecosystem components continue to  
31 increase (Halpern et al., 2008, 2015), and with them the maritime traffic. AIS (Automatic  
32 Identification System) and VMS data (Vessel Monitoring System) are the only sources of  
33 global data on vessel positions in real time to date. Studies on the impacts of maritime traffic  
34 are therefore heavily dependent on these data: however, numerous errors are found, due to  
35 GPS errors, GPS delays, and errors of receptions. This leads to vessel tracks with erroneous  
36 positions, speeds, and information (e.g., wrong vessel length and type). Furthermore, the  
37 huge size of the AIS data makes any overview complex and highly time-consuming. These two  
38 points greatly limit the research possibilities related to vessel tracks and densities including  
39 a wider context. Easy-to-use and fast calculation algorithms are required to fill these gaps

40 and allow the community to use AIS data to carry out these researches. AISanalyze opens up  
41 a wide range of research possibilities, from studying the effects and distribution of maritime  
42 traffic to improving the treatment and shortcomings of AIS data.

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