

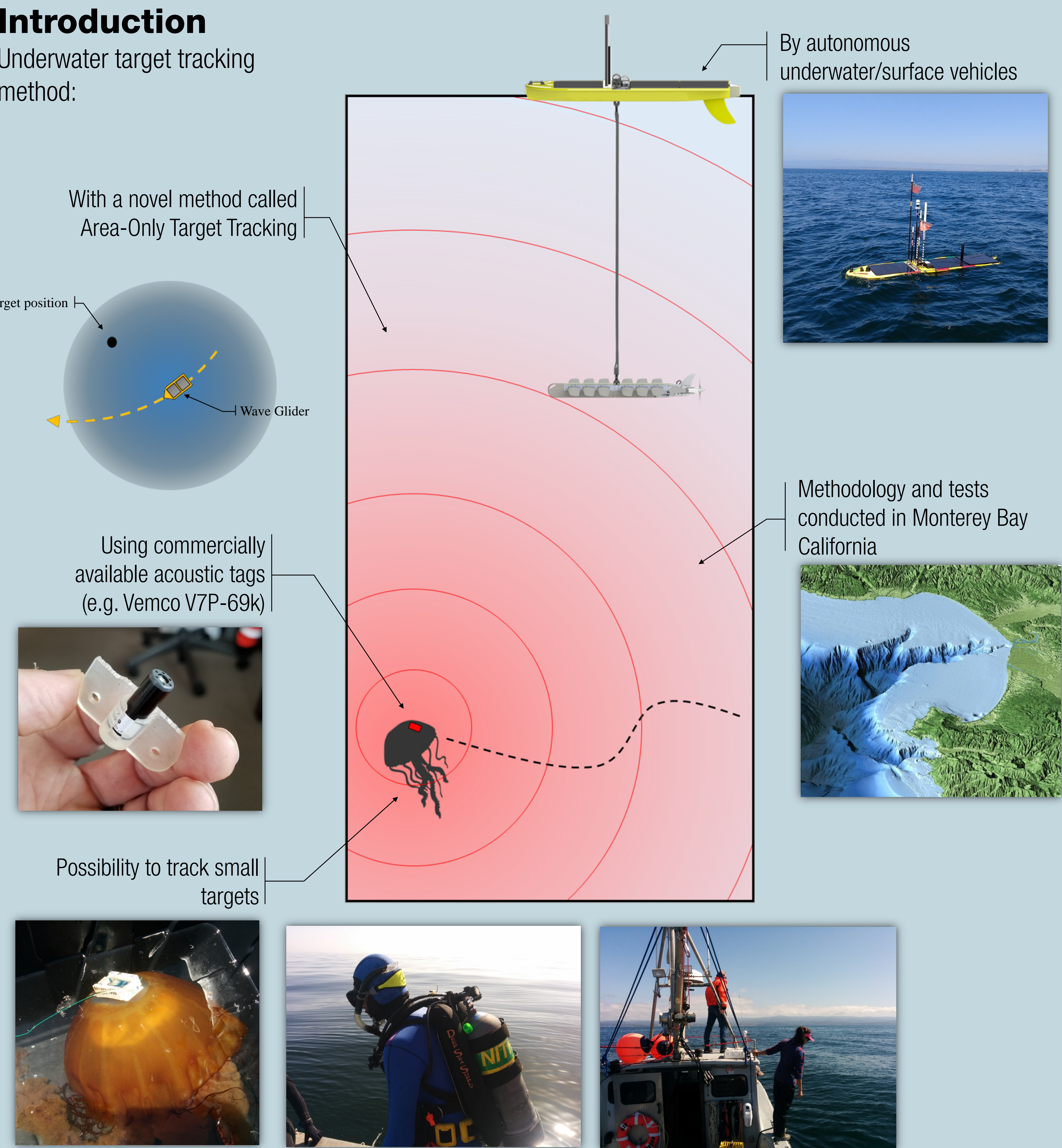
# Area-only method for underwater object tracking using autonomous vehicles

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## Introduction

Underwater target tracking method:

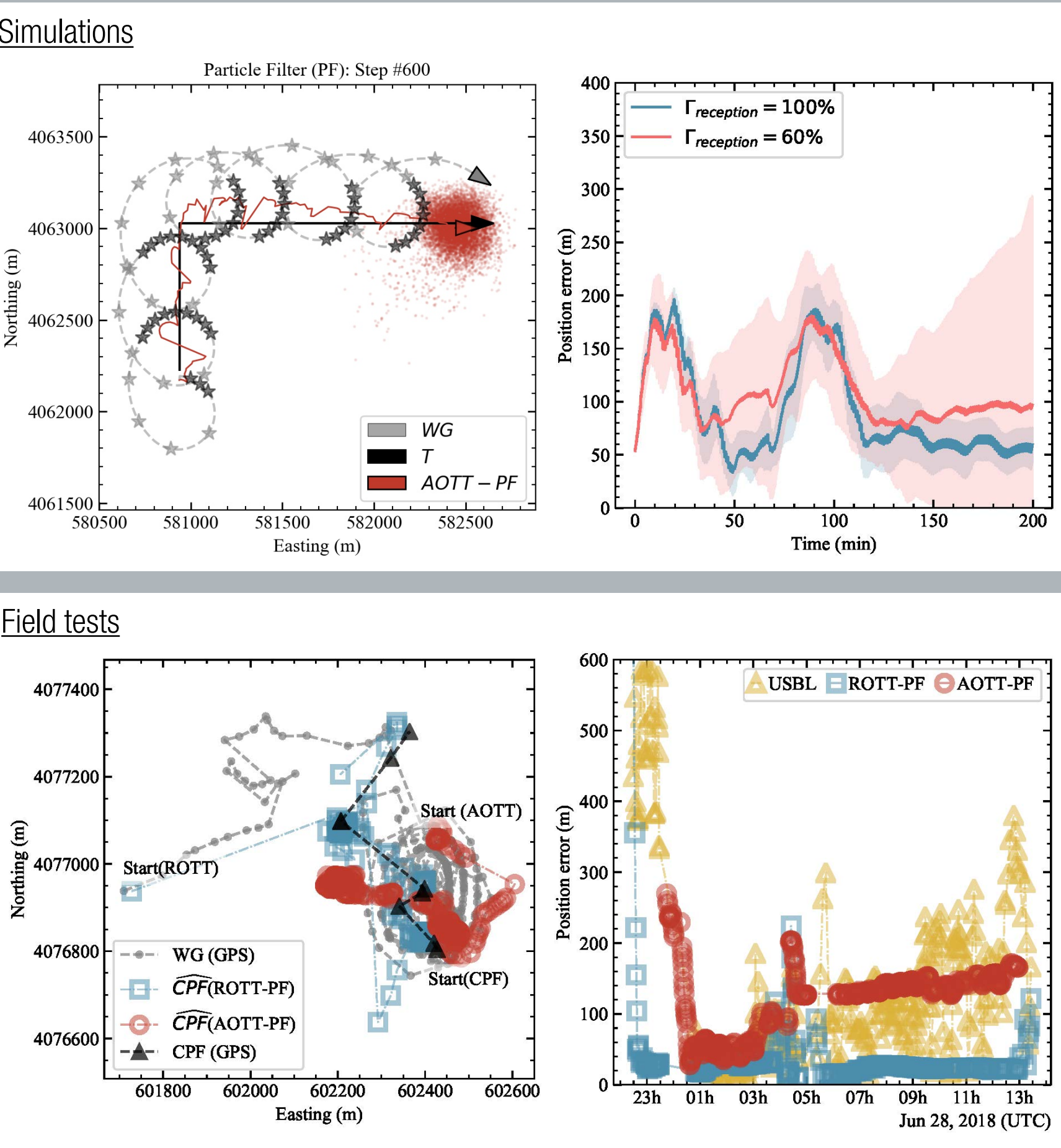


## Conclusions

This work has described the basis of a novel method for target tracking using marine autonomous vehicles, which has been called AOTT. This technique can be used to track tagged marine species that could not be tracked otherwise due to their size.

- ✓ Best practices have been derived
- ✓ Field tests conducted to validate the simulations
- ✓ Comparison between the AOTT's performance among other methods
- ✓ AOTT yields to position error of ~150 m in field tests

## Results



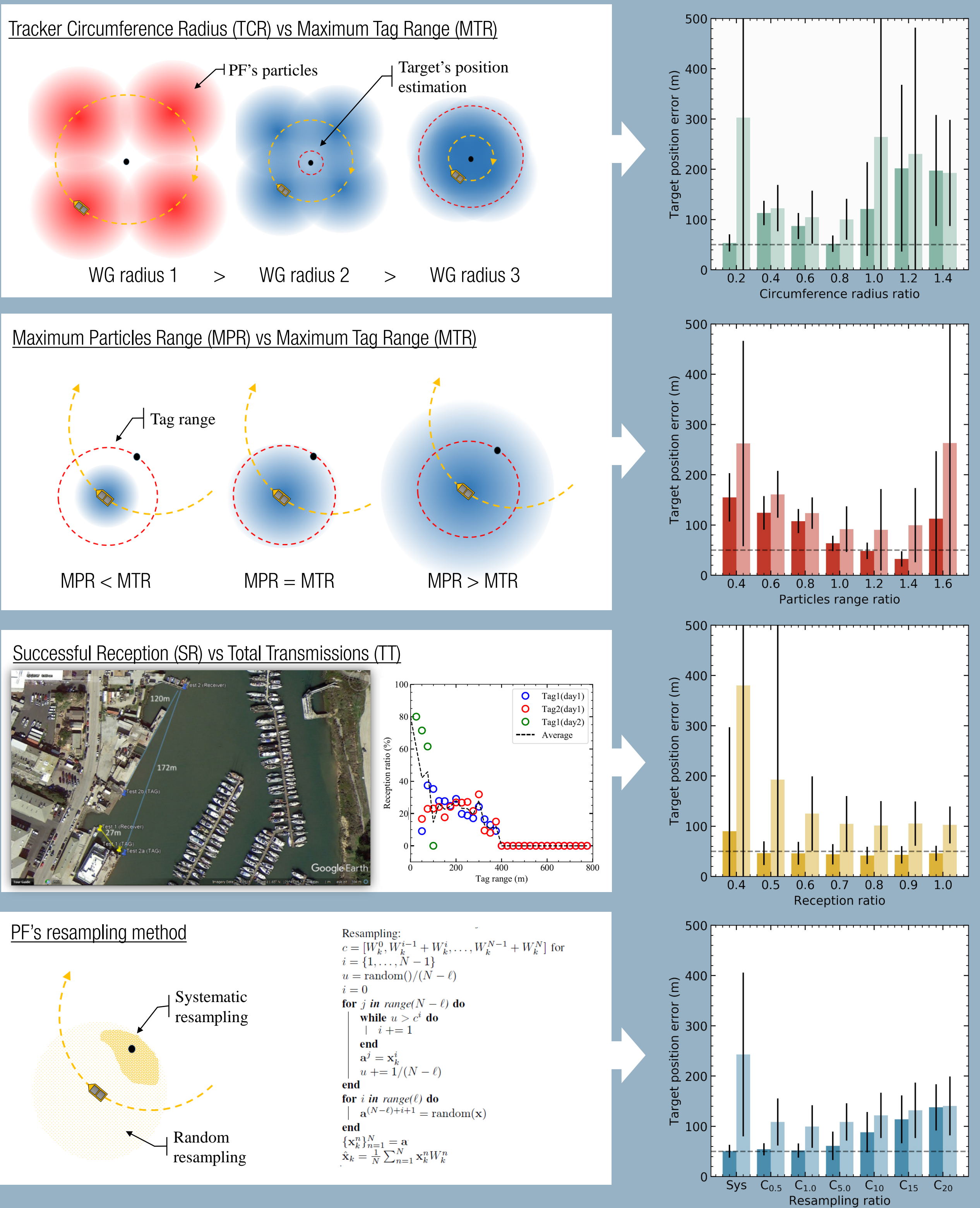
Simulations: x-y map where the tracker (WG), the target (T), and the estimated target position using the PF (AOTT - PF) are presented. Black stars represent tag transmission receptions, whereas grey stars represent a missing tag detection

Field tests: WG and Coastal Profiling Float (CPF) positions, and the estimated CPF position using both the ROTT and the AOTT algorithms

TABLE I: Optimal parameters for AOTT method

	Parameter	Ratio definition	Optimal	Limits
Static and moving targets	Tracker Circumference Radius (TCR)	$\Gamma_{radius} = TCR/MTR$	$\Gamma_{radius} \rightarrow 1$	$0.4MTR \leq TCR < MTR$
	Maximum Particles Range (MPR)	$\Gamma_{range} = MPR/MTR$	$\Gamma_{range} = 1.2$	$0.6MTR < MPR \leq 1.4MTR$
	Successful Reception (SR)	$\Gamma_{reception} = SR/TT$	$\Gamma_{reception} \rightarrow 1$	$SR > 0.5TT$
	Compound resampling particles ( $\ell$ )	$\Gamma_{resampling} = 100/\ell$	$\Gamma_{resampling} = 1.5$	$\ell < 2.5N/100$

## Optimal parameters



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## Area-Only Target Tracking method

The Area-Only Target Tracking (AOTT) method is implemented by using a Particle Filter (PF) algorithm

