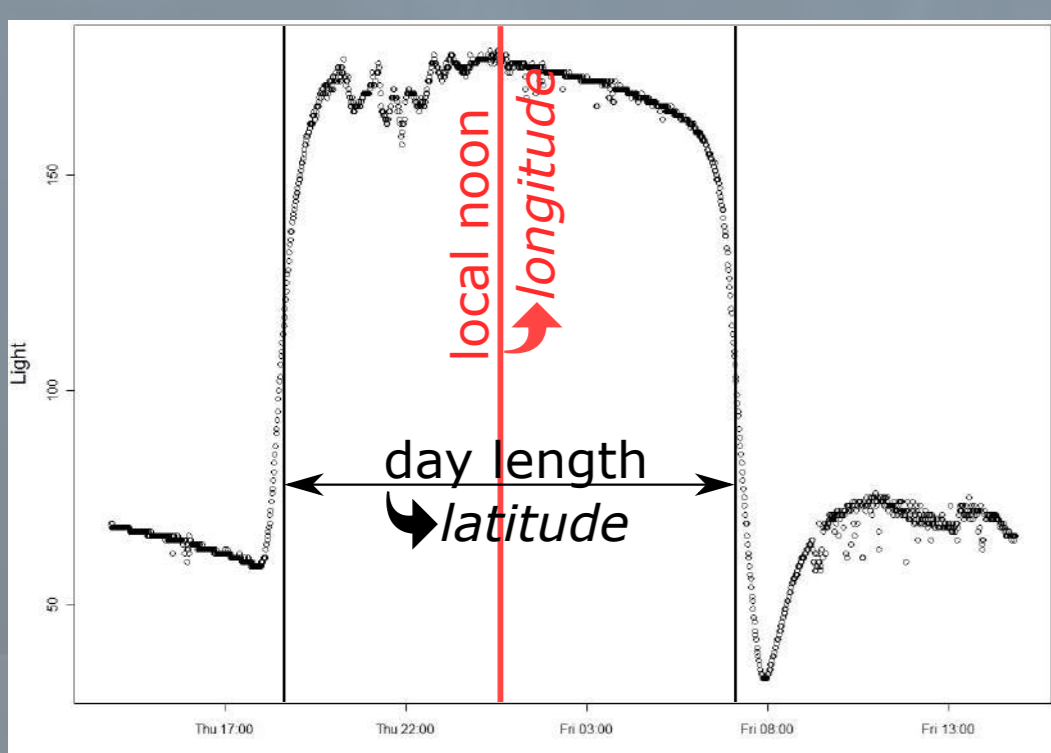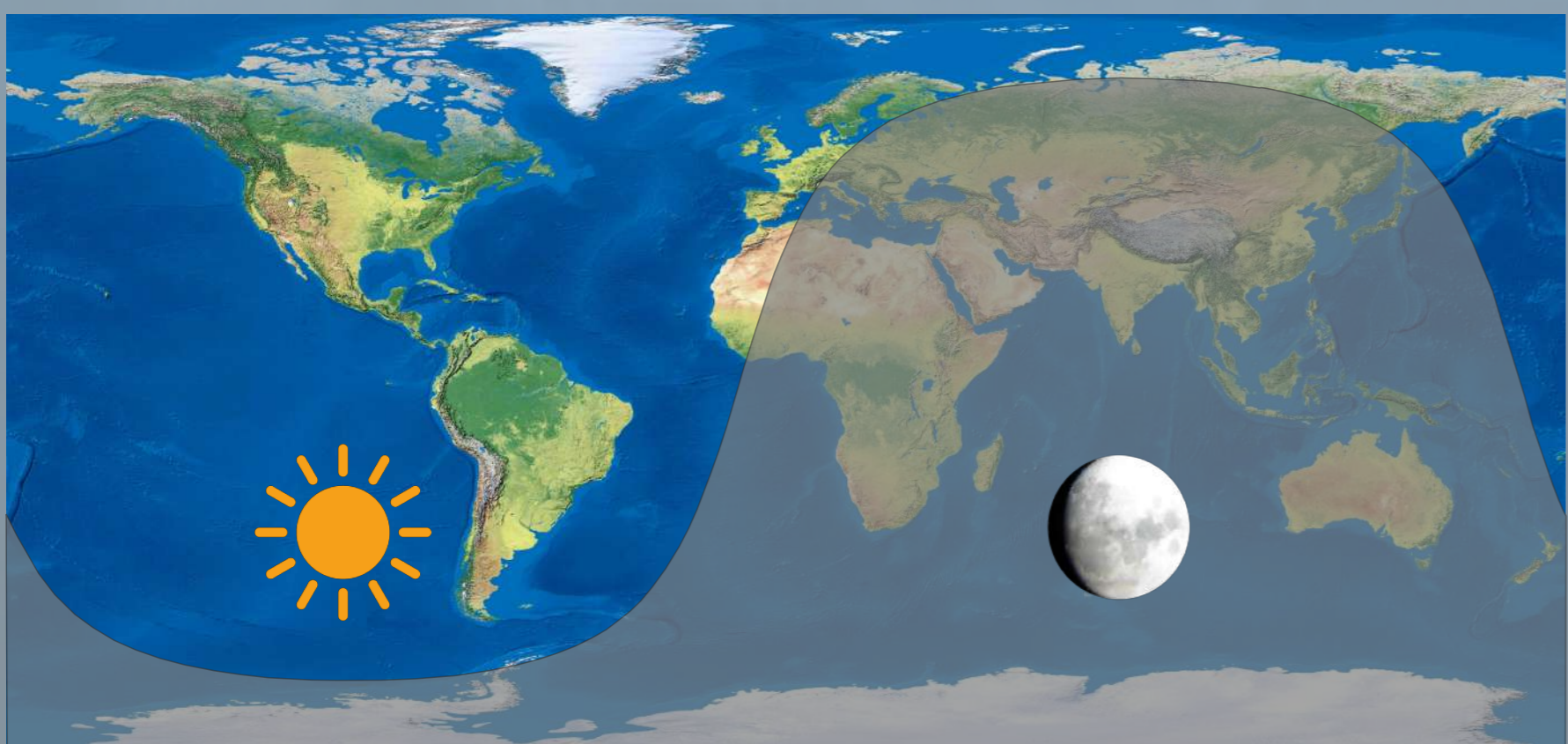# Improving geolocation of tagged animals by including diffuse attenuation coefficient in geolocation algorithms

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How does geolocation work?

- Latitude and longitude computed from local noon and day length

- Sometimes complemented with comparisons with remote-sensed SST

↘ **Large** uncertainties!!

How could we improve geolocation algorithms?

By comparing remote-sensed products with environmental data sensed by geolocation tags.

↘ SST, and diffuse attenuation coefficient that can be computed from light measurements
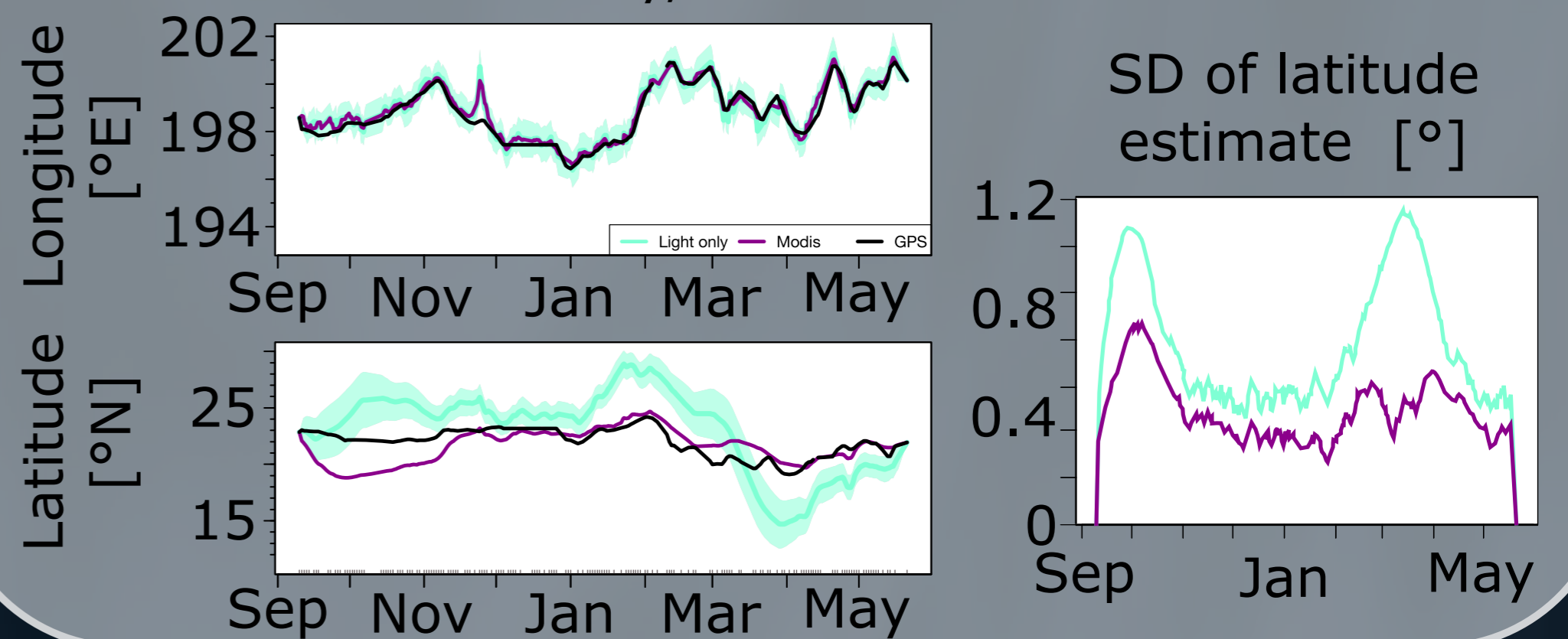
SST [°C]   log(kd) [log(m^{-1})]
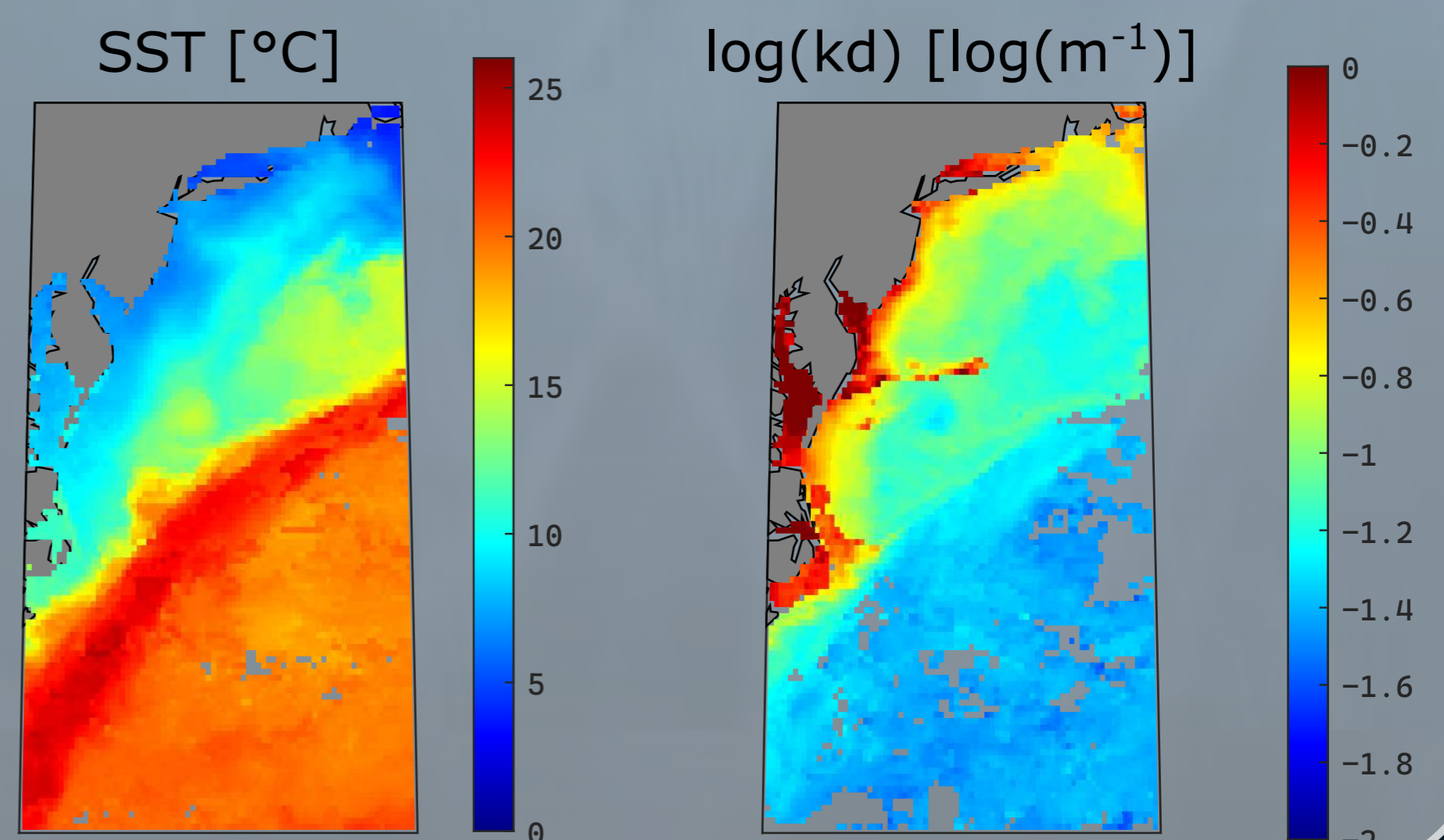
Methods

- Deploy a PSAT attached to a glider to have a true position to compare geolocation estimates to
- Extract satellite products in the region of interest (e.g. VIIRS, MODIS-AQUA,...)
- Use and extend the R package TrackIt (based on an unscented Kalman filter, Lam et al. 2010) that geolocates organisms based on light and SST only

Lam C.H., Nielsen A., Sibert J.R. (2010) Incorporating sea-surface temperature to the light-basd geolocation model TrackIt. Marine Ecology Progress Series 419:71-84
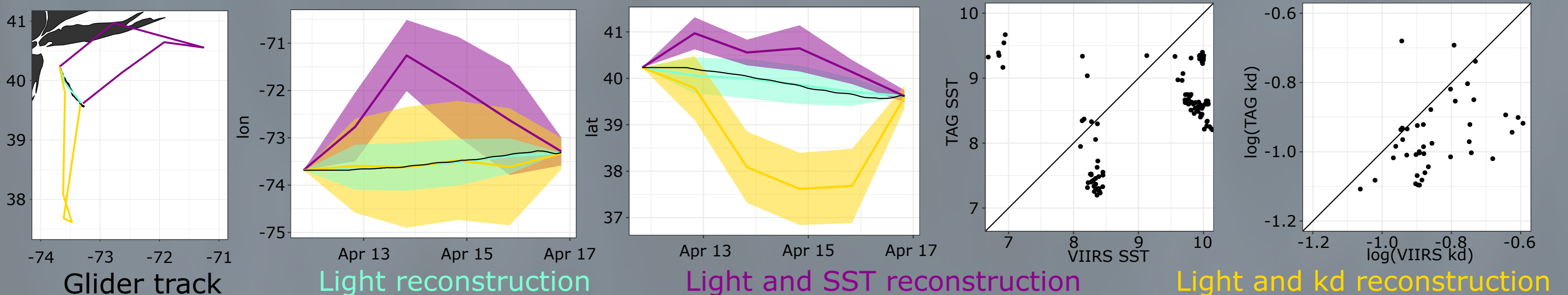
Previously geolocated tracks

Drifter buoy, cf. Lam et al. 2010

SD of latitude estimate [°]

Preliminary Results

Only 5 days of deployment (experiment aborted due to glider leak)

Glider track   Light reconstruction   Light and SST reconstruction   Light and kd reconstruction

- Very poor fit for geolocation with SST or kd!
- Bad correlation between tag and remote-sensed environmental products

Going forward

- Redeploy a PSAT on a glider to have datasets longer than 5 days
- Increase match between tag and satellite-sensed environmental products (e.g. with spatio-temporal averaging)
- Refine the algorithm to include simultaneously SST and light attenuation coefficient