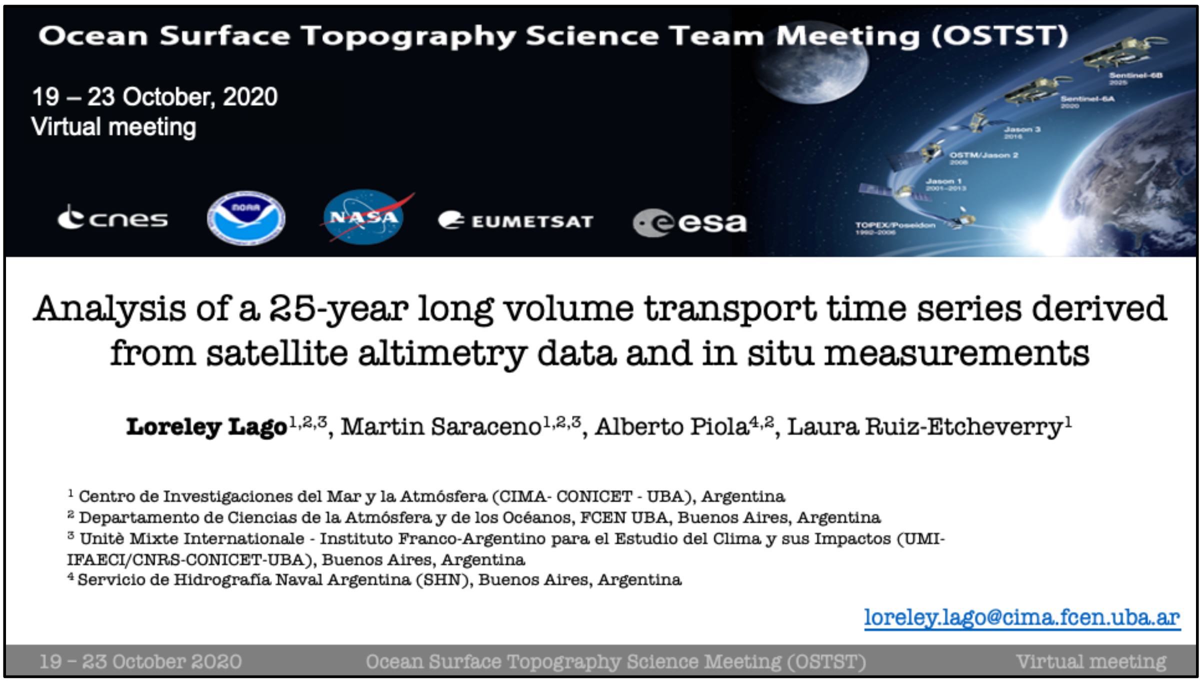

I would like to aknowledge my coauthos Martín Saraceno, Alberto Piola and Laura Ruiz-Etcheverry for their knowledge and valuable imputs in the analysis presented in this study.

The Argentine Continental Shelf

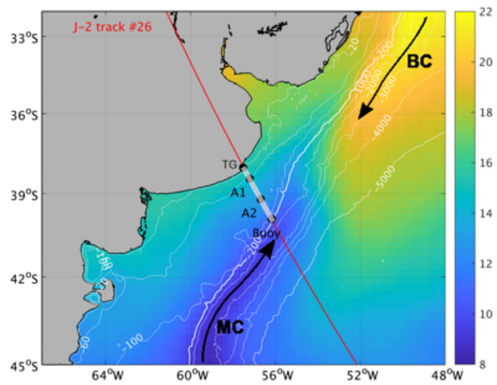

Figure 1: Northern Argentine Continental Shelf.

Continental shelves host large **primary productivity** and contribute significantly to the carbon balance of the global ocean. Still, in many regions the shelf circulation is still poorly understood.

The analysis of the in situ velocities can be found in Lago et al. (2019).

OBJECTIVE: Evaluate and analyze the along-shore transport in the section that extends from the coast to the 200 m isobath under track #26 of Jason 2 satellite mission.

Figure 2: Northern Argentine Continental Shelf.

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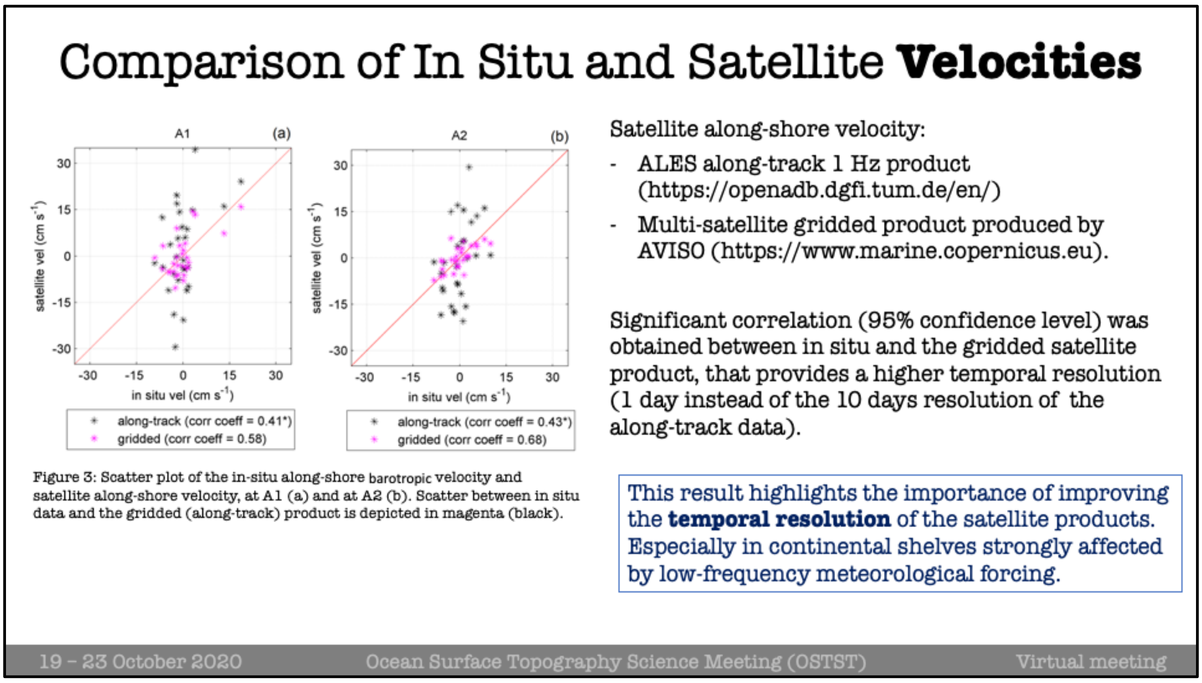
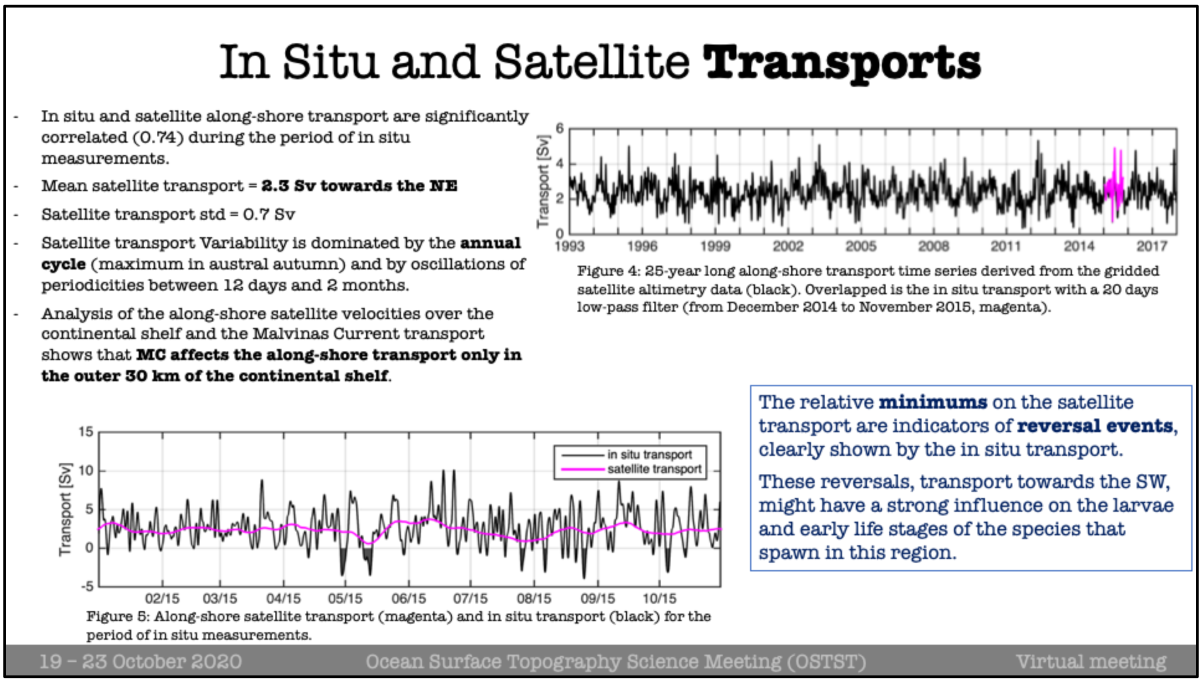
Figure 1 shows the location of the mooring used in this study. A1 and A2 counted on an upward-looking 300 KHz Acoustic Doppler Current Profiler (ADCP, Figure 2) and temperature (T), salinity (S) and pressure (P) sensors. The ADCPs provided zonal and meridional currents at 4 m vertical bins. These moorings, along with the oceanographic buoy, were deployed within the bilateral project between Argentina and France (CASSIS http://www.cima.fcen.uba.ar/malvinascurrent/en/). We obtained 11-month long hourly time series starting in december 2014, except the buoy that was active only during 2 months. TG is the tide gauge located in Mar del Plata.
The red line in Figure 1 shows track #26 of Jason 2 satellite mission.

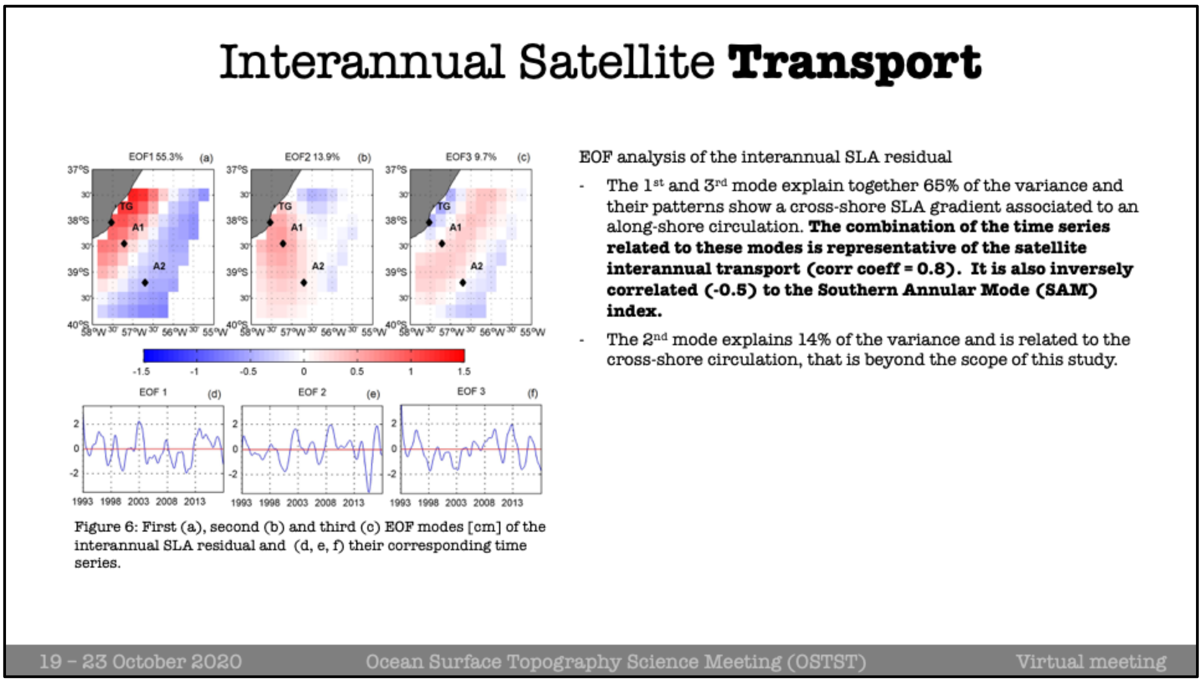


Both satellite velocities were linearly interpoated to each location of the deployments. The comparison between in situ and satellite along-shore velocities was carried out only for the dates coincident with the along-track data. The * mark next to the correlation coefficients in Figure 3 indicate that the correlation is not significant at the 95% confidence level.



The analysis of the direct velocity observations highlighted the barotropic character of the along-shore circulation and its uniformity along the section cosidered. This makes possible to rigurously compute the along-shore transport without the need of a denser array of measurements.
Satellite transport was computed using the geostrophic velocities derived from Sea Surface Height altimetric data. Velocities were interpolated to the section considered for the analysis (Figure 1).

Figure 5 shows that reversal events (transport towards the SW) are identified in the in situ transport due to the high temporal resolution of in situ data. This is hourly data that represents accurately the synoptic meteorological range associated to these reversal events. The peak-to-peak range is reduced for the satellite transport, whose temporal resolution is lower. Still, minimums found in the satellite transport are representative of reversal events



To further understand the interannual circulation in the region of study we carried out an EOF analysis of the interannual sea level anomaly (SLA). The 1st mode explains 68% of the variance and is correlated (0.5, 95% CL) to with the first mode of the ocean mass changes measured by GRACE during the period 2003-2016. As it shows weak SLA gradients, its influence on the circulation is low. Hence, we repeated the EOF analysis to the SLA residual (without considering the 1st mode, Figure 6).

SAM-induced along-shore wind stress anomalies over the region modulate the cross-shore pressure gradient that, in turn, modulates the along-shore transport variability. In particular, over the region of study between 37°S and 40°S, when the SAM is in its positive (negative) phase, it induces a weakening (strengthening) of the southwesterly winds. The wind anomalies produce a cross-shore pressure gradient that modulates the intensity of the southwesterly winds.