Subsurface POC Retrieval From Spaceborne Lidar

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1. Introduction

- Passive ocean color remote sensing cannot work at night and has a small amount of data in polar region.
- The active sensor CALIOP have a potential for quantifying and ocean subsurface backscatter and global ocean carbon stocks, due to that the 532 nm laser pulses can penetrate ocean surface, and obtain the backscatter information of subsurface water body.

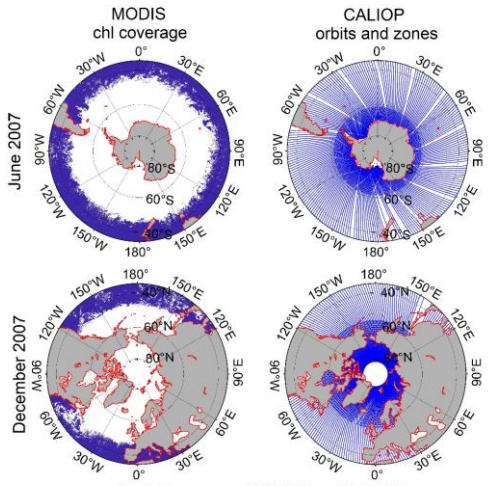

Fig.1 Coverage of MODIS and CALIOP

2. Data and Method

- Remove the effect of the transient response (TR)
- Remove the effect of the crosstalk (CT)
- Remove two-way transmittance of the overlying atmosphere
- Filter valid profiles

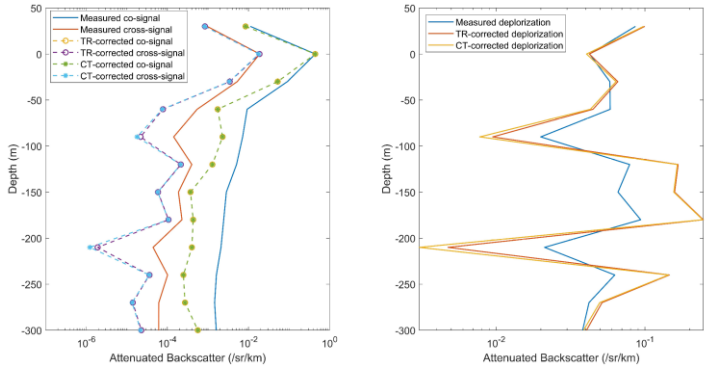

Fig.2 Measured and corrected signals

Table 1 The filtering procedure steps and corresponding number of CALIOP profiles (Decmber 2017)

Filtering steps	Number of profiles
Starting data (index_Land_Water_Mask=7)	35080065
(1) Surface peak signal located within Surface_Elevation ±120m	15016960
(2) index_Surface_Saturation_Flag_532Par=0 & index_Surface_Saturation_Flag_532Perp =0	11593234
(3) IAB<0.017 sr^{-1} & AOD<3	3469979
(4) First 3 bin values below the surface >0	1398824
(5) $\delta_T \leq 0.05$	1293248
(6) 2 m/s<W<9m/s	962252

3. Result

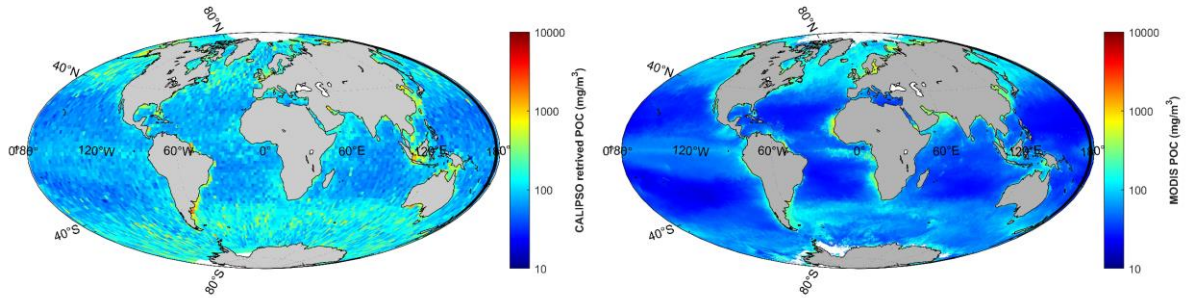

Fig.3 CALIPSO retrieved POC and MODIS POC product (2007)

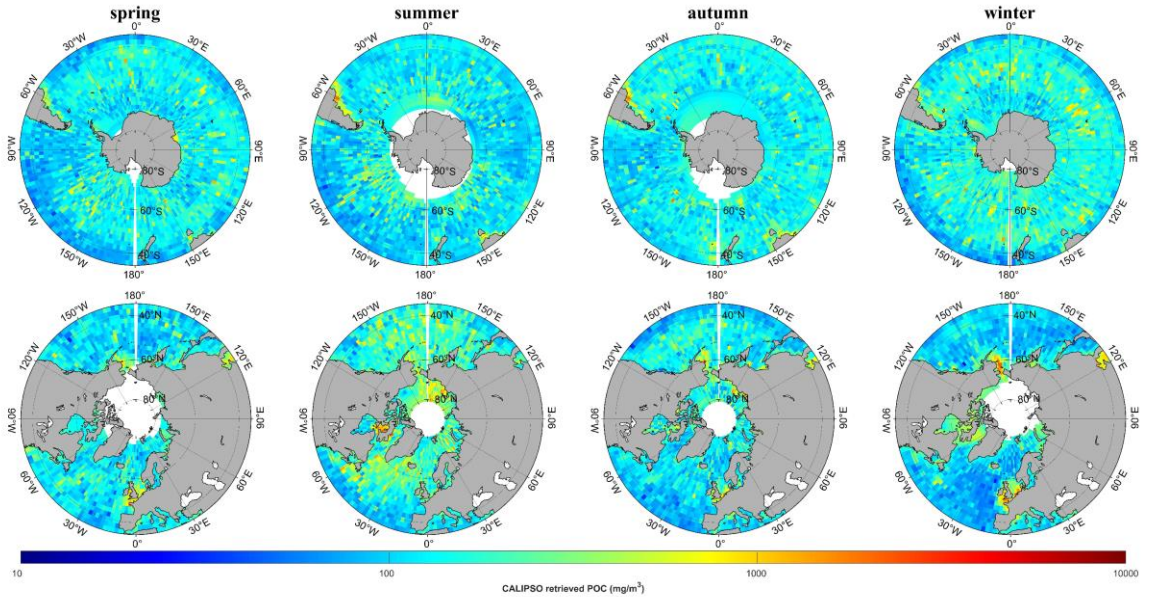

Fig.4 CALIPSO retrieved POC in polar regions

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4. Discussion

- Validate the results with *in situ* or bio-Argo data
- Analyze temporal and spatial variation and driving factors
- Retrieve subsurface POC with ICEsat-2

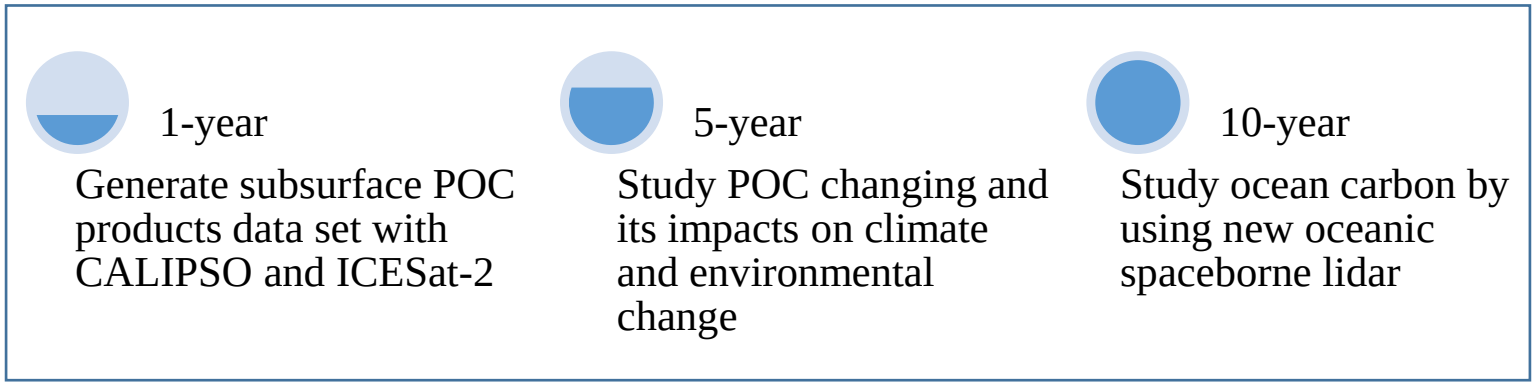

Fig.5 Priorities for next steps

5. Reference

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