

PP-SLP

“Impact of SLP data on
Numerical Weather Prediction”

Pilot Project on impact of SLP observations from drifters

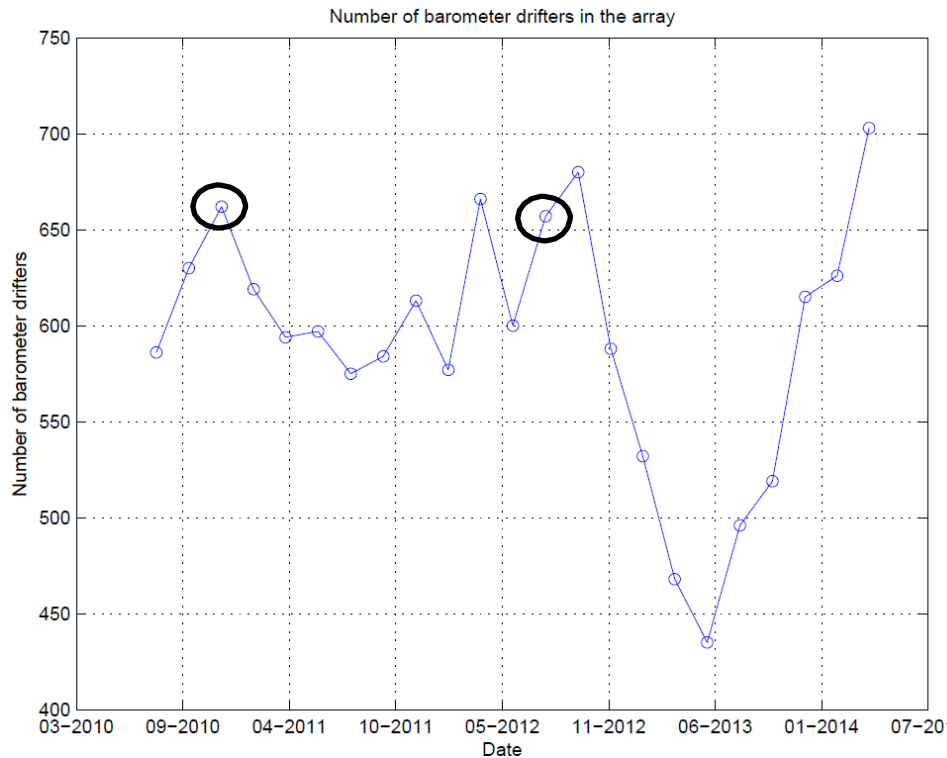
- Drifter's SLP is the **only** in-situ **global** source of SLP data
- SLP data from drifter are important for climate science (SLP patterns, trend, indexes => atmospheric circulation and)...
- ...and a strong operational component designed for NWP applications (=> in need of impact evaluation)

OSE designed by SIO(Centurioni) and ECMWF (Cardinali and Horanyi) with help from Kelly Stroker -JCOMMOPS

- Two periods: November- December, 2010 and July-August, 2012
- The data denial removes all known SLP observations from drifters (which amounts to 95% of the all of the buoy-derived surface pressure data)
- All other in-situ observations are retained (i.e. ships and coastal stations)

SLP data

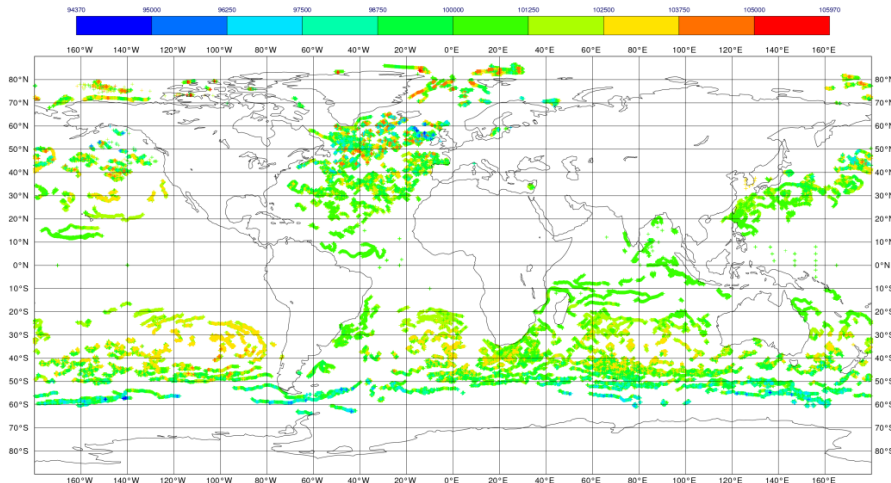
Evolution of the array



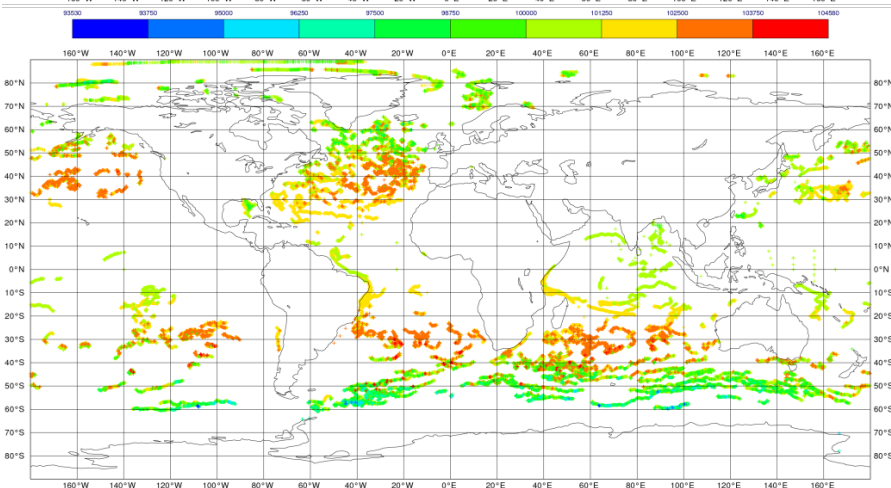
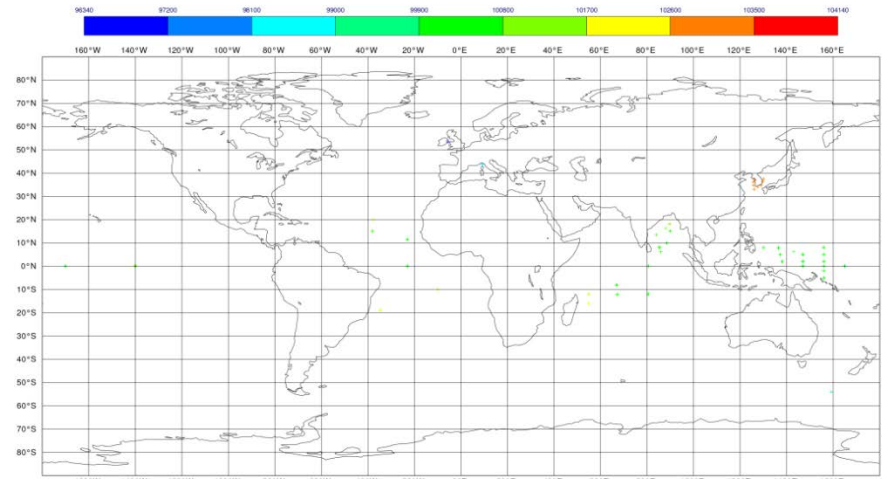
- In 2012 there was a larger drifter density in the North Atlantic thanks to E-SURF-MAR
- Overall there was more SLP data in 2010 because drifters lived longer

Control runs vs denial runs

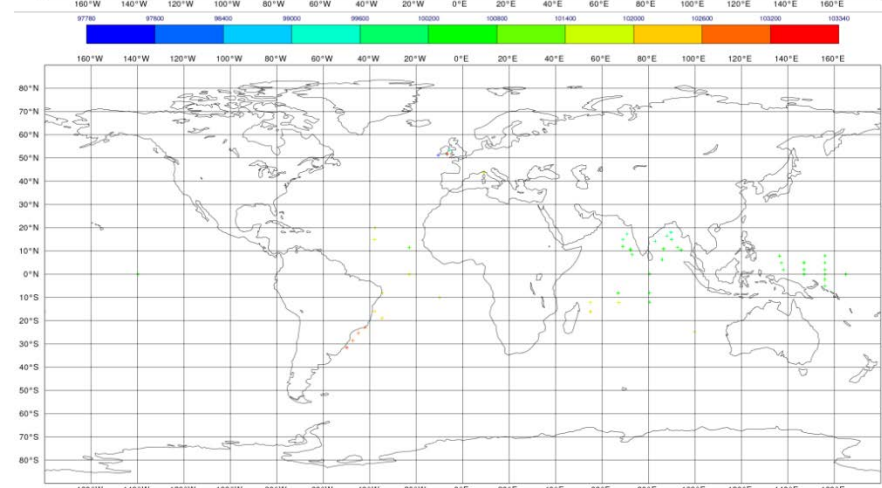
	Winter, 2010		Summer, 2012	
	Control	Denial	Control	Denial
Northern Hemisphere	358688	10100	316236	5731
Tropics	84791	24094	136182	29985
Southern Hemisphere	435628	3	267839	4089
Altogether	879107	34197	720257	39805



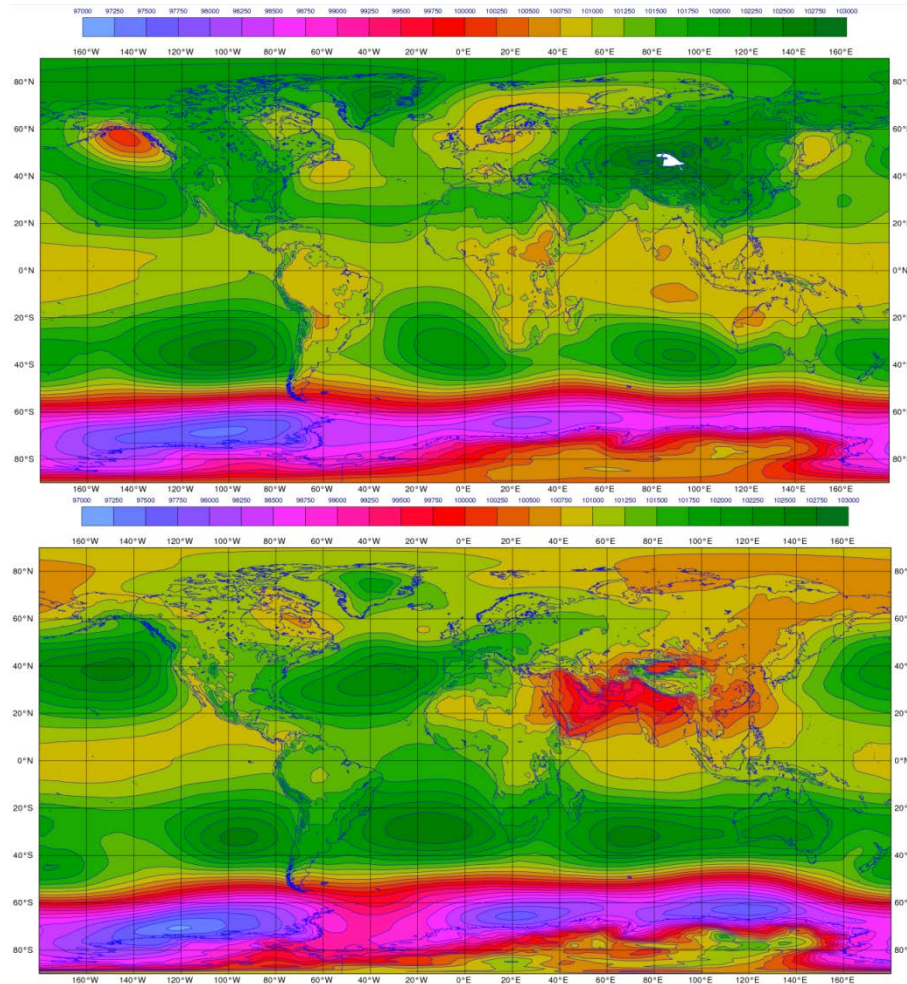
2010



2012



Large scale SLP analyses



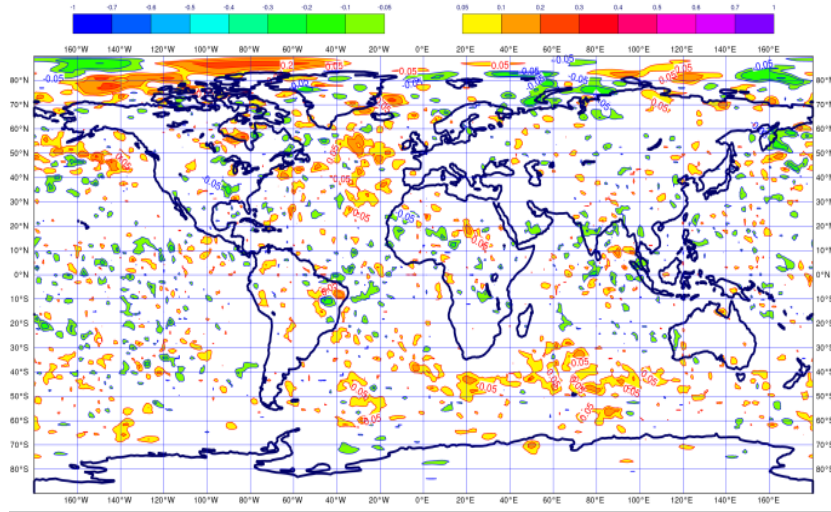
WINTER 2010

SUMMER 2012

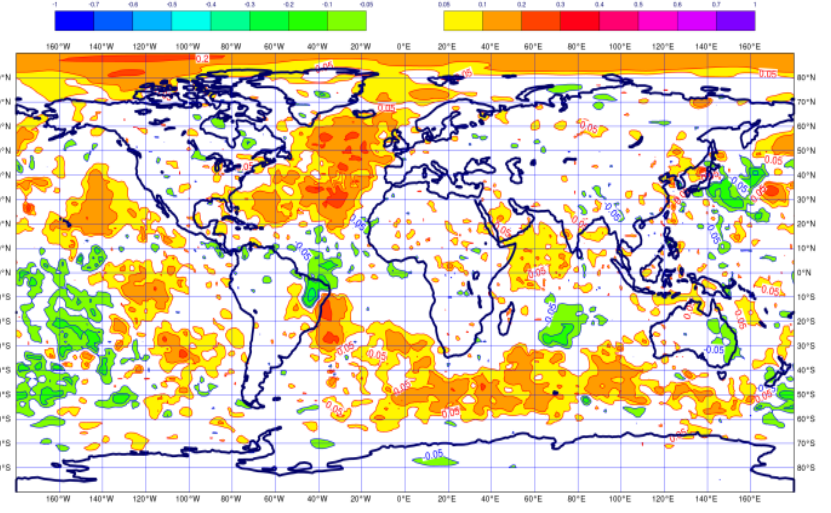
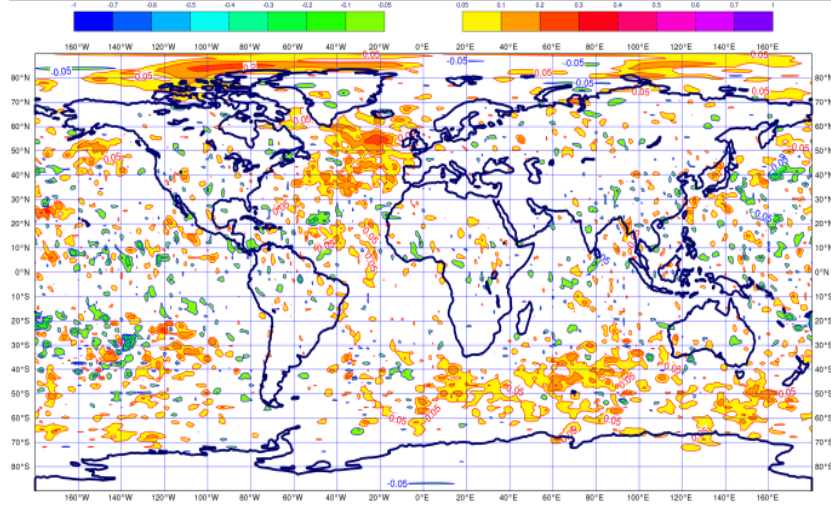
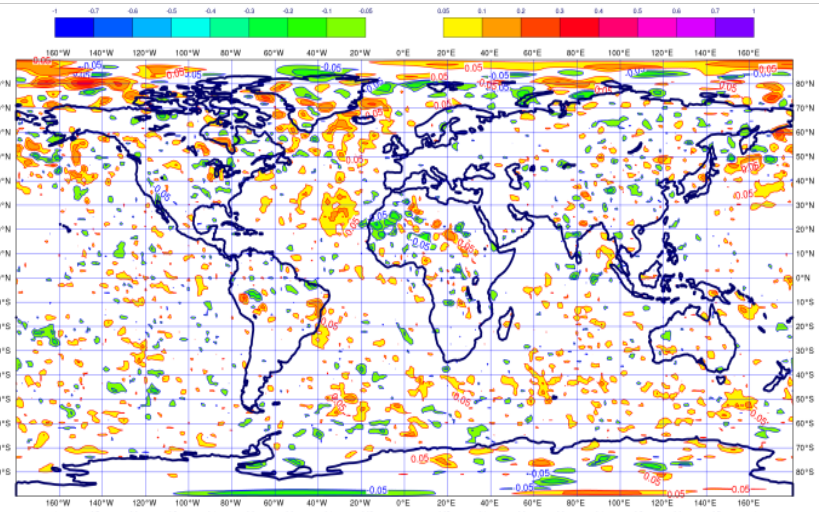
The difference in mean sea level pressure between the control and denial experiments is larger in 2010, up to 5-7 hPa over Atlantic and Pacific oceans. The missing surface pressure data have a large influence on the analyses.

Preliminary results: rmse, denial vs control

temperature



humidity

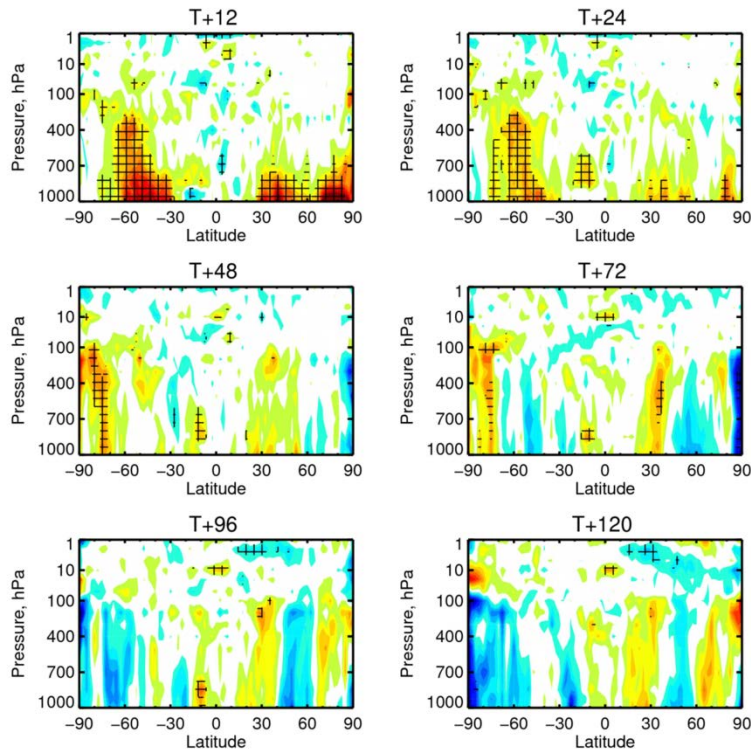


SL wind

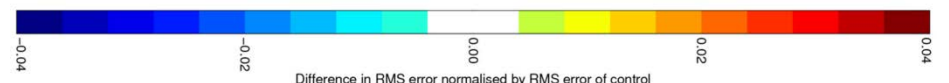
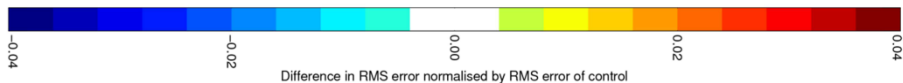
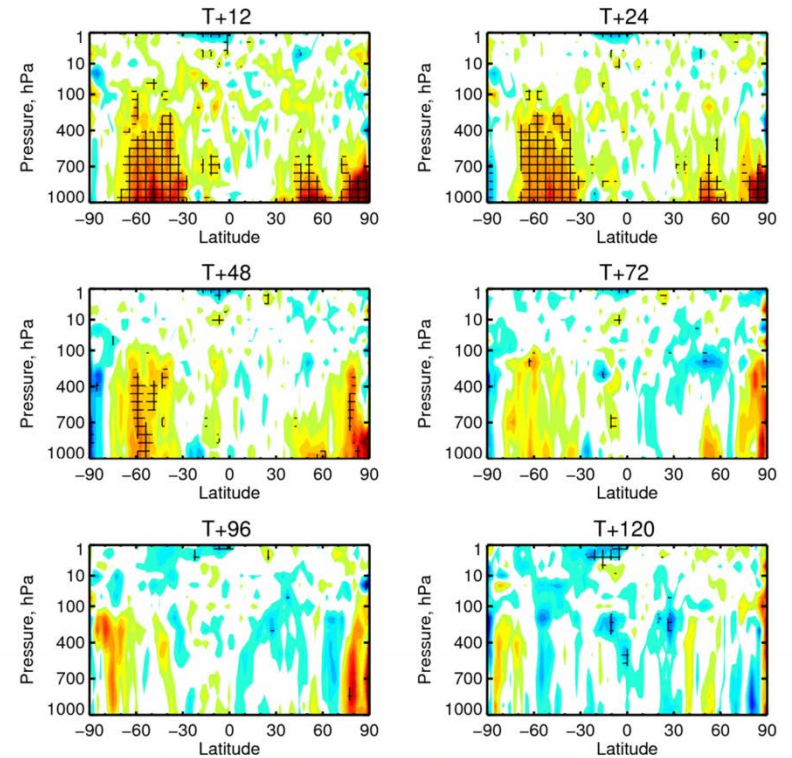
geopotential

Normalized wind: rmse

2010



2012



Some preliminary conclusions

- At the North Atlantic there is less impact in 2010, while a strong impact is seen in 2012 (probably due to the increased number of observations and the stronger atmospheric flow).
- The impacts are strong over the northern polar region and in the southern hemisphere.
- For the mean sea level pressure, there are very strong impacts over the oceans up to day 1, which are gradually decreasing with the forecast range.
- The geopotential is particularly impacted (strong dependence from surface pressure) for longer forecast ranges especially at the tropics (the impact is extended high in the atmosphere).
- The geopotential impact extends vertically at least to 500 hPa and also to other variables (especially to the wind fields, but significant temperature impacts are also recognized).
- The wind impacts are also significant (extending less in the altitude) especially at the Southern Hemisphere and near to the North Pole (the polar signal is especially strong for the 2012 summer season).
- The temperature impacts are also significant until day 2 particularly at the Southern Hemisphere and at the North Pole regions.