

# ***Interactive comment on “Wind induced variability in the Northern Current (North-Western Mediterranean Sea) as depicted by a multi-platform observing system” by Maristella Berta et al.***

## **Anonymous Referee #1**

Received and published: 19 April 2018

Review on

Wind induced variability in the Northern Current (North-Western Mediterranean Sea) as depicted by a multi-platform observing system

by

Maristella Berta, Lucio Bellomo, Annalisa Griffa, Marcello Magaldi, Anne Molcard, Carlo Mantovani, Gian Pietro Gasparini, Julien Marmain, Anna Vetrano, Laurent Bequery, Mireno Borghini, Yves Barbin, Joel Gaggelli, and Celine Quentin

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General Comments: =====

This paper discusses the variability of the Northern Current south of Toulon based on measurements by a glider, ship borne CTD, HF radar, as well as wind speed and direction based on observations and from an atmospheric model. The authors try to split the surface current as measured by HF radar into a wind-driven and a geostrophic component. The ship borne CTD measurements (11 stations during 5 days) have only been used to calibrate the glider data (6 transects during 16 days). HF radar surface currents are available during 17 days. This time frame is quite restricted which makes the results shown in the manuscript interesting but not generally valid in a statistic sense.

The procedure to derive the wind driven current component is quite simple. In a first step, the angle between model winds and HF radar surface currents is determined and the mean value and its standard deviation is calculated. If the surface current is dominated by wind, this angle should be negative, i.e. to the right of the wind following Ekman's theory, while during weak wind, the HF radar surface currents mainly represent the geostrophic component. The geostrophic component measured prior to the onset of a wind event should also represent the geostrophic component during the wind event, as only longer lasting events of strong wind mix the water masses and modify the geostrophic component.

There is another method to find the angle and the wind driven component of the current directly by using a complex correlation (Kundu 1976) between wind and surface current, see Essen 1993, Section 2.1 on the Ekman component. It would be interesting, if the complex correlation gives comparable results. Remarks on the Stokes drift component (page 8/line 14 of this manuscript) can be found in Section 2.2 of Essen's paper.

Also, there is another quite old paper by Essen 1995 on the derivial of the geostrophic current from HF radar surface currents and SST images. This paper might give some

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ideas on how to join HF radar surface currents and glider zonal currents to derive the geostrophic component of the current.

The manuscript is well structured and written in good English grammar. There are only a few detailed comments and remarks on typos, see below.

Papers that should be discussed:

(1) Essen, H.-H., Ekman Portion of Surface Currents, as Measured by Radar in Different Areas. Deutsche Hydrographische Zeitschrift 45, pp. 57...85, 1993.

(2) Essen, H.-H., Geostrophic surface currents as derived from satellite SST images and measured by a land-based HF radar. Int. Journ. Rem. Sens. 16, pp. 239...256, 1995.

Detailed comments (page/line numbers): =====

3/35: "the use of altimeters is not appropriate." Please add a remark on why this is the case.

7/23: Please delete "GDOP".

9/02: "is consistent with the Beaufort scale..." Please explain. 5 Beaufort is 8.0 - 10.7 m/s, 6 Beaufort is 10.8 - 13.8 m/s. What is consistent here?

14/06: What is the location of the mean angle shown in Fig. 10?

14/23: Here the complex correlation between wind and current might give more insight.

17/15: "transitioning from late summer to fall-winter conditions." You have a bit more than two weeks of data only. Is this really enough to identify a seasonal trend?

18/01: Please define "OSSE".

Typos (page/line numbers): =====

5/33: "(x.y.t)" -> "(x,y,t)" 5/33: "to be subtracted to" -> "to be subtracted from"

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6/30 - 7/1: check '( ... )'

7/33: "16.1 MHz,the" -> "16.1 MHz, the"

10/29: "are colder of ~1.5..." -> "are colder by ~1.5..."

10/30: "part is deepened of ~20-30..." -> part is deepened to ~20-30..."

10/33: "it deepenes of ~20-30..." -> "it deepenes to ~20-30..."

11/19: "transport reduced of ~50%..." -> "transport reduced by ~50%..." ?????

12/01: "geostrophic velocity, structure..." -> geostrophic velocity structure..." 12/01: "it influences surface velocity." -> "it influences the surface velocity."

Figures: =====

Fig 1b: "the yellow squared marks represent the CTD stations" They are orange due to the color coding with time. Also, please mention the HF radar sites at FP and CB in the caption.

Fig 3c: Please add a remark on the black dashed line in the caption.

Fig.4d: "black arrows are the surface currents" -> "black arrows show the surface currents", same in Fig. 5d, 6d.

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Interactive comment on Ocean Sci. Discuss., <https://doi.org/10.5194/os-2018-20>, 2018.

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