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Soloviev *et al.*, Fine-scale features on the sea surface in SAR satellite imagery – Part 1: Simultaneous in-situ measurements

It was a pleasure for the reviewer to read this manuscript. The basic ideas pursued earlier work carried out at the University of Hamburg by Feindt and Gade who tentatively suggested an approach for distinguishing between natural and artificial features in SAR images that is based on polarization phase differences. However, the authors of the present paper correctly conclude from these earlier investigations that "the technology of the nineties of the last century did not allow conclusions that were on a sufficiently reliable statistical base. Obvious "tendencies" were observed; however, higher resolutions had been necessary to form a solid base for Gade's "tentative conclusions". In the present work, a state-of-the art CPD filter was applied to SAR images of artificial fish oil slicks, natural slicks, ship wakes, an atmospheric frontal line, and rain signatures collected in the Straits of Florida. Thus results were obtained that were in line with Gade's conjectures thus forming a considerably safer basis for this approach.

The manuscript is written in an exceptionally excellent English style, the conclusions a well supported by data. Therefore, the manuscript can be warmly recommended for publication. A few minor suggestions should be considered by the authors as follows:

1.) In Chapter 5, third section, a definitely wrong statement is given:
"In contrast, a natural surfactant monolayer covering the sea surface produces relatively weak damping. The HH-VV correlation in the case of a surfactant monolayer is relatively high and almost the same as for the clean surface (Migliaccio et al., 2009)."
This observation by Migliaccio et al. cannot be generalized. Some cautionary statements are due! The present authors should refer to the wealth of observations published by the Hamburg group about airborne radar data over biogenic and artificial surface films. Many examples were published clearly showing that in the presence of some plankton species (for example, *phaeocystis globosa* or red tide forming species) natural sea slicks maybe formed exhibiting comparable wave damping characteristics as artificial sea slicks and stronger wave damping effects than crude oil spills! A convincing example for this fact can be found in
Hühnerfuss, H., W. Alpers, H. Dannhauer. M. Gade, P.A. Lange, V. Neumann, and V.Wismann (1996)Natural and man-made sea slicks in the North Sea investigated by a helicopter-borne 5-frequency radar scatterometer. *Int. J. Remote Sensing*, **17**, 1567 - 1582.

The reason for this observation is the fact that the morphology of both natural and anthropogenic sea slicks may become comparable. Details can be found in:
Hühnerfuss, H., F. Hoffmann, J. Simon-Kutscher, W. Alpers and M. Gade (2006) New chemical insights into the structure and morphology of sea slicks and their geophysical implications. In: Gade, M. ; Hühnerfuss, H.; Korenowski, G. (eds.) Marine Surface Films: Chemical Characteristics, Influence on Air-Sea Interactions, and Remote Sensing, Springer Verlag, Heidelberg, **2006**, 37-44.

2.) The quality of some Figures should be improved: in Figure 1 the letters indicating the locations are hardly readable; Figure 3: what is the meaning of PE; bold letters may improve readability in Figure 4 and 10a.
3.) Some misprints in the references: please, check the name of Hühnerfuss (not Huhnerfuss)

In conclusion, the present paper represents a considerable step forward with regard to the approach of using a CPD filter for discriminating natural and artificial features on the sea surface. The final step would include application of well-defined artificial sea slicks that are known to simulate natural sea slicks of different morphology. But this will be new story that could be carried out in a joint experiment with the Hamburg group.