General comments

The paper is addressed to an important issue. Interpretation of atmospheric and oceanic phenomena seen in SAR imagery is still a challengeable task. Nevertheless the results presented are quite disappointing. There is nothing really just discovered among them. The discussion undertaken is very weak. Proposed interpretation of phenomena detected in SAR imagery is wrong at places. I've got an impression that the authors had not been dealing much with SAR imagery in their career and not always knew what they were talking about. I'm afraid this manuscript should not be published in a peer-viewed journal.

Specific comments

Introduction is too romantic and general.

Page 2, line 4 "radar… penetrating through clouds…" – radar doesn't penetrate through clouds; it is its pulses that do

Page 2, line 10 "The fine-scale features observable in SAR include surface signatures of ship wakes, sharp frontal interfaces, freshwater plumes, and internal waves." Is that all? How about circulation features, e.g. eddies?

Page 2, line 11 "The visibility of these features can be enhanced or masked due to the presence of natural or anthropogenic surfactants." How about the role of wind speed???

Page 2, line 26 "coherent structures" – what is that?

Page 2, line 26 stratification is not a process

Page 2, line 27 "surfactants or oil spills" – so oil is not a surfactant?

Page 3, line 7 – "internal wave solitons" – only solitons?

Page 3, line 7 – "spreading freshwater lenses" – only spreading ones?

Page 3, line 17 – "influences of atmospheric process" – what kind of process?

Page 3, line 32 – (Maingot, 2011) – what kind of information is given in this paper? A user guide of SeaKeeper SK1000?

Page 4, line 14 – "during very low wind speed conditions" – when?

Page 4, line 15 – "core of the Gulf Stream" – does Gulf Stream have a core?

Section 3.1

The frontal structure seen in the image can be frequently observed in SAR imagery obtained in different parts of the World Ocean. Apparently they are caused by differences in wind speed and have nothing to do with the Deepwater Horizon dispersants. Elongated slicks seen in the coastal area reflect the surface currents and have nothing in common with internal waves. Their very origin is still unknown.

Section 3.2

As it was mentioned above, the frontal structure was more likely of atmospheric origin. So it is useless to search correspondence with ocean interior.

Section 3.3

The structures being under discussion are atmospheric gravity waves, not oceanic.

No need to present here what you could NOT investigate.

Of course there are oceanic internal waves in that region. It is very naïve to give such an example as a confirmation of oceanic origin of features seen in figure 5.

Page 7, line 6 slick is not a natural phenomenon, it is an area without ripples.

Page 8, line 29 “frontal eddies and meanders” – what is that? Nothing was mentioned about them before.

Figure 2 – is there a need in such a figure for Ocean Science readers?

Figure 3 – where were the photos taken? What is the correspondence between the SAR image and photos?

Technical comments

“fine scale” or “fine-scale”? Need to use one version throughout the paper.

Some commas are missing after “et al.”, “e.g.”.

Some abbreviations are not clarified (e.g., CTD).

Figures should be of bigger size.

Reference list is not alphabetically ordered.

Caption of figure 13 – “bot” instead of “but”.

I would recommend mentioning spatial resolution and swath width for every SAR image being discussed.