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Hydrology and Earth System Sciences Discussions

Interactive comment on "Use of ENVISAT ASAR Global Monitoring Mode to complement optical data in the mapping of rapid broad-scale flooding in Pakistan" *by* D. O'Grady et al.

R.S. Westerhoff (Referee)

rogier.westerhoff@deltares.nl

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Overall, this is a nice overview given by scientists building something that can be used in an operational way. Compliments for that! Also compliments for working towards combined use of optical and radar backscatter imagery. I would be happy to be in contact to share knowledge. My comments are mainly based on the ASAR topics, by the way.

However, from what I read, the topic is not entirely new and the authors are in fact just using a type of change detection method, which is pretty common in most software

packages nowadays (or I have not understood correctly, please explain better then). Furthermore, the authors speak of systematic and emergency response, while also indicating there are many region dependent factors that should be taken into account (as far as the ASAR signal is concerned). The article would be more unique if a window towards systematic global use would be made. When trying to do things more systematically, one should try to minimize these region dependent factors. This would be good extra topic for the discussion.

Also, while in the theory explaining there is a minimal difference for environmental conditions, in the case study there could be differences because of vegetation (p5779).

Suggestions for revision:

[minor] Explain term Digital Number: ASAR products are provided as radar brightness and pixel values correspond to amplitude information. Therefore, for detected products: DNi,j = pixel value at line and sample "i,j" Source: http://earth.esa.int/pub/ESA_DOC/ENVISAT/ASAR/ASAR_products_absolute_calibration_v , p18

[minor] p.5774: "The incidence angles and the DEM were then used to calculate local incidence angles () for each pixel. Both the orthorectified Digital Number (DN) and surfaces were then transformed to geographic coordinates by third order polynomial transformation."Could the authors explain if the calculation from incidence angle to local incidence angle would change whether one is using ascending or descending data and thus if it is possible to done systematically?

starting on page 5775, the authors say:

"Given a reasonably close temporal separation of images, and in the absence of flooding, the environmental conditions, and therefore the nature of F , are similar for a given pixel in the target image to the corresponding pixel in the dry baseline offset.Converting to decibels and deducting the base backscatter values .... formulae (3) and (4)... This

assumes that the difference in between the two images is negligible."

This of course is true for a short difference in time, but the function F is heavlity changing with the type of land cover. Where there is e.g. agricultural use, the time between two passings can be up to a week, in which a crop can grow and change the function F heavily, also causing the backscatter of the C-band signal to change. I would be very interested in the difference between the different seasons or months of this function and the deviations occuring from it.

Also, the procedure in 3.4.2 (and thus the end of 3.4.1) is not entirely clear. Please explain. Have the authors taken the exact same image (e.g. the 35 day revisit image) or another image with a different angle of incidence? Both are possible, but both have different implications on the backscatter and relation to the angle-environment-backscatter relation.

Paragraph 5.4 Overall, the paragraph now reads like a piece of extra information that might just as well be left out. Do the authors want to say that there is a possible combination between the flood data and the soil moisture datasets to be used in hydrological? If yes, how, what should be the way to go?

Furthermore, this paragraph looks a bit incomplete. For example, at p5786, "...also offer a unique opportunity to retrieve soil moisture at a global scale with a spatial resolution on the order of 1 km (Pathe et al., 2009)." Why don't the authors mention the work of the SHARE initiative, a.o. Doubkova, Bartsch, Wagner, as well as some Australian CSIRO scientists Ticehurst and van Dijk?

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 5769, 2011.