

Interactive comment on “The dynamics of cultivation and floods in arable lands of central Argentina” by E. F. Viglizzo et al.

E. F. Viglizzo et al.

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Comment of REF 1:

I totally disagree with the consideration reported in section 3.1 at the lines 2-5. The authors state: The negative relationship between groundwater and cultivation may have practical implications in highlands: first, groundwater level can be useful to predict a cultivation reduction in response to flood expansion; second, considering the small movement of groundwater in soils, groundwater level can be monitored to anticipate flood risk, helping to code in advance with its potentially harmful consequences. First of all I do not think that groundwater rise may help to predict land use changes because the first is influenced by the second term but not vice-versa, at least not in the short term. Second, groundwater level is generally characterized by

the slow response time and exactly for this reason it cannot be used to predict or anticipate flood;

Reply from Viglizzo E F Regarding the first issue, I must accept that we were not clear enough to explain the idea and involuntarily fell in a circular argument. The reviewer states that given land-use change influences groundwater rise, groundwater rise cannot be used to predict land-use change. What we should have properly been clarified is that there is considerable time lag between the inter-flooding period (1989-1995) and the subsequent flooding period (1996-2003). Thus, while cultivation expansion during the inter-flooding period 1989-95 explained groundwater rise, high water table contributed to remove land from cultivation during the flooding period 1996-2003. Hypothetically, a delayed negative feed-back may have operated: it is likely that the rapid cultivation expansion during the inter-flooding period triggered a negative feed-back that caused, through floods, a retraction of cultivation during the later flooding period. The same reasoning line can be used in relation to the second issue. The referee states that because of its slow response time, groundwater level cannot be used to anticipate flood in highlands. Given that groundwater showed a smooth rise (around 50 cm/year) since 1996, we think that this persistent rising trend could have been used to anticipate the maximum flood expansion that occurred during 2001 and 2002. Furthermore, as we shown in Figure 5a, we found a positive highly significant correlation between water level height and the percentage of cropland affected by flood in all highland districts. We later used this evidence to suggest it is possible to implement an early-warning system to anticipate flood risk in the area through changes in groundwater level.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2319, 2008.

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