First we would like to thank the reviewer for the comments (in italics; responses in bold).

Recognition of these kinds of small scale features in landscapes, such as ephemerally flooded spots or zones is important for improving local or global greenhouse gas budgets. Role of wet spots in forest CH4 emissions is an example of equal research line. An interesting question is how to assess the spatial extent of these environments.

We agree with the reviewer that the spatial extent of different environments in a landscape is an important issue, hence our emphasis on the contrast between the emission histories of the LFS and SFS. The key conclusion is that small scale heterogeneity (driven by topography in this instance) can result in important differences in GHG emissions.

It is not quite true that "it is unclear how flooding influences annual ecosystem GHG budgets, particularly in flood-prone ecosystems that experience variable periods of inundation". There are studies on CH4, CO2, and N2O fluxes from river, lake, and pond associated flooded systems.

We should have phrased this differently. We intended to imply that there is no consensus, as opposed to no/few studies, as to how flooding impacts on annual GHG emissions. It is correct to say that relative to other environmental settings, studies of temperate coastal systems are limited in number; on an areal basis these are particularly important in Ireland and, more widely, in Western Europe.

Thus, I am surprised that CH4 was not included in the study as it is likely emitted from wet soils. In addition, the study did not include ecosystem CO2 uptake and the role of vegetation and organic matter accumulation were not dealt. For these reasons I am hesitant to support publication of this manuscript.

Our primary objective was to test if, and to what extent, small scale environmental heterogeneity (expressed particularly in terms of differences in the duration of flooding) could result in differences in GHG emissions. For that reason we focussed on using two variables (CO_2 and N_2O), that are often the most significant GHGs in terrestrial ecosystem, and quantified the difference between the two sites.
We agree with the reviewer that having demonstrated the significance of small scale heterogeneity, the impact of other potential factors, including CH_4, could be included in subsequent analyses.
We also acknowledge that CH_4 is often a major GHG in permanently inundated soils (e.g. wetlands, hydropower dams and lakes). In contrast ecosystems where flooding is intermittent or periodic and of a shallow depth, CO_2 is the dominant gas (e.g. Altor and Mitsch, 2006 Ecological Engineering; Jerman et al., 2009 Biogeosciences, Morse et al., 2012 Ecological applications; Batson et al., 2014; Jacinth, 2015 Geoderma; Winston and Richardson, 2015 Wetlands). For instance, Morse et al., (2012) showed that CO_2 fluxes comprised 60 to 100% of the contribution (8000-64,800 kg CO_2-$ha^{-1}yr^{-1}$) to the total GHG emissions from an intermittently and permanently flooded coastal plain; in contrast, CH_4 fluxes ranged from -6.87 to 197 kg CH_4-$ha^{-1}yr^{-1}$. The highest emissions of CH_4 were from the permanently flooded site. Broadly similar findings were reported by Batson et al., (2014), where CH_4 contributed 0% to the total GHG emission from

floodplain areas with different hydroperiods. Furthermore, as the major period of flooding occurred during the cooler period of the year the lower temperatures would have restricted any flooding-related emissions of CH_4.
We have clarified our use of the terms "GHG annual budget" and "annual emission budget". We use 'annual emissions budget' (as we did not measure uptake by the vegetation or the soil).

In terms of the role of vegetation and organic matter accumulation, we quantified the above-ground biomass of each site for one growing season and, as reported in the discussion section, the biomass at the SFS was 5-6 times higher than that of the LFS. This suggests a larger input of organic matter from autochthonous sources in the SFS, but we found higher emissions at the LFS, suggesting that the main source of the differences in emissions was not the organic matter derived from the vegetation. The higher nutrient content of the LFS therefore implies an added, presumably external, flood-water related source, as discussed in the paper.
As an aside, the higher standing biomass at the SFS also implies greater CO_2 uptake relative to the LFS. Thus, the difference between the two sites is likely to be even larger based on the annual GHG budget than indicated by the emissions alone.

Materials and Methods: description and quantification of vegetation and soils organic matter are missing. Why the activities of beta-glucosidase and protease where measured?

There are a variety of enzymatic activities that are associated with the mineralisation/breakdown of organic matter. Two of the four we chose (details provided below) are widely used as a measure of changes in microbial activity and subsequent changes in the mineralization of organic matter (Stott et al., 2010 Soil Biology and Biochemistry; Henry, 2012; Soil Biology and Biochemistry; Vranova et al., 2013 Applied Soil Ecology).

Beta-Glucosidase enzyme catalyses the hydrolysis of B-D-glucopyranosides in the final step in the degradation of cellulose, the most abundant polysaccharide in the soil, releasing simple sugars (glucose) that are available for soil microbial populations. Protease catalyses the hydrolysis of the terminal amino acids (C and N containing) of polypeptide chains releasing nitrogen that can be utilised by soil microbes.

We will add the description for the quantification of vegetation from the sites in the method section.

The actual description for soil organic matter (total C and N) is already mentioned in section 2.4 of the paper.

Generally, citations to previous work on effect of flooding on GHGs are lacking.

We have provided a more extensive list of reference to previous studies focussing on the most relevant ones-intermittent flooding-in the context of our study.