

## Reply to Dr. Rozemeijer (Referee #1)

We appreciate the constructive comments and suggestions from Dr. Rozemeijer. We have addressed the comments in our revised manuscript as described in the following.

Comments from Referee #1:

1) # 12293\_8: Is 'breaching' common here? 'Exceeding' maybe better.

**Response:** We agree. We have replaced 'breaching' by 'exceeding'.

2) # 12293\_9: Please add that this is the MAC for drinking water.

**Response:** We agree. We have added 'for drinking water'.

3) # 12293\_21-23: Specify why these two sensors were tested. Are they the only systems using spectrophotometry available?

**Response:** The two sensors are not the only online UV/VIS spectrophotometers that are available on the market. For example, other sensors that are offered are Satlantic/ISUS V3 or YSI/NitraVis. However, the two sensors presented are often and widespread used for monitoring. Hach Lange GmbH is market leader in Europe. s::can Messtechnik GmbH has a worldwide network of more than 40 partners around the world.

4) # 12293\_23: For comparison purposes, it seems more reasonable to apply both sensors at both locations. Please explain why one sensor was tested in Ireland and the other in Jordan.

**Response:** Primarily, the sensors were used for two independent studies which focused on different scientific research questions. A collaboration between the two research teams enabled to write a technical note about the UV/VIS sensors used. We have added 'which were originally used for two different scientific studies (Grimmeisen et al., 2014, Huebsch et al., 2014)'.

5) # Introduction: You may want to add info on what was already known about the performance of the sensors from the providers and from previous applications. And specify what you add to this existing knowledge.

**Response:** The authors have added the following information in the technical note: 'Some technical information about UV/VIS sensors in natural waters can be found in the literature (e.g. Drolc and Vrovsek, 2010; Thomas and Burgess, 2007; van den Broeke et al., 2006), but up to date there is no technical information available that describes a detailed comparison of widespread and commonly used online spectrophotometers and their positive and negative aspects. There is sparse information from the two manufacturers on sensor performance in natural waters.'

6) # 12296\_14-16: Why does the manufacturer advise this?

**Response:** This comment relates to the following sentence: 'The manufacturer advises to use a path length of 35 mm in natural water, even if this might not be the optimal path length for the monitored NO<sub>3</sub>-N concentrations in the field (optimal at  $\leq 10$  mg L<sup>-1</sup>).' The reason is explained already in the following two sentences: 'If additional measuring options are included such as turbidity, TOC and DOC, the path length has to be suitable for the combined options. Those may occur at different ranges and the best compromise has to be selected.' We have added 'The reason is that' at the beginning of the two sentences to make it easier to understand for the reader.

7) # 12299\_7-11: The setup was already described before.

**Response:** We agree. We have excluded the sentences 'Spring waters A and B were constantly monitored during the research period for the DWS and MWS, respectively. Spring water A was sampled in a karst spring in an agricultural dominated area in South Ireland, whereas spring water B occurs in an urbanized catchment and is continuously contaminated by faecal matter from sewer seepage of Salt, a city in Jordan.' We have changed the following sentence 'For Fig. 3, the spring water samples used have a similar NO<sub>3</sub>-N concentration of 11.4 mg L<sup>-1</sup> and 11.1 mg L<sup>-1</sup>, respectively' to 'Spring water sample A and B have a similar NO<sub>3</sub>-N concentration of 11.4 mg L<sup>-1</sup> and 11.1 mg L<sup>-1</sup>, respectively.' Furthermore, to provide the full information we have changed the following sentence in the Materials and methods section 'The DWS was installed in a flowing spring emergence (Spring A) in south-west Ireland and the MWS in a flowing spring emergence (Spring B) in Jordan.' to 'The DWS was installed in a flowing spring emergence (Spring A) in a karst spring in an agricultural dominated area in south-west Ireland and the MWS in a flowing spring emergence (Spring B) in an urbanized catchment in north-west Jordan.'

8) # 12299\_14&16 and further: What is 'mains'?

**Response:** 'Mains water' is another word for 'tap water' or 'potable water' and is a widely used term.

9) # paragraph 3.3: Were the interfering substances not measured? What interfering substance caused the offset? Do you have info to quantify the interference by different substances?

**Response:** The offset of the spring-river-pond water in Fig. 3a) was demonstrated for illustration purposes to explain the principle of the sensor only. However, the offset was caused by increased absorption in the wavelength range between 250-400 nm which is an indicator for the presence of COD (van den broeke et al., 2006). The monitored water for research purposes was spring water A and B which was not or negligible influenced by interfering substances which can be also recognized in Fig. 2 (accuracy of the calibration). Thus, the authors did not measure interfering substances additionally. The manufacturers give no specification of problems with additional substances, but

evidence can be found in the literature (e.g. Thomas et al. (1990), Kröckel et al. (2011), Langergraber et al. (2004)).

10) # 12300\_19-20: consider rephrasing ‘calibration intervals can be performed on a long term basis’, eg: x month calibration intervals are sufficient’

**Response:** We have added ‘of up to two years’.

11) # 12300\_26: precicion → precision

**Response:** Done.

12) # 12303\_8: remove comma after although

**Response:** Done.