Comment	Response
General	While we appreciate the critical review comments, one of the key aspects highlighted by both reviewers was about the novelty of this work. We would like to take this opportunity to restate that the study was not intended to develop a new method /process /tool or model to predict the chlorine decay. The aim of this study was to primarily: a) Estimate and compare the chlorine decay parameters for surface water and ground water (specifically from deep hard rock aquifer). This would help predict & manage water quality aspects in water distribution networks b) Validate the results with those from the existing studies
The title does not accurately reflect the content of the paper. A more appropriate one would be "Comparison of fast and slow reacting components in surface and groundwater using the two-reactant model" The abstract provides good coverage.	We would like to retain the title "Estimating fast and slow reacting component in surface and groundwater using 2R model "of the manuscript for the reasons articulated in the next point.
The paper does not present any new concepts or tools, but does contain new data sets for chlorine decay in one surface and one ground water.	We agree that paper does not present any new method or tool for predicting residual chlorine. That was not the objective of this study. a) All prior studies have estimated the chlorine decay parameters for water from different sources (variable water quality). Their results are specific and more suitable for predicting chlorine decay in water supply networks of the source water for which the studies were conducted. This study aims to estimate the chlorine decay parameters using the 2R model relevant to local conditions found in southern India with hard rock aquifers. This in turn would help further studies to accurately predict chlorine decay in water distribution networks with intermittent water supply systems, which is the common occurrence in such regions.

The authors have clearly distinguished their new contributions. However, they have not given appropriate credit to already published work on chlorine decay in groundwater's and have incorrectly cited other work (see below).	We have cited Fisher et al 2011 at multiple times and have credited use of 2R model by Fisher et al 2011(P201, L9). We agree that there has been a typographical error, where we have wrongly cited Fisher et al 2011 instead of Fisher et al 2012. We will correct the error in the updated Manuscript. We also agree that we did not mention the use of 2R model for predicting chlorine decay in groundwater – this was done mainly because Fisher et al 2011 tested 2R model for shallow groundwater whereas in this study we calibrated and validated the 2R model for deep groundwater from hard rock aquifers that are between 800 to 1000 feet deep .(reference enclosed) http://www.thehindu.com/todays-paper/tp-national/tp-karnataka/fluoride-surfaces-in-city-as-borewells-plumb-new-depths/article1698111.ece. Fisher et al 2011 have not mentioned the depth of groundwater; however we will include this in the updated manuscript.
The overall presentation is mostly well structured, but the language would benefit from further editing, particularly the lack of definite and indefinite articles.	We will proof read the manuscript for grammatical mistakes.
There is some overlap between Results, Discussion and Conclusions, which should be eliminated. Perhaps a combined Results and Discussion would be beneficial for this purpose. References were mostly appropriate.	We will modify the Results, Discussion and Conclusions and will eliminate the overlaps.
P201, L9. Neither Mutoti et al. (2007) nor Rossman (2006) considered the 2R model to describe chlorine decay in bulk water. Their papers assume a traditional first-order bulk decay model and are more concerned with the additional decay due to interaction of chlorine with the pipe wall. Fisher et al. (2011) primarily showed that the 2R model accurately described the effect of varying initial chlorine concentration (ICC) with a single set of (constant) coefficients.	P201, L9- While the current manuscript refers to 'second order chlorine decay model'; this is an error and we will rephrase this to "**first and** second order chlorine decay model has been calibrated and tested for surface water under varying conditions such as temperature variation, type of treatment and re-chlorination (Fisher et al., 2012; Fisher et al., 2011; Mutoti et al., 2007; Rossman, 2006)
P206, L6ff. The authors claim that it is the high	We agree with the referee's interpretation

ratio of initial concentrations of slow to fast reactants that is responsible for the poorer prediction of the groundwater validation data by the 2R model. It should first be noted that even R2 values of 0.94 and 0.89 indicate a very good match to the data (also evident visually from Figure 3). The high reactant ratio in groundwater arises from a very low (calibrated) value of fast reactant (0.003mg/L) compared with 8mg/L of slow reactant. The low value indicates that the fast reaction is negligible in groundwater; i.e. a single slow reaction would represent the groundwater decay data almost as well as the fitted 2R model. However, a more likely reason for the lower R2 values of 0.94/0.89 for the validated data is that R2 is a measure of fit involving the error relative to the variance in the data. The groundwater data has far lower variance than the surface water data and the lower-ICC groundwater data h as lower variance than the higher-ICC data. Even with the same level of error in all data, this would account for the variation in R2. This is another reason for using RMSE, rather than R2, as a measure of model accuracy. The evidence presented (and the previous work from the literature) does not support the authors' contention that "Employing [e.g. 2R] models that accurately predict chlorine decay in surface water may not always be suitable for groundwater" (P205, L15).	regarding the prediction accuracy. We understand that RMSE provides better prediction accuracy rather than R2. In the updated manuscript we will introduce RMSE values for our datasets. We will rephrase our statement on the accuracy of 2R model for predicting chlorine decay in groundwater.
P205, L10. The authors claim that the 2R model has not previously been fitted to decay data from groundwaters. On the contrary, Fisher et al. (2011) fitted the 2R model to data from an artesian bore water at Wanneroo Groundwater Treatment Plant (Warton et al. 2006), achieving R2>0.94 for ICCs up to 10mg/L with a single set of coefficients, even when only the highest and lowest ICCs were used as calibration data. Fisher et al. (2015) fitted the 2R model to a different artesian water and two shallow groundwaters from the Mirrabooka Groundwater Treatment Plant. They achieved RMSEs 0f 0.02- 0.07mg/L, which is of similar order to measurement accuracy (±0.05mg/L). R2 values were not presented as they were greater than 0.9. The authors' presentation of parameter values in Table 5 are not those from Fisher et al. (2011), but instead are some of those of Fisher et al. (2012).	As we mentioned in one of our previous responses, the groundwater levels in the study area are very deep and a large section of the population depends on such groundwater to meet their domestic water demand. Therefore accurate chlorine prediction in water distribution network remains an important issue. To our knowledge none of the earlier studies have used the 2R model for estimating decay parameters in groundwater from **deep** hard rock aquifers. Fisher et al 2011 estimated decay parameters for shallow groundwater, which could not be applied to predict chlorine decay in deep groundwater. The decay parameters estimated by 2R model depend on the quality of source water. Therefore the estimates would be different for shallow vs

No technical corrections are included here, due to the following recommendation	deep groundwater (low organic carbon but high in inorganic components - Deborde et al 2008). This study estimated decay parameters for local water sources which could further be used by water quality managers for accurate prediction of chlorine in distribution networks. Deborde, Marie, and U. R. S. Von Gunten. 2008. 'Reactions of Chlorine with Inorganic and Organic Compounds during Water Treatment—kinetics and Mechanisms: A Critical Review'. *Water Research* 42 (1): 13–51.