The comments of both reviewers were addressed as outlined below (in blue). The figures were also modified to make the lines and symbols more distinct for readers with colour deficient vision and to ensure consistency of fonts. Line numbers refer to the marked version.

Reviewer #1:

1) Line 32. "that that" may be repeated.

Changed to "that" (line 32)

2) Lines 37-39. "Some of these components … much older." I think the meaning of this sentence may be inaccurate. It should be the infiltration of recent or ancient rainfall.

This sentence was removed as the age of the water was not referred to in the paper. The previous sentences (lines 33-37): "Baseflow represents water stored in the catchment that sustains streamflow between precipitation events. Regional groundwater may be a significant component of baseflow in gaining rivers; however, displaced soil water, interflow, bank return flows, snow melt, and/or water stored in floodplain pools can also be important" contain the important information as to the different water stores.

3) Line 141. "SC_b. is based on the SC of the river during low flows using two methods for estimating SC_b were used." This sentence is confusing, please modify it.

The description of the calculation of SC_b has been reworded (lines 189-192). "In common with other studies (Sanford et al., 2011; Miller et al., 2014, 2015, 2016; Cartwright et al., 2014; Rumsey et al., 2015), SC_b is estimated from the SC of the river during low flows. Two methods for estimating SC_b were used. The *Variable SC* approach estimates daily SC_b values by interpolating between high SC_r values in successive water years, which assumes that the river is entirely fed by groundwater each year during low flows (as in Fig. 1)".

4) Lines 183-184. It is feasible to adopt the recommended value of recession coefficients. However, the recession coefficients of different watersheds are likely to have certain differences, and it can be easily determined through recession analysis. So I suggest you determine it through recession analysis.

The recession constants were recalculated for individual hydrographs. This is reported on lines 234-237: "In Eq. (2), a is the recession constant which was estimated from the falling limbs of the hydrograph following Nathan and McMahon (1990) and Eckhardt (2005). a varies between 0.92 and 0.95 with a median value of 0.93 (Table S1)." Table S1 in the Supplement summarises the parameters used in the filters and sliding minimum analyses. The changes to a made no substantial difference to the calculations.

5) Line 195, Figure 2. Lack of legend for baseflow conductivity.

The legend was corrected (line 249).

6) Line 230, Figure 4. The legend for points and lines is missing.

The legend was added (line 285).

7) Line 247, Figure 5. The legend for the dots in different colors is missing.

The meaning of the closed and open symbols was added to the caption (lines 305-308).

Reviwer #2

Some of the general comments made by Reviewer 2 were addressed in the original version, but were scattered through the different sections of the Discussion. In the revised version, the more general themes have been moved to the Conclusions with additional details.

I guess the paper could be even stronger if more detailed information was given how a valuable CMB/SC method should look like (i.e., what kind of flow periods should at least be considered to reduce bias in baseflow estimation, see below).

This has been made more explicit in the Conclusions (lines 374-377): "SC records of several years to decades that include both low- and high-flow years are ideally required to evaluate and apply the CMB method. In addition, SC values from near-river groundwater could be used to assess whether and when the rivers are entirely sustained by groundwater inflows."

I am not sure if the presented bias in baseflow estimation during high SC periods can be transferred 1:1 to other regions than Australia. Or in other words, are the found deficiencies of the presented methods also an issue in more humid catchments, i.e., other regions of the world where typical ranges of SC might be very different to those measured in this study?

This is also now addressed in the Conclusions (lines 380-388): "The high SC values of groundwater in southeast Australia result in the streams having high and variable SC values. Although only a subset of streams was analysed in this study, SC values in the rivers in this region are almost invariably highest during low flow periods in drier years (Department of Land, Water and Planning 2021), implying similar behaviour. Other semi-arid to temperate catchments globally are likely to behave in a similar manner, although this may not be as obvious where the groundwater SC values are lower. Higher rainfall catchments may never be totally sustained by groundwater inflows as interflow and bank storage waters may always be present (McCallum et al., 2010; Cranswick and Cook, 2015; Rhodes et al., 2017; Cartwright and Irvine, 2020). In those cases, the CMB method may still be able to estimate the relative importance of groundwater contributions to baseflow, especially if independent estimates of groundwater SC can be made."

A further concern in this perspective is the selection of catchments that are used to justify the outcomes of the study. I am not sure if the reference to the Supplement is enough to understand the characteristics of the study catchments (as there is also no map or other topographic or hydrogeological information on this catchments). At this point I ask myself how much regional distinctions are in the study and what about the transferability of the results (see above). To judge this, the reader might need more details on the catchments what from my point of view can be easily done by transferring information from supplement to the paper.

In response to this (and also the request from the Associate Editor), the descriptive material from the Supplement was moved to the main body of the paper (Section 2, lines 113-157). The start of Section 3 (lines 160-166) was reworded to avoid repetition. Catchment maps showing the location of the gauging stations and landuse were added to the Supplement (Figs S1-S4).

The study proposes a multi geochemical analysis in larger rivers to identify many/more sources of water: It would be nice to be more concrete here, e.g., what kind of geochemical analysis are needed, during which seasons or flow periods and what is meant with larger catchments. I doubt that larger catchments will offer a clearer signal as with increasing catchment area also often human interactions

increase and regional groundwater systems will become more important. However, it might be worth to gain an additional review for this interesting study from the isotope/tracer or hydrogeological community.

This has also been addressed in the Conclusions (lines 392-396): "There is an increasing number of analytes that may be measured autonomously over extended periods and detailed multi component geochemical studies can separate different sources of water may help resolve this question. For example, nitrate is commonly elevated in near-surface waters compared with regional groundwater (e.g. Duan et al., 2014; Bowes et al., 2015) and stable isotopes (Klaus and McDonnell, 2013; Tweed et al., 2016) can also be used to separate different water sources."

Minor comments

Fig. 5: What is the difference between the blue and white points (here circles and squares)?

The figure caption has been amended to explain the closed and open symbols (lines 305-308).

Fig.3: A lot of overplotting is going on here. A density scatterplot might help out to see more details of the point clouds.

The symbols on these plots have been changed to make them clearer (line 261).

Is the filter parameter of 0.93 justified by other studies in the same region or is it just a value from literature? Normally it is recommended to have values between 0.95 and 0.90 and the specific values has a high impact on the actual baseflow estimate.

As discussed above, the recession constants are now calculated for individual hydrographs. This is reported on lines 234-237: "In Eq. (2), a is the recession constant which was estimated from the falling limbs of the hydrograph following Nathan and McMahon (1990) and Eckhardt (2005). a varies between 0.92 and 0.95 with a median value of 0.93 (Table S1)." Table S1 in the Supplement summarises the parameters used in the filters and sliding minimum analyses.

In general, the axes labels of most figures are too small.

The text size on the figures has been increased

The SM method is based on variable N. Is N somewhere reported for the specific catchments? And, is the assumption of N being a function of catchment area really valuable?

More detail has been provided and the values of N, a, and BFI_{max} have been included in Table S1. Lines 292-296 state: "Adjusting the SM technique by varying N in Eq. (2) and the RDF by varying BFI_{max} in Eq. (3) allows the total BFI estimates from these methods to be brought into agreement with those calculated using the CMB (Tables 1 and S1). For the SM technique, N values are as high as 35 days and are higher in catchments with low BFI values (Table S1). Values of BFI_{max} are inversely proportional to the calculated BFI, and are as low as 0.07 (Table S1)."