Supplement of

High-resolution water level and storage variation datasets for 338 reservoirs in China during 2010–2020

Youjiang Shen[1], Dedi Liu[1], Liguang Jiang[2], Karina Nielsen[3], Jiabo Yin[1], Jun Liu[4], Peter Bauer-Gottwein[4]

[1]State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, 430072, China

[2]School of Environmental Science and Engineering, Southern University of Science and Technology, Shenzhen, 518055, China

[3]DTU Space, National Space Institute, Technical University of Denmark, 2800, Kongens Lyngby, Denmark

[4]Department of Environmental Engineering, Technical University of Denmark, 2800, Kongens Lyngby, Denmark

Correspondence to: Dedi Liu (dediliu@whu.edu.cn)

Contents of this file

Text S1, Figures S1 and Table S1.

- Text S1 describes the details of the optimal buffer distance for calculating reservoir area series.
- Fig. S1 further supports the Text S1 in selecting the optimal buffer size.
- Table S1 describes the details of 93 reservoirs with in-situ observations for evaluation in this work, and corresponding statistical metrics of our remotely-sensed WSE and RWSC datasets.

Text S1. Reservoir buffer size comparison.

As mentioned in Sect. 2.2, we tested five reservoir buffer sizes, to capture valid water pixels beyond the static GRanD reservoir shapefiles. Ideally, reservoir water areas would increase with continually increasing buffer distance. However, there are tradeoffs between large and small distances because the continual increase in water area with buffer distance could indicate either very large increases in water area beyond static shapefile or capture of non-target reservoir waters (e.g., lakes and rivers nearby).

To determine the optimal buffer size, we assessed proportional water increases with increasing buffer sizes across reservoirs. More specifically, we calculated water areas using the GRSAD algorithm with 30 m, 60 m, 90 m, 120 m, and 1000 m buffers during 2010-2020. For each year, we took the sum of monthly water area estimates (12 values) as the total water area for each reservoir, then, calculated the proportional water increases with increasing buffer sizes across reservoirs and divided into five categories, i.e., percent of reservoirs (N = 339) no increase, <1% increase, 1–5% increase, 5–10% increase, and >10% increase in total water surface area (See Fig. S1).

The principle of selecting the optimal buffer size is to minimize the proportion of reservoir area increases due to non-target reservoir waters. Thus, we pay more attention to the proportion of reservoirs that increase >1% in total water area as buffer distance increased. As the buffer was extended from 30 m to 60 m, the proportion of reservoir displaying >1% increase also increased. As the buffer was extended from 60 m to 90 m, percentage displaying <1% is the highest, and percentage displaying >1% is still large. Percentage displaying <1% was highest between 90 m and 120 m (Fig. S1). We broadly interpret this change to represent capture of real reservoir area fluctuations. 120 m is also reasonable in a broad sense. Thus, we set the 120 m to construct reservoir area time series.

Fig. S1.

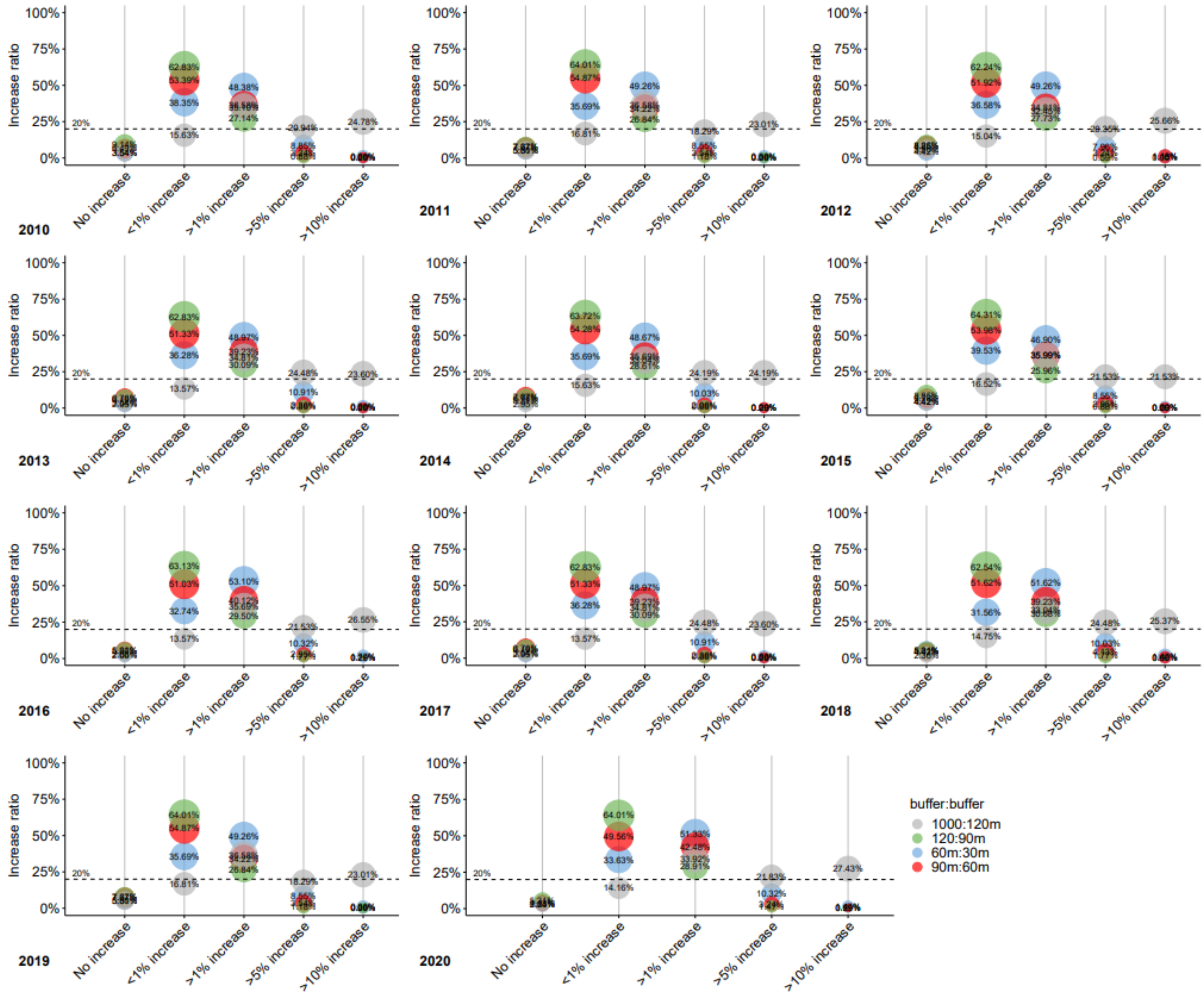

Fig. S1: Buffer comparisons with percent of reservoir (N = 339) No increase, <1% increase, 1–5% increase, 5–10% increase, and >10% increase in total water surface area for each year (2010-2020).

Table S1.

We obtained daily water level and storage data spanning 2015-May 2021 of 93 reservoirs as a reference for validation. Detailed evaluation results and locations of these reservoirs can be found in Sect. 3.3 and Evaluation reports in the repository. Here, we just give the reservoir ID of Figs. 3-4 in the main text.

Table S1. ID of reservoirs validated in this study.

ID	GRanD	ID	GRanD	ID	GRanD	ID	GRanD	ID	GRanD	ID	GRanD
1	5535	13	5197	25	5304	37	5372	49	5478	61	5736
2	5566	14	5199	26	5305	38	5376	50	5505	62	6161
3	5610	15	5201	27	5306	39	5378	51	5526		
4	5656	16	5204	28	5319	40	5387	52	5528		
5	5722	17	5215	29	5323	41	5392	53	5590		
6	6169	18	5216	30	5336	42	5397	54	5593		
7	5062	19	5238	31	5349	43	5410	55	5604		
8	5115	20	5267	32	5356	44	5419	56	5648		
9	5189	21	5270	33	5360	45	5437	57	5660		
10	5192	22	5288	34	5362	46	5463	58	5697		
11	5193	23	5296	35	5367	47	5469	59	5729		
12	5196	24	5298	36	5368	48	5477	60	5730		