

# Temporal Environment-Aware Image Generation via Latent Diffusion

## Supplementary Material

### 001 **A. Dataset**

002 The dataset, as presented in Table 1, integrates multiple  
003 data modalities including high-resolution images, stream-  
004 flow measurements, and timestamped weather conditions.  
005 Table 2, shows the weather data features that are crucial for  
006 precise alignment between the generated images and real-  
007 world environmental changes. All the stream sites involved  
008 in our tests are small streams from the same region.

### 009 **B. Experiment Setup**

010 The proposed method is implemented using PyTorch, and  
011 trained on a single NVIDIA RTX A6000 GPU with 48 GB  
012 memory. We use VQGAN-f-8 for first stage auto encoder  
013 part. Image resolution for first stage part is  $256^2$ , z-shape is  
014  $4 * 32 * 32$ , model-channels are 256, the transformer depth  
015 is 1, and the number of heads is 32. The conditioning is  
016 implemented by cross attention to integrate  $c$  and  $z$  in latent  
017 diffusion, with condition dimension of 512. The diffusion  
018 channel multiplier is set to  $\{1, 2, 4\}$ , the batch size is 4, the  
019 length of sequence is 8, and the learning rate is  $1e - 06$ . The  
020 scale factor  $s$  is set to 2.

Table 1. Statistics of data from multiple stream sites.

Sites	Train			Validation			Test		
	Size	Flow	Date	Size	Flow	Date	Size	Flow	Date
West Brook Reservoir	271	1.01-76.00	2021/03/25-2021/10/17	108	1.30-122.91	2021/08/21-2021/09/30	162	1.20-147.77	2021/07/06-2021/08/21
West Brook Lower	680	0.20-373.18	2019/12/31-2021/11/01	272	2.86-363.90	2021/07/25-2021/09/24	480	1.42-373.00	2021/04/25-2021/07/25
West Brook Upper	788	0.04-263.43	2020/01/03-2021/11/06	315	0.58-196.98	2021/06/13-2021/08/22	472	1.11-122.81	2021/02/13-2021/06/13
Avery Brook Right	540	0.77-69.59	2021/03/19-2021/12/21	216	2.24-76.94	2021/10/03-2021/11/21	323	1.86-283.25	2021/07/14-2021/10/03
Avery Brook Left	366	1.78-283.25	2021/07/02-2021/12/21	146	4.45-73.00	2021/10/29-2021/12/01	220	2.04-76.94	2021/09/08-2021/10/29
Avery Brook Bridge	155	2.44-57.62	2021/03/10-2021/12/21	38	3.83-66.77	2021/08/04-2021/11/27	39	0.81-61.49	2021/06/07-2021/08/04
Obear Brook Lower	320	0.03-13.16	2021/03/30-2021/11/01	128	0.03-13.27	2021/07/09-2021/10/14	193	0.01-4.69	2021/05/23-2021/07/09
West Whately	137	0.47-6.66	2021/04/06-2021/10/28	35	0.65-10.55	2021/07/31-2021/10/06	35	0.12-4.90	2021/06/09-2021/07/31
Sanderson Brook	168	1.19-38.37	2021/04/01-2021/10/28	45	1.49-38.52	2021/08/21-2021/10/02	42	1.03-28.70	2021/06/19-2021/08/21

Table 2. Summary statistics for weather data.

Statistic	Average Temp (C°)	Max Daily Temp (C°)	Min Temp (C°)	Wind Speed (m/s)	Wind Direction (°)	Max Wind Speed (m/s)	Mean Relative Humidity (%)	Atmospheric Pressure (mb)	Mean Solar Radiation (W/m <sup>2</sup> )	Total Rainfall (mm)
Mean	9.40	14.81	4.40	1.45	217.91	9.17	72.61	1017.39	156.59	3.74
Std	9.98	10.73	9.91	0.67	104.81	3.71	18.88	7.28	94.61	9.19
Min	-18.92	-17.18	-49.49	0.00	0.00	0.00	20.77	988.00	5.02	0.00
Max	29.08	36.03	24.28	5.37	359.90	27.93	100.00	1039.00	365.70	84.60