



*Supplement of*

## **FootNet v1.0: development of a machine learning emulator of atmospheric transport**

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## 3 **1 Sensitivity test on the amount of history information for** 4 **footprint emulation**

5 This section presents results from a sensitivity test on the amount of history information as the  
6 input for FootNet. Figure S1 A shows a footprint simulated by the STILT full-physics model from  
7 the test data set. Figure S1 (B,C,E,F) show the corresponding predictions made by FootNet, with 6-  
8 hour, 12-hour, 18-hour, and 24-hour backward history information, respectively. Figure S1 D shows  
9 the comparison and linearly fitted lines between the truth (STILT results) and the predictions.  
10 We find that FootNet with a 6-h history information as its input gives the best performance in  
11 the emulation, for the study using data from two locations (SF Bay Area and the Barnett Shale)  
12 presented in the main text. More information could be required for a generalizable model trained  
13 using more footprints from a broader region in the future.

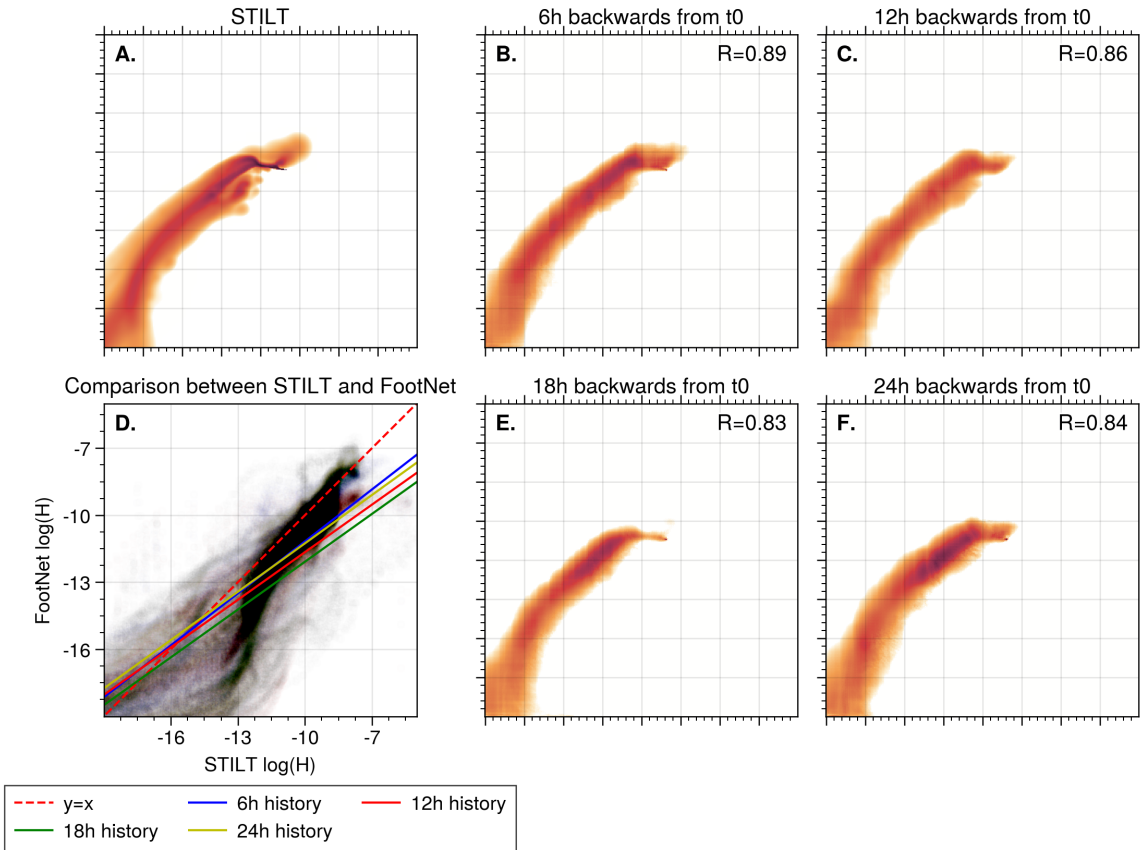


Figure S1: Log-transformed footprints ( $\log(H)$ ) simulated by (A) the STILT model, FootNet with (B) 6-hour history information backward from measurement time ( $t_0$ ), (C) 12-hour history information, (E) 18-hour history information, and (F) 24-hour history information. Pearson correlation coefficients associated with the emulated results are shown in the top right corner of the figures. (D) Comparison between the footprint values from the STILT simulation and the FootNet emulations.

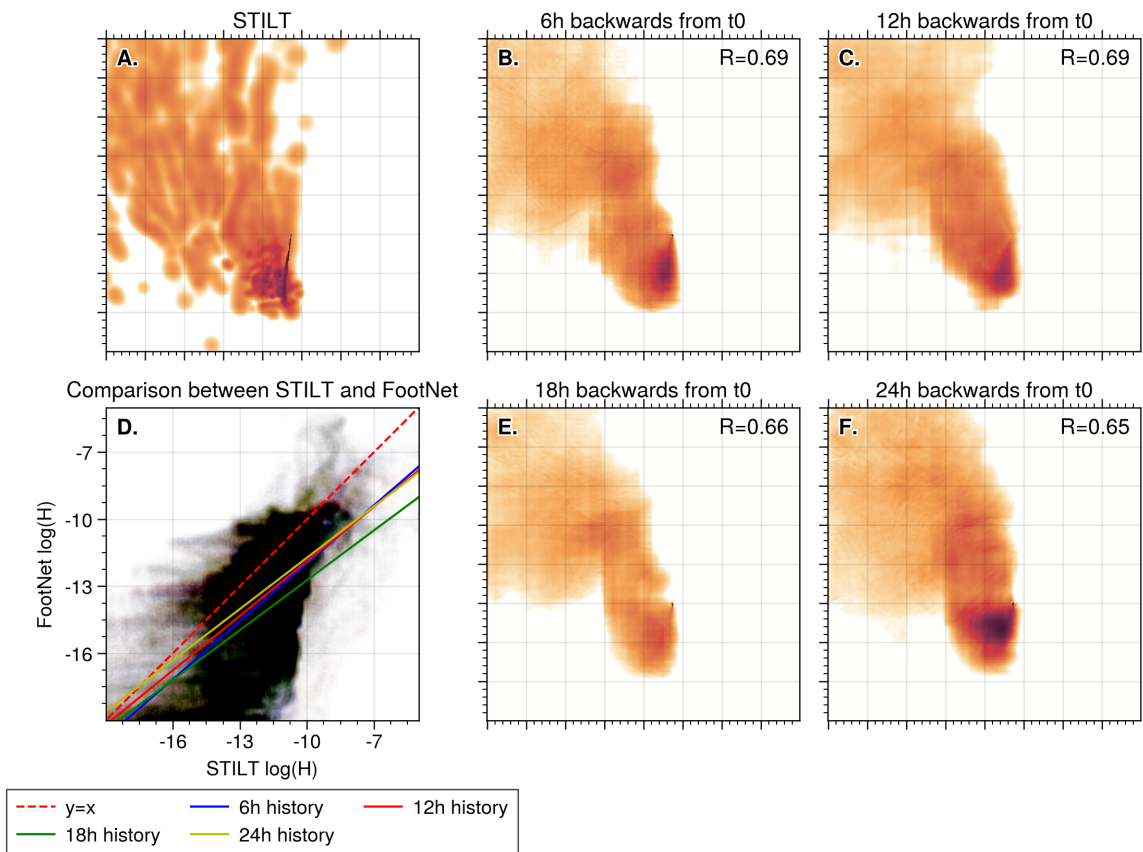


Figure S2: Same as Figure S1, but for a different location.

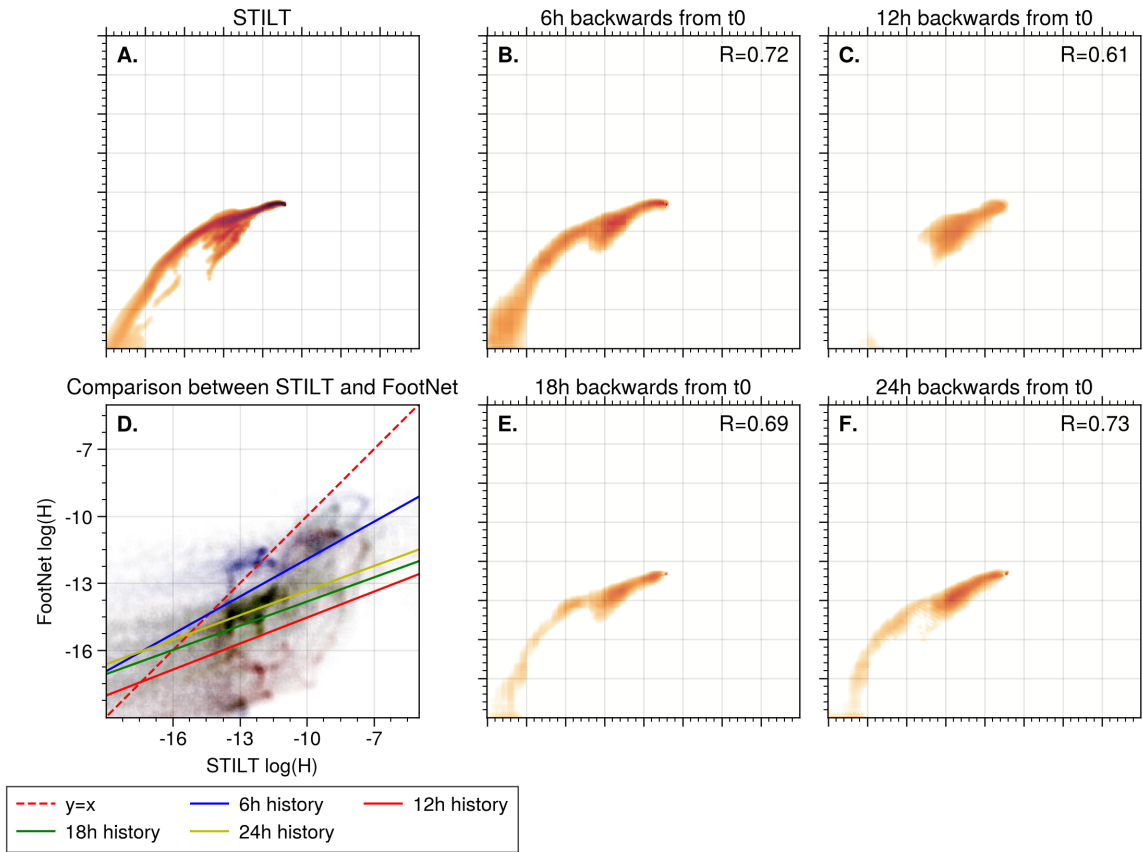


Figure S3: Same as Figure S1, but for a third location.