

TUM



Online Domain Adaptation for Semantic Segmentation in Ever-Changing Conditions

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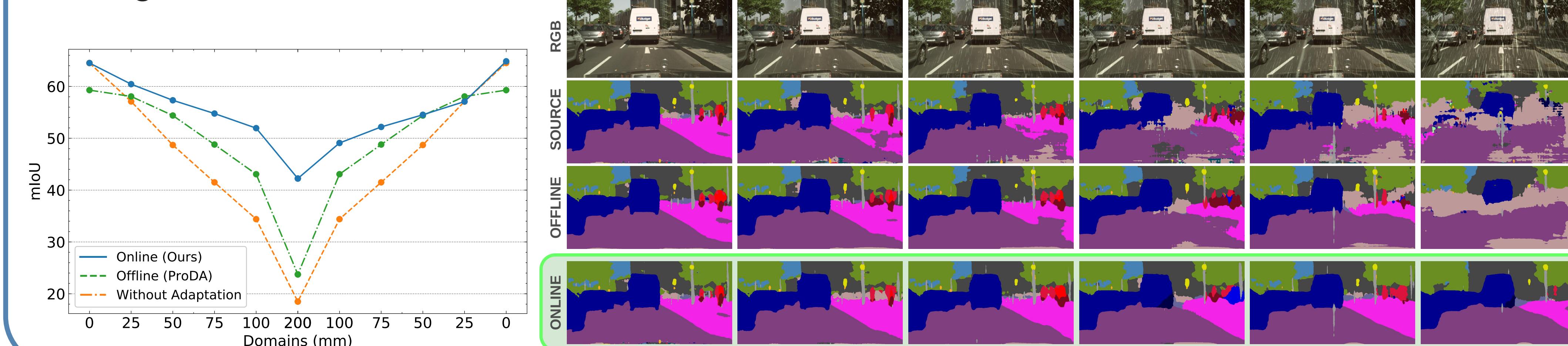


Problem Definition & Contributions

Problem UDA aims at reducing the domain gap between training and testing data, but is usually carried out offline. However, **domain changes may occur continuously and unpredictably** (e.g. sudden weather changes). In such conditions, deep neural networks witness dramatic drops in accuracy.

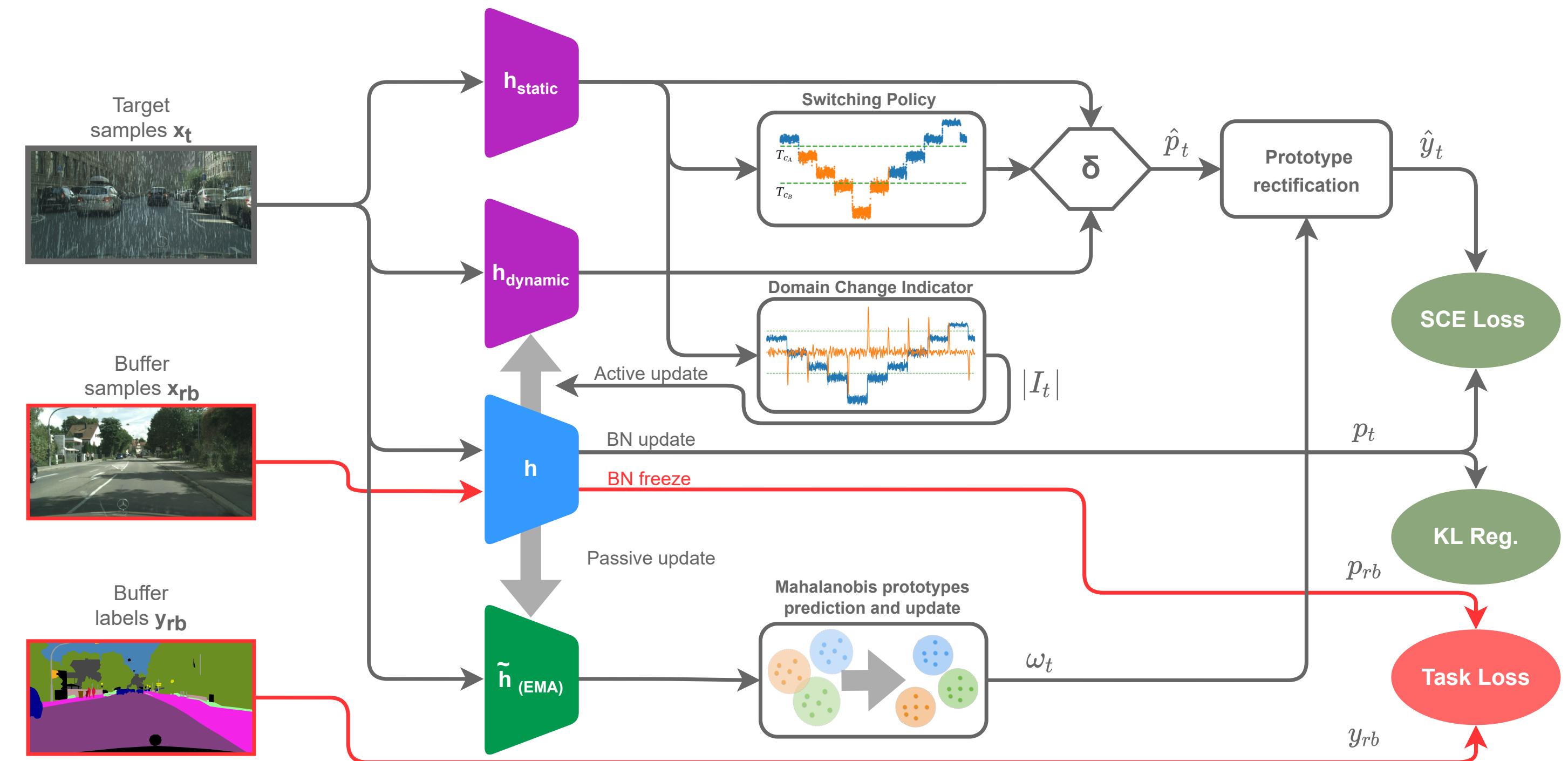
Main contributions:

- We introduce an online progressive adaptation **benchmark** for UDA methods.
- We propose an **online approach** that leverages progressive adaptation to increase performance on distant domain.
- We demonstrate that **catastrophic forgetting can be avoided** by actively updating the self-training policy during adaptation and using a Replay Buffer.
- We run experiments on various simulated scenarios and, crucially, we show that models that have been previously exposed to gradual domain adaptation can **acquire the ability to cope with sharp changes** as well.

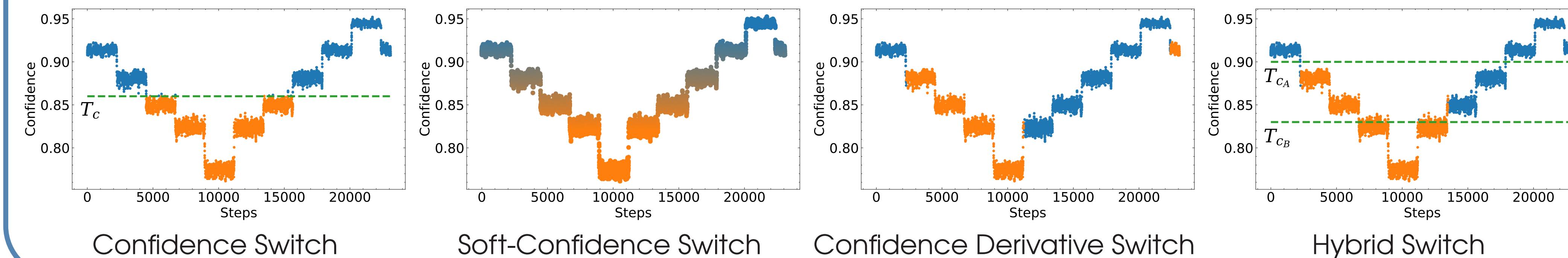


OnDA Architecture

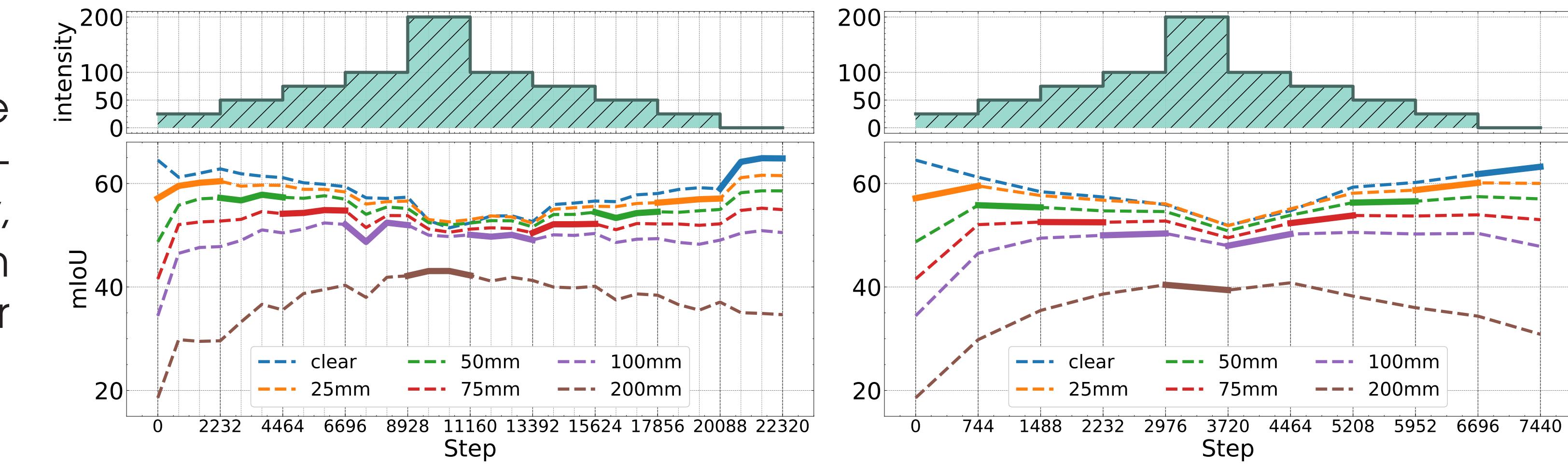
We use h_{static} confidence gradient for both detecting domain changes and teachers orchestration. Every time we detect a domain shift we update h_{dynamic} . Employing h_{static} prevents catastrophic forgetting, while h_{dynamic} enables greater flexibility for targets far away from source. **Teacher orchestration is handled by the Switching Policies.**



Teacher Switching Techniques

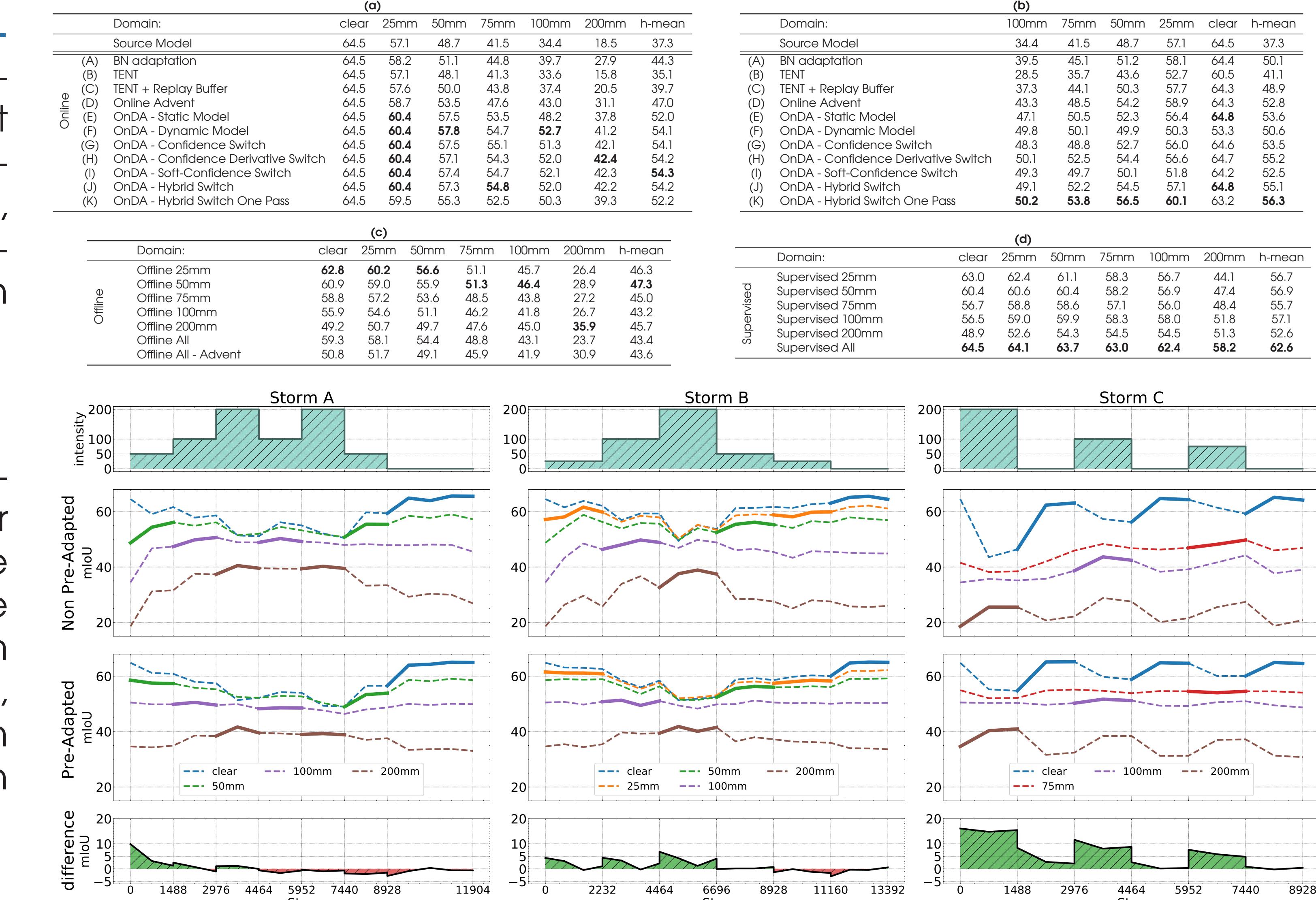


Experimental Results



Comparison with Offline UDA. We evaluate OnDA in different flavours on the Increasing Storm scenario, together with existing offline adaptation methods.

More Storms. We simulate three, further storms. We compare OnDA performance when adapted from scratch on these storms, and after having been previously adapted on the Increasing Storm.



Dataset and Qualitative Results on Synthetic Weather

