WINN
WOFOST Insigths in Neural Networks

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When modeling nature...

Process-based models are **explainable** but **hard to calibrate**

Neural Nets are **flexible** but **black boxes** and **lack physical consistency**

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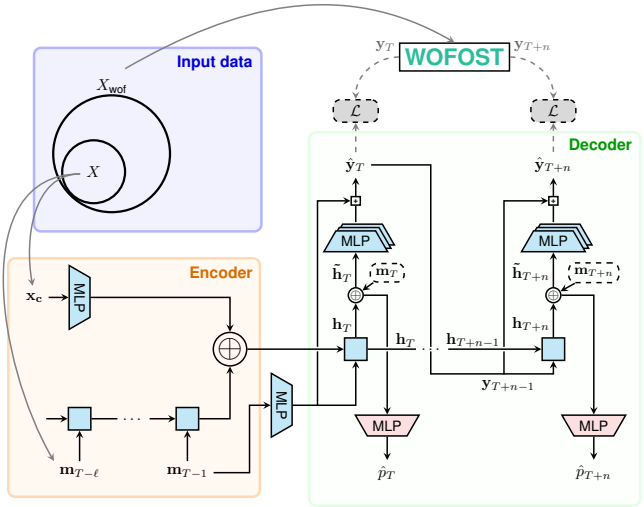
We fuse ~~physics~~ knowledge into NN to generate consistent crop predictions that generalize beyond observed conditions !

A PHYSICS-GUIDED SEQ2SEQ WOFOST SURROGATE



- **Observational Bias**
  Surrogate modeling.
- **Inductive Bias**
  Using prior knowledge to introduce by-construction constraints:

$$\mathbf{y}_t^i = \max(\mathcal{M}(\tilde{\mathbf{h}}_t^d), 0) + \mathbf{y}_{t-1}^i$$

- **Learning Bias**
  Adding physical penalties to $\mathcal{L}$:

$$\mathcal{L} = \alpha\mathcal{L}_{\text{d}} + \beta\mathcal{L}_{\text{d-phy}} + \gamma\mathcal{L}_{\text{s-phy}}$$