

Unified high resolution water quality retrievals from Earth Observation satellites

James D. Harding | s1138132

james.harding@ed.ac.uk

The University of Edinburgh

Problem Definition

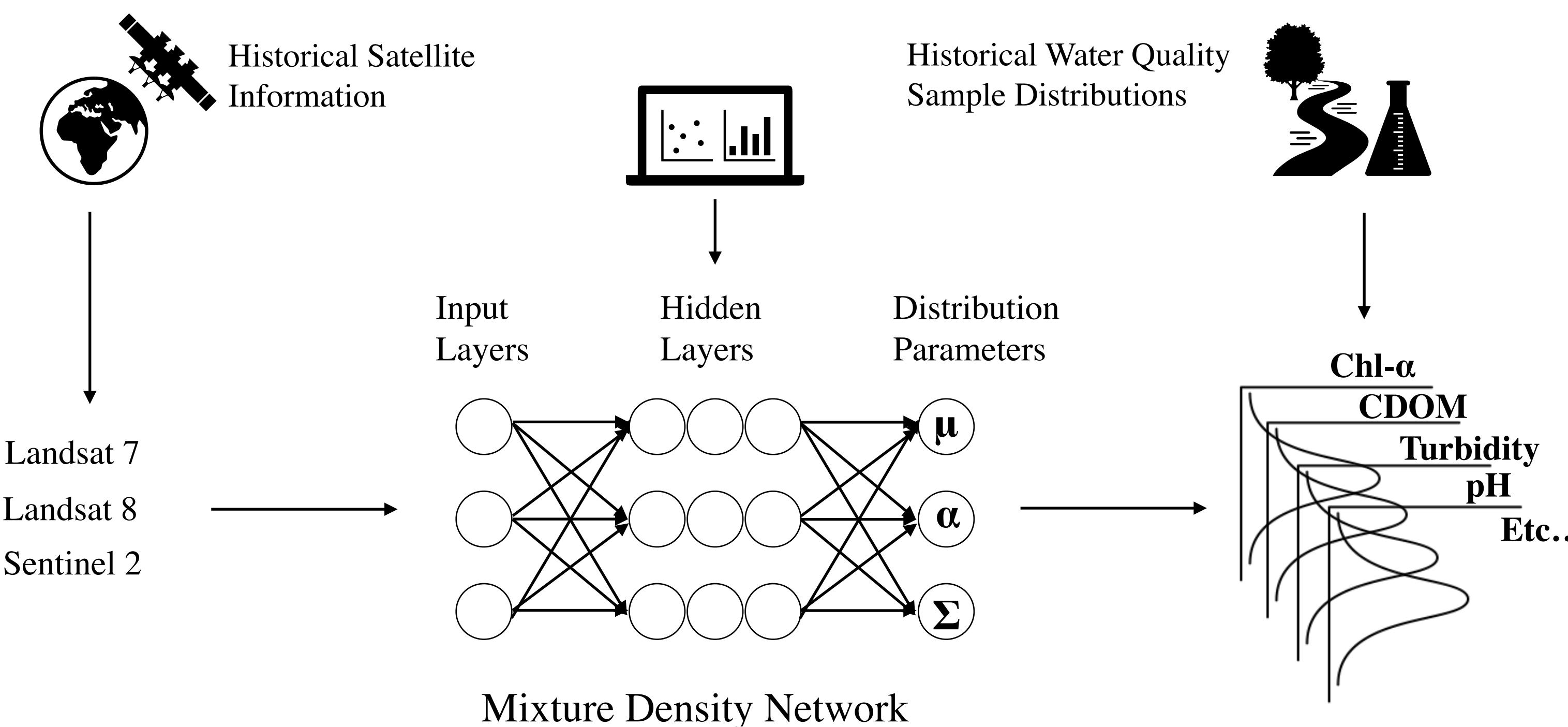
- Need for improved generalised regional models¹. With prediction intervals for real data, and which are calibration free in order to:

- Enhance spatiotemporal coverage
- Allow for non-optical parameter estimates via covariances with optical parameters
- Integrate more seamlessly and efficiently as a tool with regional monitoring groups
- Enhance understanding of biogeochemical processes

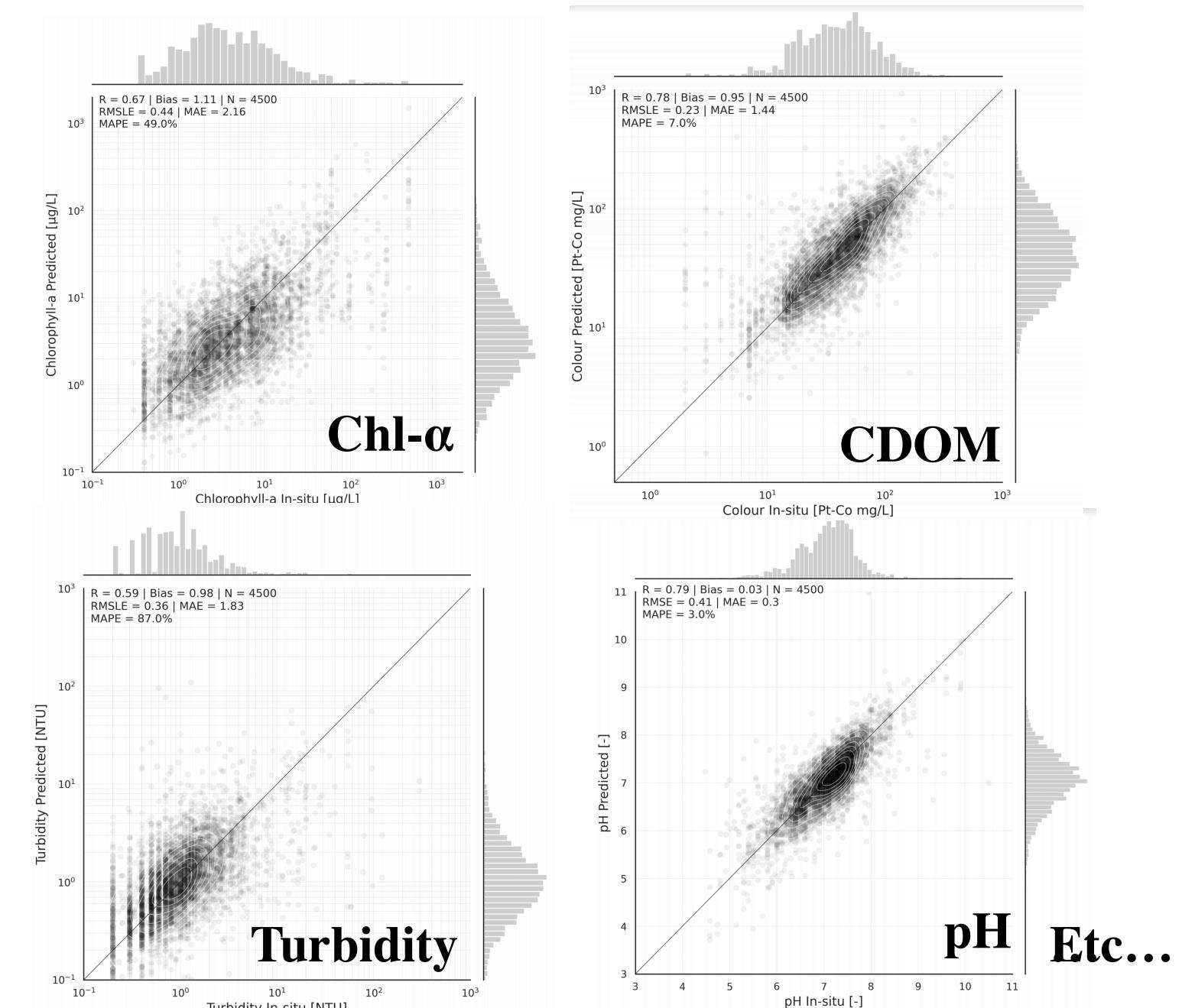
Approach

- Train a unified multi-band input, multi-parameter output mixture density network using Scotlands historical at-sensor and in-situ observations (1999-2018 / 200+ lochs and rivers / 30+ parameters):
 - Provides prediction intervals conditioned on real data
 - Unbiased, calibration free estimates for three satellites
 - Relates statistically with regions past monitoring work
 - Preserves parameter covariances and utilises these to fill sparse and irregularly sampled in-situ data

This work in figures



Preliminary Test Results



¹ Topp, S.N.; Pavelsky, T.M.; Jensen, D.; Simard, M.; Ross, M.R.V. Research Trends in the Use of Remote Sensing for Inland Water Quality Science: Moving Towards Multidisciplinary Applications. *Water* **2020**, *12*, 169. <https://doi.org/10.3390/w12010169>