Module	Explanation
1. Associator	Spatio-temporal matching of MERIS TOA reflectances with AERONET (L2) AODs from stations in the dustbelt.
2. Artificial Neural Network (ANN) Setup	Use of 14 features, decided by performing sensitivity tests: • Reflectances at (9) wavelenghts • sun-sensor geometry (5) • Use of L2 regularization. • Flexible iteration breaks w.r.t. error measures.
3a. Tuner	Grid search for parameter tuning: hidden layers, nodes, activation functions, regularization param., etc.
3b. Pretrainer	Preliminary training of the ANN. Random train-test-set splits: final model from a median w.r.t. to abs. error.
3c. Final trainer	Use **transfer learning** with the Pretrainer.

- The resulting ANN has **7 hidden layers** with node number $\in [4, 56]$.
- Performance for $\mathbf{0.01} < \mathbf{AOD} < \mathbf{1.01}$: (mean) *Pearson's corr. coefficient of* $\mathbf{0.71}$*/0.65*, and *abs. error of* $\mathbf{0.085}$*/0.088* on the validation/test set.

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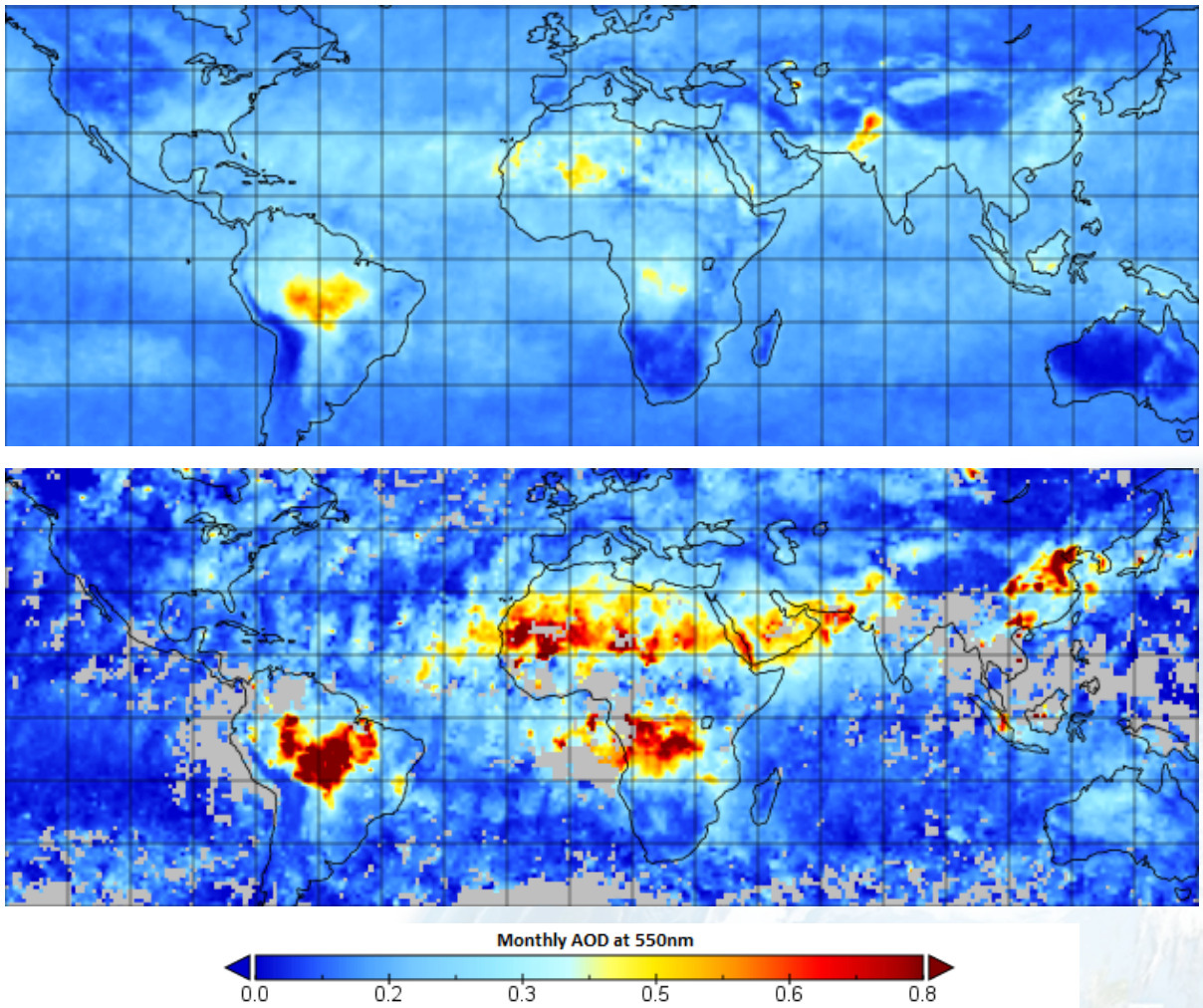
MERIS-ANN approach vs AATSR-ensemble algorithm



Monthly mean AOD at 550nm retrieved by the MERIS-ANN approach (above) and the AATSR-ensemble algorithm v. 3.0 (below).

***Note: the AATSR-product is color-scaled to the retrieved range of MERIS-ANN approach (max $AOD^{AATSR} = 2.1$).*

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