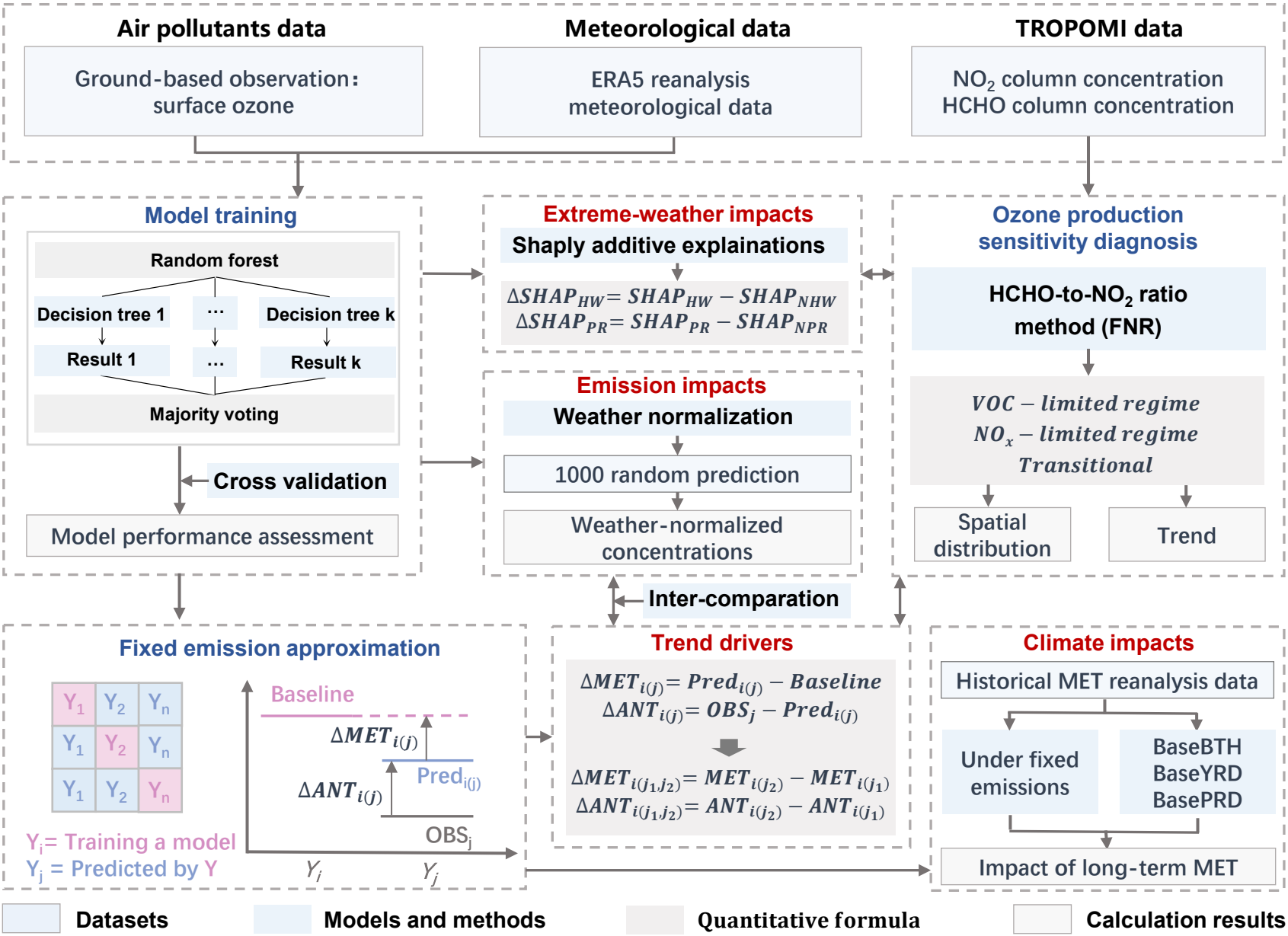
Air pollutants data
Ground-based observation: surface ozone
Meteorological data
ERA5 reanalysis meteorological data
TROPOMI data
NO_2 column concentration
HCHO column concentration
Model training
Random forest
Decision tree 1
…
Decision tree k
Result 1
…
Result k
Majority voting
Cross validation
Model performance assessment
Extreme-weather impacts
Shaply additive explainations
$\Delta SHAP_{HW} = SHAP_{HW} - SHAP_{NHW}$
$\Delta SHAP_{PR} = SHAP_{PR} - SHAP_{NPR}$
Emission impacts
Weather normalization
1000 random prediction
Weather-normalized concentrations
Ozone production sensitivity diagnosis
HCHO-to-NO_2 ratio method (FNR)
$VOC - limited\ regime$
$NO_x - limited\ regime$
$Transitional$
Spatial distribution
Trend
Inter-comparation
Fixed emission approximation
Y_1 Y_2 Y_n
Y_1 Y_2 Y_n
Y_1 Y_2 Y_n
Y_i= Training a model
Y_j = Predicted by Y
Baseline
$\Delta MET_{i(j)}$
$\Delta ANT_{i(j)}$
$Pred_{i(j)}$
OBS_j
Y_i
Y_j
Trend drivers
$\Delta MET_{i(j)} = Pred_{i(j)} - Baseline$
$\Delta ANT_{i(j)} = OBS_j - Pred_{i(j)}$
$\Delta MET_{i(j_1,j_2)} = MET_{i(j_2)} - MET_{i(j_1)}$
$\Delta ANT_{i(j_1,j_2)} = ANT_{i(j_2)} - ANT_{i(j_1)}$
Climate impacts
Historical MET reanalysis data
Under fixed emissions
BaseBTH
BaseYRD
BasePRD
Impact of long-term MET
Datasets
Models and methods
Quantitative formula
Calculation results