TICKLE COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

World Organisation for Animal Health
Founded in 1924

PROVNA: Data Curation and RVF Risk Model

Dr. Assaf Anyamba, Heidi Tubbs

WAOH Workshop on PROVNA Project and Foresight
July 3-4, 2024
Lisbon, Portugal

PROVNA

THE UNIVERSITY OF TENNESSEE KNOXVILLE

IZS TERAMO
ISTITUTO ZOOPROFILATTICO SPERIMENTALE DELL'ABRUZZO E DEL MOLISE "G. CAPORALE"

Climate and Geospatial Data

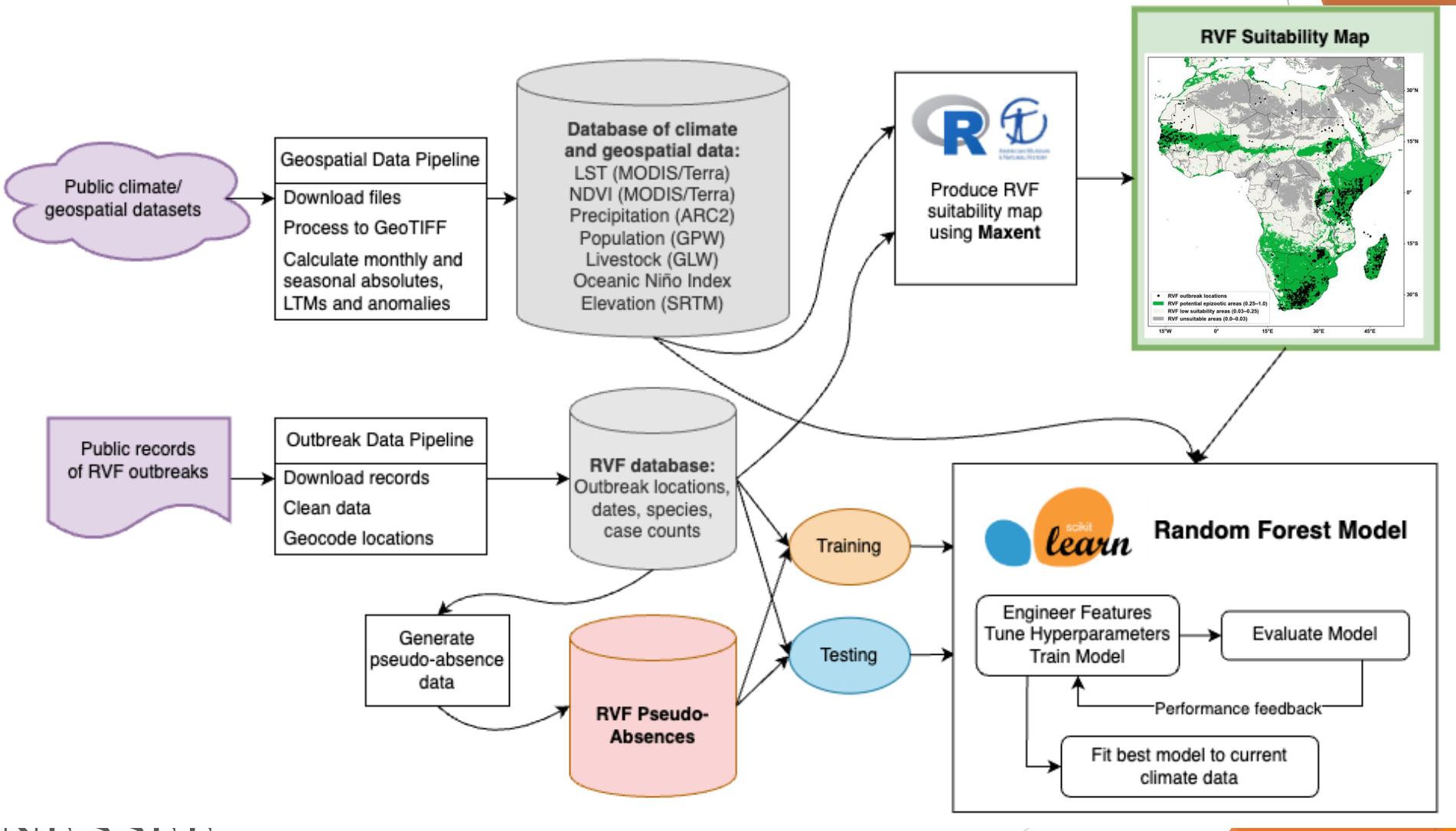
Dynamic

- Land surface temperature (LST)
  - MODIS/Terra (MOD11C3)
  - Monthly, 0.05 degree resolution
  - 2000–2024
- Normalized difference vegetation index (NDVI)
  - MODIS/Terra (MOD13C2)
  - Monthly, 0.05 degree resolution
  - 2000–2024
- Precipitation
  - Africa Rainfall Climatology 2 (ARC2)
  - Daily, 0.1 degree resolution
  - 1983–2024
- Oceanic Niño Index (ONI)

Baseline

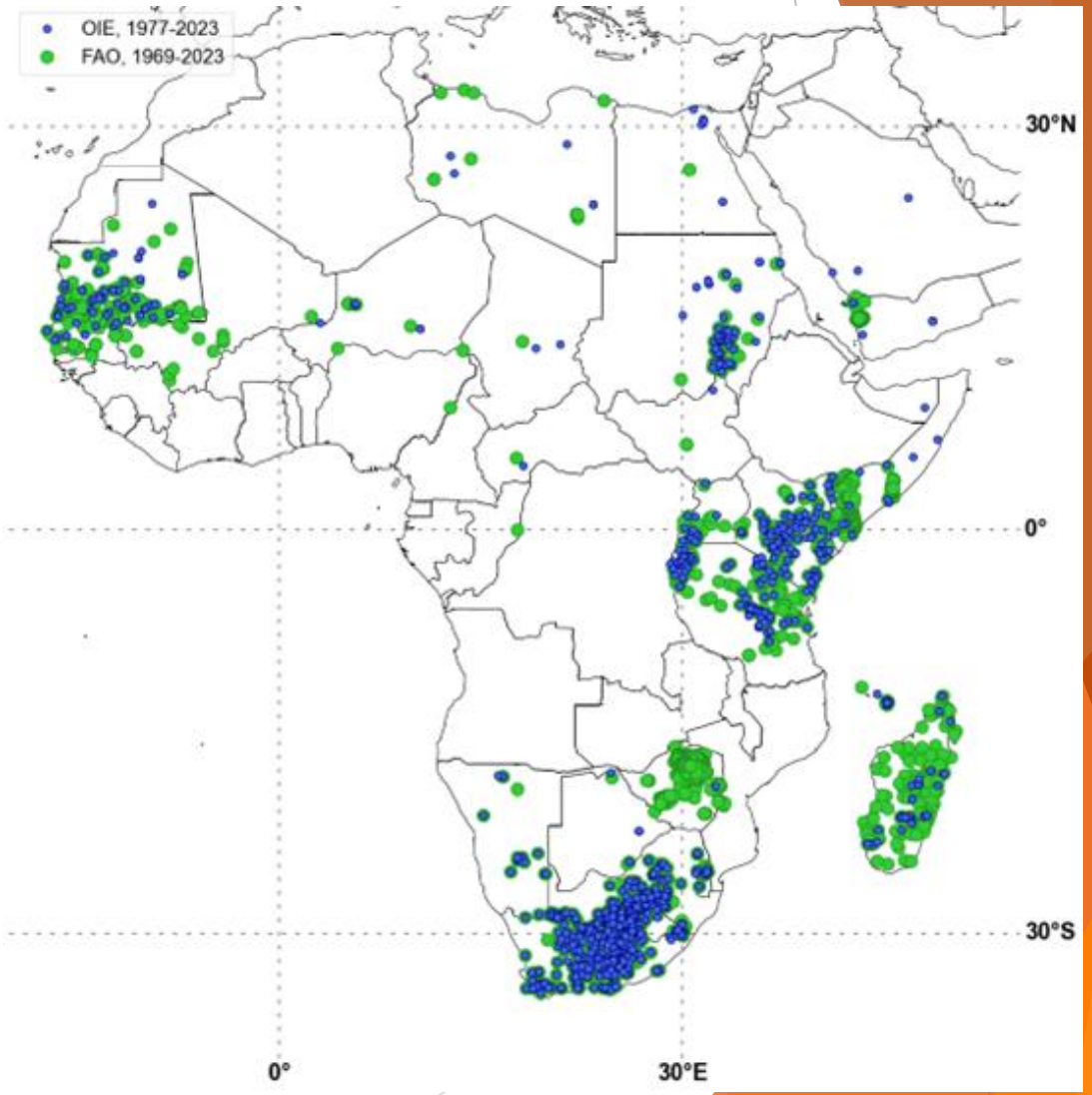
- GPW Human Population Density
  - 5-yearly, 2.5minute (0.04 degree) resolution
  - 2000–2020
- GLW Livestock Population Density
  - 1 km (0.01 degree) resolution
- SRTM Elevation
  - 30 m resolution

RVF Risk Model Implementation



RVF Historical Outbreak Data

- Sources: FAO, WOAH (OIE)
- 1969-2023
- ~2800 reports
  - Removed duplicates by coordinates and year/month
  - Manually filtered very close (<0.05degree distance) points
  - Manually filtered country-level points

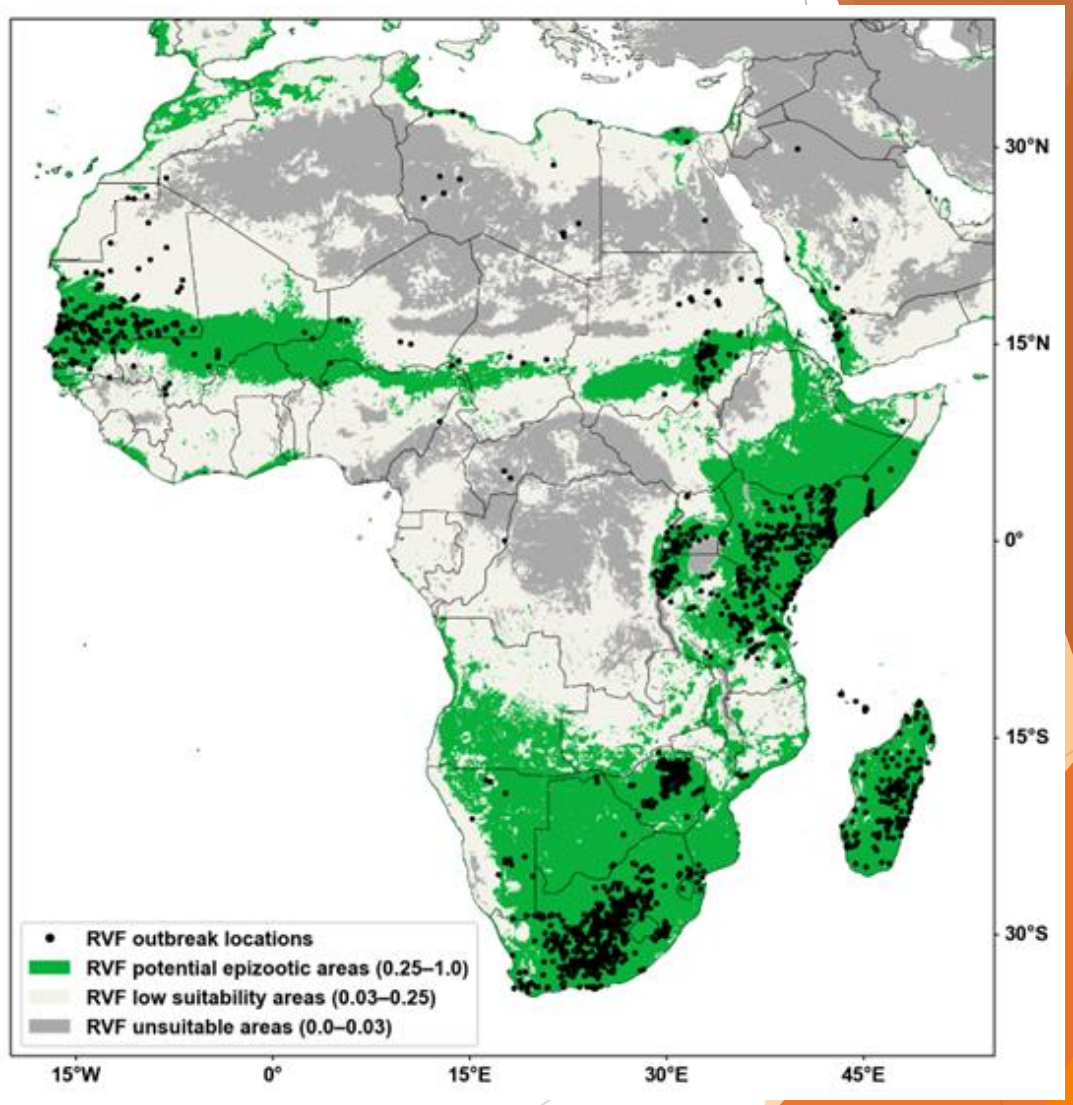


THE UNIVERSITY OF TENNESSEE KNOXVILLE

RVF Suitability Map

- Suitability map created with R, Maxent software from AMNH*
- Features:
  - Bioclimatic variables derived from 2000-2023 climate data
    - MODIS/Terra NDVI
    - MODIS/Terra LST
    - ARC2 Precipitation
  - SRTM Elevation
  - RVF presence (outbreaks)

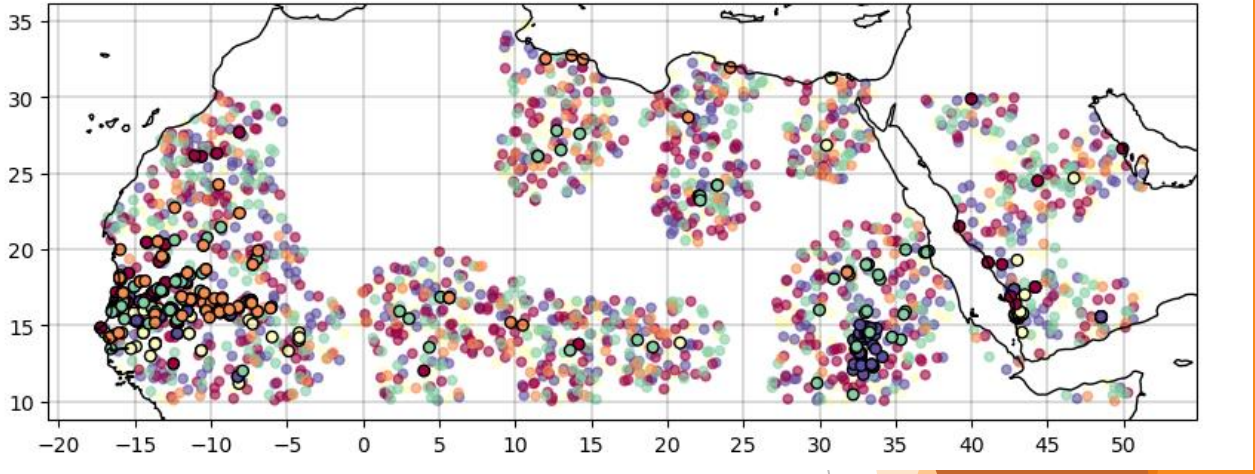
*AMNH: American Museum of Natural History

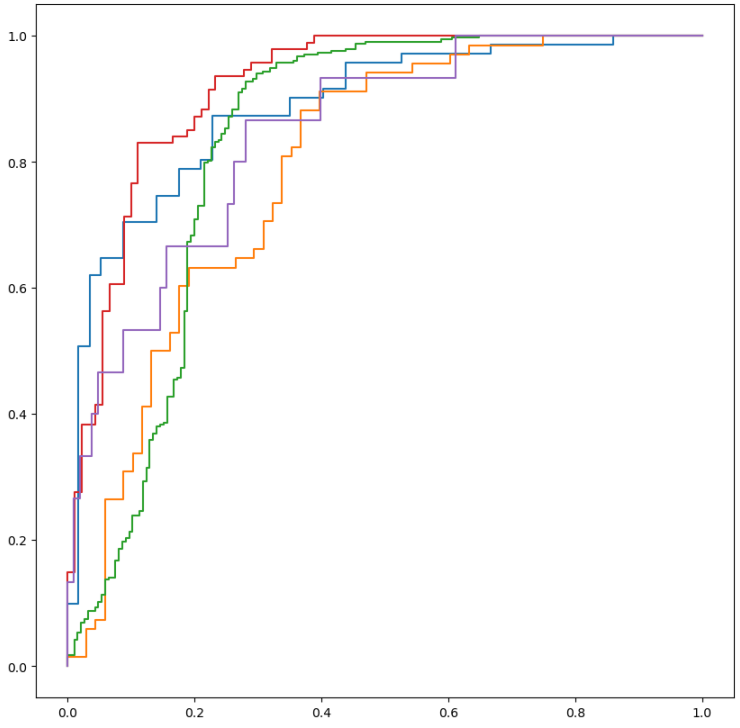


THE UNIVERSITY OF TENNESSEE KNOXVILLE

Random Forest Model: Development and Testing

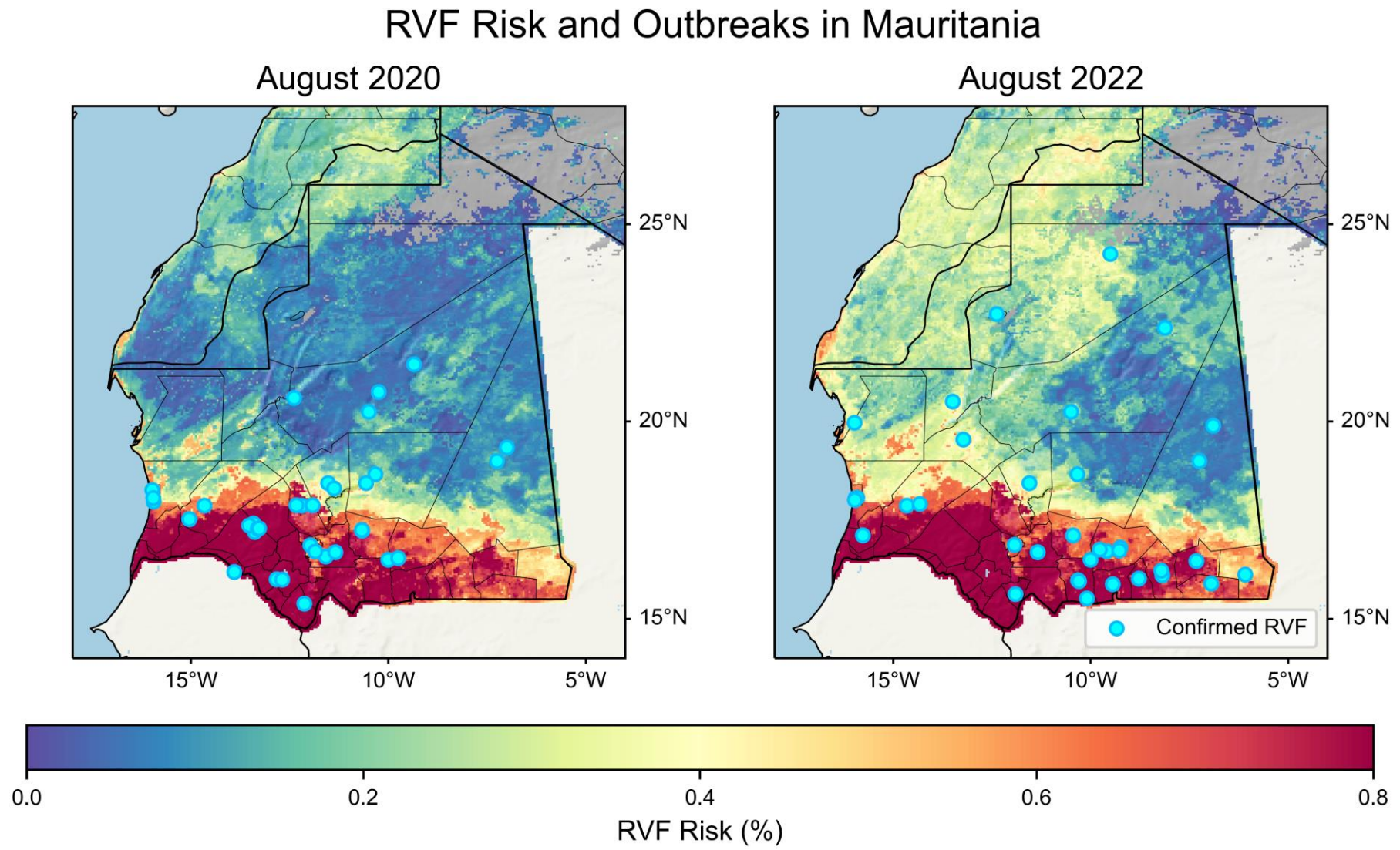
- Pseudo-absence data points randomly generated
  - latitude, longitude, year, month
- Records split into 5 k-folds (subsets)
- Each subset is held out one at a time for testing
- Model applied to climate dataset





THE UNIVERSITY OF TENNESSEE KNOXVILLE

Random Forest Model: Results



THE UNIVERSITY OF TENNESSEE KNOXVILLE

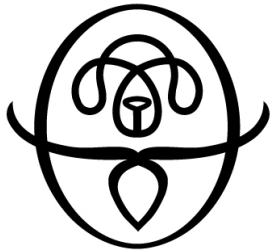
Pathways to Operational Sustainability

- WAOH + Tunis Region Office
- FAO DST in collaboration with WAOH
- Regional body such as Centre Régional AGRHYMET
- REMESA (*REseau MEditerranéen de Santé Animale)*
  - Will require a dedicated Operator
  - Transboundary Threats Require Regional Perspective

Funding and Collaboration

Federal Ministry
for Economic Cooperation
and Development

World Organisation
for Animal Health
Founded in 1924



PC-TAD

ISTITUTO
ZOOPROFILATTICO
SPERIMENTALE
DELL'ABRUZZO
E DEL MOLISE
"G. CAPORALE"

DEPARTMENT OF CIVIL &
ENVIRONMENTAL ENGINEERING

THE UNIVERSITY OF
TENNESSEE
KNOXVILLE

Discussion & GEE App Demo

THE UNIVERSITY OF TENNESSEE KNOXVILLE