Research Overview and Questions

- Project examines agricultural transitions, their drivers, and potential climate change impacts across maize systems in Mexico (Fig. 1).
- Will identify whether current agricultural transitions are adaptive or maladaptive under future climate.
- Will use a combination of remote sensing, field surveys, causal econometric models, and crop models.

Field survey

- Conducted a field survey in June-August 2022 with 708 farmers across a gradient of maize production systems in Mexico (e.g., large vs small landholdings, rainfed vs irrigated; Figs. 2 and 3).
- Interviewed farmers about maize management practices, perceptions of climate change, and whether they are adapting their crop management practices.
- Georeferenced plot boundaries for each farmer’s main maize plot and collected management information to train/validate remote sensing algorithms.

Weather impacts on yields

- Downloaded and processed annual maize production statistics at the Municipality level across Mexico from 2003 to 2020 (Fig. 7).
- Census data contain information on maize area sown, area harvested, production, and irrigation status.
- Currently linking these census data with weather data using similar variables as those reported as important by farmers in our survey (Figs. 4 and 5).
- Will also estimate mean sowing date and variety length (adaptation actions, Fig. 6) for each municipality using MODIS and Landsat satellite data.
- Will use panel fixed effects regressions to causally identify the impact of interannual weather shocks on maize yields, and what the impact of adaptation strategies are on mitigating yield losses.

Remote sensing analyses

- Will use STARFM to fuse MODIS and Landsat satellite data (Fig. 8) to develop a high spatial and temporal resolution product.
- Will map maize sowing date and variety length (the two main adaptation strategies) by using methods that we have developed for and applied to the rice-wheat cropping system in northern India (Fig. 9).