

## Geotechnologies and agricultural key topics in climate change projects

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### Background

Scientific evidences indicate that land use and land cover (LULC) dynamics may affect climate change processes. Among the factors related to these changes, greenhouse gas emissions resulting from deforestation and agricultural practices stand out. The Brazilian Agricultural Research Corporation (Embrapa) has been playing a relevant role in articulating, coordinating, and carrying out research and development projects on climate changes. Embrapa Satellite Monitoring is effectively taking part in this initiative by participating and coordinating projects and actions based on geospatial technologies. With the aim of establishing relationships among LULC and greenhouse gas emission processes, we have based our efforts on three main foci: pasture quality, agricultural transitions, and alternative land use strategies, such as the integration of agricultural, cattle ranching, and forestry practices.

### Methods

One example is the development of methods for the identification and monitoring of pasture degradation levels in Brazil with attention to spatially explicit information and models. Another set of projects uses image processing techniques and data of various spatial, temporal, and spectral resolutions to map agricultural expansion, retraction, and intensification. Vegetation indices and field data have also been used to qualify agroforestry systems and to quantify their aboveground biomass.

### Main results

The research team relies on national and international partnerships funded by Embrapa and external sources, such as projects within the Climate Change Program in cooperation with the National Institute for Space Research (Inpe) and the State University of Campinas (Unicamp), funded by the São Paulo Research Foundation (Fapesp); the Sustainable Landscapes project, in cooperation with the United States. The scientific development produced by means of multiple sources of geospatial information enables interdisciplinary approaches and becomes a powerful asset to better understand the role of LULC dynamics in climate changes.