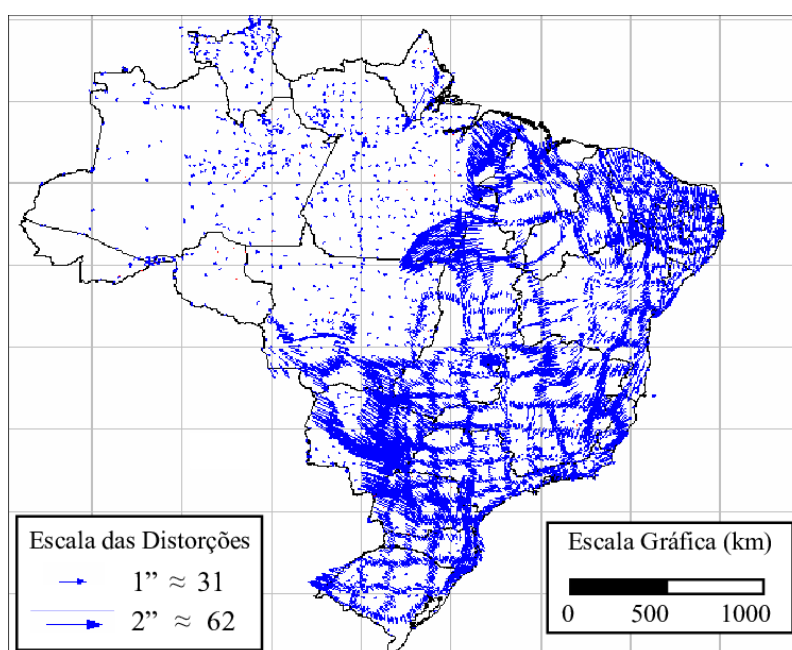


The main projection Brazil adopted was the SAD69 datum, which was usually combined with the UTM projection. SAD69 was built on classical geodetic triangulation and was not geocentric, so it didn't match the Earth-centered models used in modern GPS and GNSS. Because of this, differences appeared when trying to compare GNSS-derived coordinates with maps based on SAD69. One issue that still shows up today is that many older datasets were produced in SAD69, and if they aren't properly reprojected, they can cause inconsistencies in newer analyses. There were 3 more which were Córrego Alegre 61/70+72, however they were not used in the same scale as SAD.

Sistemas geodésicos clássicos e suas materializações	Identificação das Grades	Área de Abrangência das Grades			
		Lat. Sul	Lat. Norte	Lon. Leste	Lon. Oeste
Córrego Alegre 1961	CA61_003.GSB	-27°30'	-11° 00'	-37°35'	-58°15'
Córrego Alegre 1970+1972	CA7072_003.GSB	-33°10'	-00° 30'	-33°30'	-58°20'
SAD 69	SAD69_003.GSB	-34°10'	04°30'	-33°30'	-63°30'
SAD 69/96	SAD96_003.GSB	-34°10'	05°30'	-33°30'	-63°20'

Reference: IBGE. (2015). Resolução PR Nº 01/2015 — Oficialização do SIRGAS2000 como Referencial Geodésico do Brasil.

Brazil Map with SAD 69:

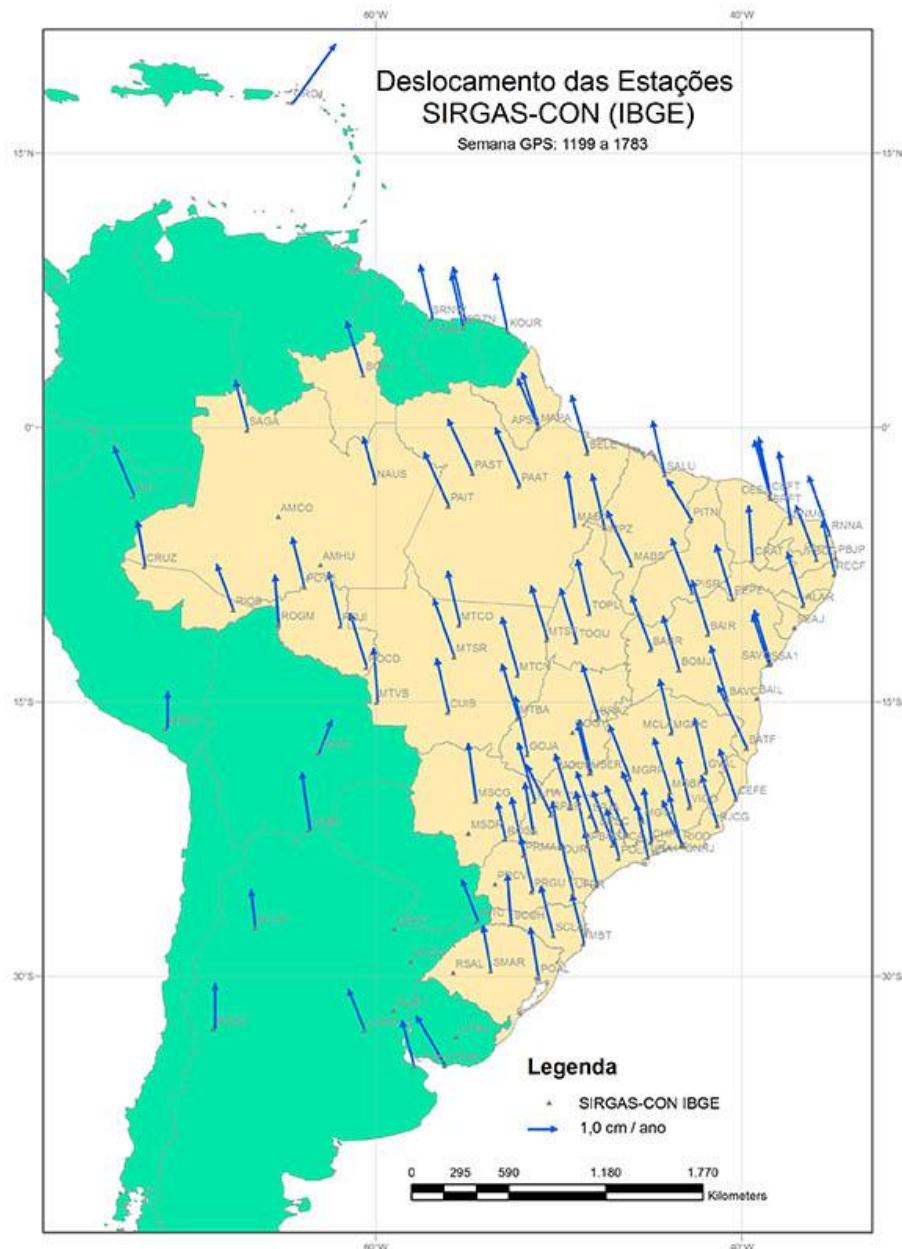


<https://adenilsongiovani.com.br/blog/sad69/>

Brazil eventually changed their main projection system to SIRGAS2000, which has been the official national reference system since 2015. Institutions like the Brazilian Institute of Geography and Statistics (IBGE) now use it as the default. SIRGAS2000 follows modern geodetic standards and is

geocentric, meaning its origin matches the Earth's center of mass. Because it is aligned with the International Terrestrial Reference Frame (ITRF), it can be used with the global GNSS system and provides much higher positional accuracy than older datums.

Map of SIRGAS Stations in South America:

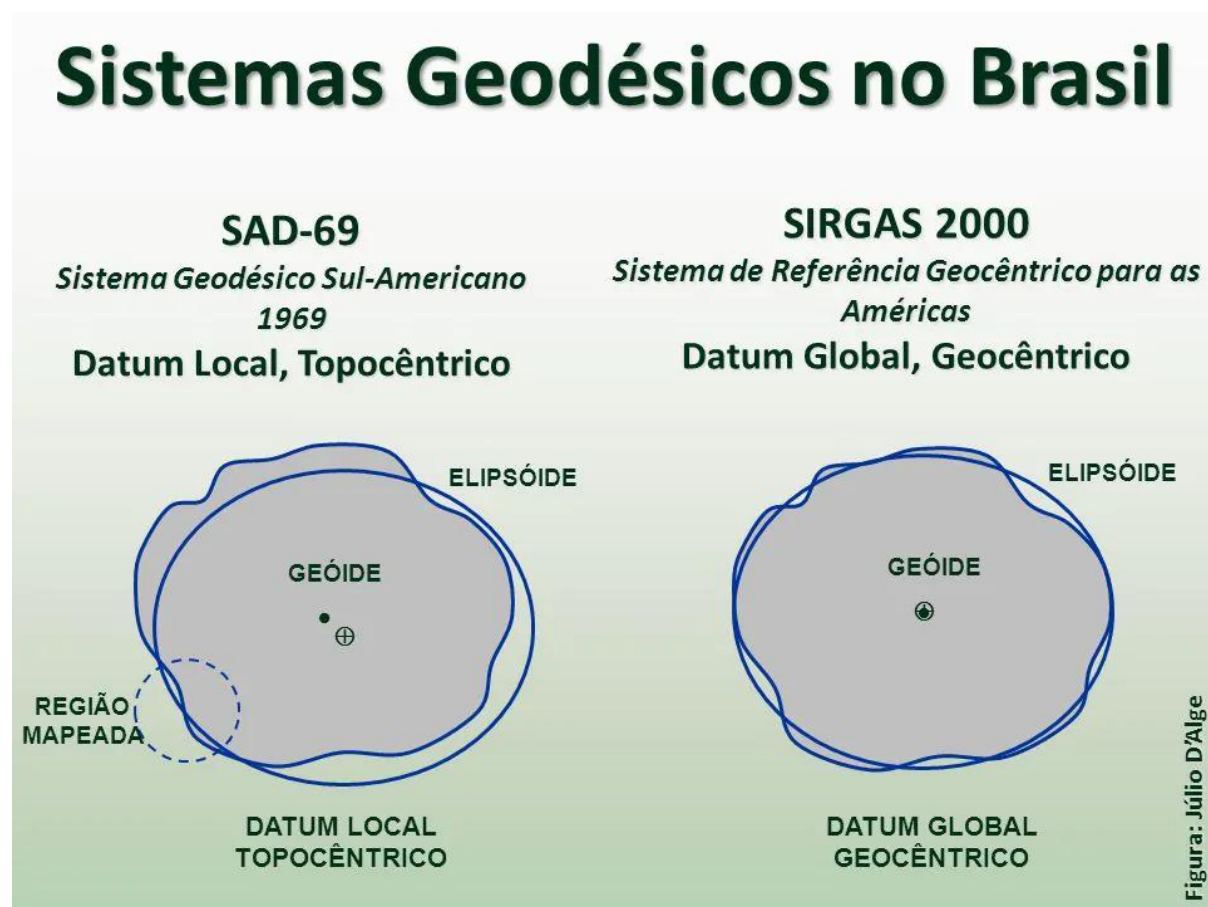


<https://www.ibge.gov.br/en/geosciences/geodetic-positioning/sirgas-en/18415-analysis-center-ibge.html?edicao=18416>

For the projection itself, Brazil still uses mainly the UTM (Universal Transverse Mercator) system. The UTM is a cylindrical conformal projection, which means that it preserves shapes and angles locally, making it especially useful for engineering, cadastral maps, and other applications that depend on accurate geometry. One of the downsides is that UTM doesn't preserve area, and distortions increase as you move farther from the central meridian, so as closer to polar areas, the more distortion the area will suffer, such as Greenland. To reduce this effect, UTM uses a scale factor of 0.9996 at the central meridian, which helps keep the distortion low across most of each zone.

The UTM system divides the world into longitudinal strips that are 6 degrees wide. Because Brazil stretches so far east to west, it falls into zones 18S through 25S. This works well for regional and local mapping, but when creating maps that cover the entire country, the multiple UTM zones can cause misalignments especially near the boundaries of each zone. For broader thematic studies, like nationwide climate maps or vegetation maps, Brazilian cartographers sometimes choose different approaches, such as working directly with geographic coordinates (latitude and longitude), equal-area projections, or custom regional systems.

For smaller scale maps or applications where the whole country needs to fit into one coordinate system, it is common to simply use SIRGAS2000 geographic coordinates (EPSG:4674). This isn't a projection, but it avoids the complications of switching between multiple UTM zones and works well for web mapping and general visualization.



Could not find a translated version, but here is the translation of the image:

Geodetic Systems in Brazil

SAD-69

South American Geodetic System 1969

Local Datum, Topocentric

- ELLIPSOID
- GEOID
- MAPPED REGION

- LOCAL TOPOCENTRIC DATUM

SIRGAS 2000

Geocentric Reference System for the Americas
Global Datum, Geocentric

- ELLIPSOID
- GEOID
- GLOBAL GEOCENTRIC DATUM

Reference

1. IBGE. (2015). Resolução PR Nº 01/2015 — Oficialização do SIRGAS2000 como Referencial Geodésico do Brasil.
2. SIRGAS. (2000–present). Official SIRGAS Documentation and Technical Reports.
Available at: <https://www.sirgas.org>