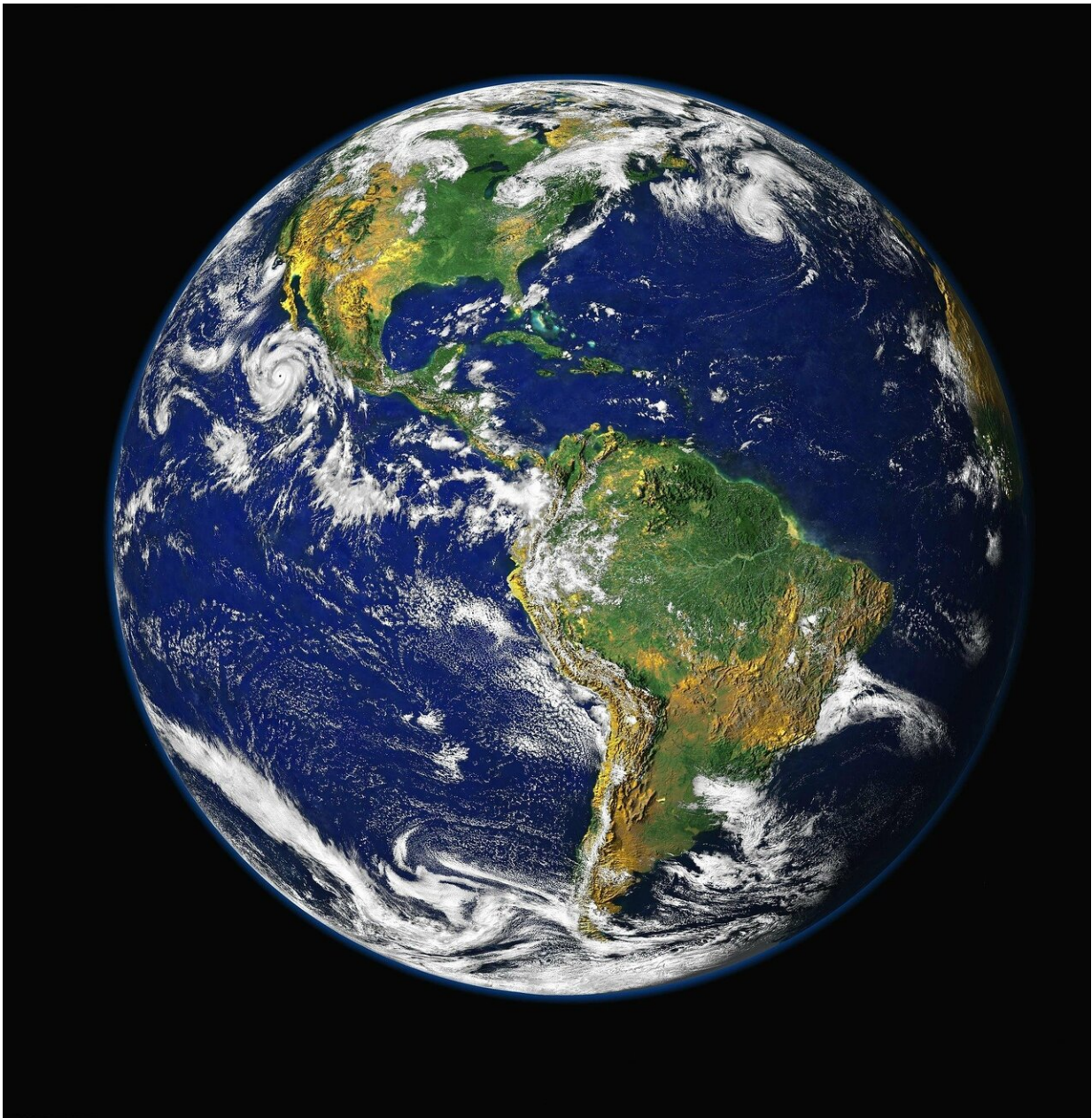


# Methodology for credibility assessment of historical global LUCC datasets

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The study highlights a fundamental shift in the nature of crust formation 3.75 billion years ago, which facilitated the formation of Earth's unique, stable continental crust. Credit: CC0 Public Domain

A study of the methodology for credibility assessment of historical global LUCC datasets has been published in *Science China Earth Sciences*. The corresponding author is professor Fang Xiuqi of Beijing Normal University.

Accurate historical global land use/cover datasets are essential for a better understanding of the impacts of LUCC on [global change](#). However, there are not only evident inconsistencies in current historical global land use/cover datasets, but inaccuracies in the data in these global [dataset](#) revealed by historical record-based reconstructed regional data throughout the world. Assessing the credibility of existing global land cover datasets is a precondition for improving [data quality](#).

However, it is difficult to assess the credibility of historical global land cover data applying currently used methods for assessing contemporary data. This is because the actual past land cover data (referred to as the "true value") that serves as the baseline of the credibility [assessment](#) is not directly accessible and needs to be reconstructed in most cases. Moreover, historical and natural records available for land cover reconstruction are very limited, and a widely accepted method for such an assessment remains to be developed.

This study, therefore, proposes a methodological framework for credibility assessment of the historical global land use/cover datasets that addresses temporal as well as spatial changes in the amount and distribution of land cover and has outlined four approaches based on the

accuracy, rationality and likelihood assessments illustrated through five [case studies](#), including accuracy assessments of HYDE cropland cover data in Germany over the last 1000 years and in the North China Plain over the last 300 years; rationality assessments of HYDE cropland cover data in Northeast China over the last 1000 years and in the coastal plain adjoining the Bohai Sea over the last 7000 years; and a likelihood assessment based on the consistency of cropland cover data in China derived from 10 modern global land cover datasets.

1. Accuracy assessment based on regional quantitative reconstructed land cover data. The accuracy assessment is a quantitative credibility assessment that uses quantitatively reconstructed regional land cover data derived from historical or natural records as the baseline.
2. Rationality assessment based on regional historical facts. This qualitative assessment is to assess the extent of rationality through a comparison of the temporal and spatial conformity of the land cover data from the global dataset with the historical facts relating to regional development.
3. Rationality assessment based on expertise. This qualitative assessment is to assess the [rationality](#) upon which the expertise is based through an examination of how the data, assumptions, and methods of global land cover datasets match with the related spatial and temporal rules of nature and society, such as features of the natural environment or agricultural characteristics.
4. Likelihood assessment based on the consistency of multiple datasets. This method is employed when it is difficult to determine the credibility of more than one existing dataset. Considering each global land cover dataset as an expert determination regarding the actual land cover, the likelihood of the [credibility](#) of the land cover data for a given spatial or temporal unit is assessed by measuring the degree of consistency of the data on the unit derived from multiple datasets.

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