

GLORIA MRIO Database: Construction, Updating, and Maintenance

Topic: Advancing Multi-Regional EEIO Models: A Developer's Summit on Learnings, Evolution, and Future Directions (II)

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Multi-regional input-output (MRIO) databases have become essential tools for analysing global supply chains, environmental footprints, and the socio-economic impacts of production and consumption. However, the development and maintenance of MRIO databases remain challenging tasks, requiring the integration and harmonisation of large volumes of heterogeneous data from multiple national and international statistical sources. Issues such as cross-country statistical inconsistencies, evolving sectoral classifications, and the need to incorporate emerging sectors and environmental extensions continue to pose methodological and practical challenges.

GLORIA (Global Resource Input-Output Assessment) database provides a time series of high geographical resolution input-output tables with matching 6357 environmental and socio-economic satellite accounts for 164 countries and a homogenous 120-sector disaggregation available for all countries, covering six final demand categories (i.e., household final consumption, non-profit institutions serving households, government final consumption, gross fixed capital formation, changes in inventories, and acquisitions less disposals of valuables) and five valuations (basic prices, trade margins, transport margins, taxes on products, subsidies on products). Corresponding standard deviation diagnostics and quality checks are provided to support data validation and transparency. The GLORIA dataset integrates global economic flows with environmental pressures and socioeconomic indicators, relying on a range of input data, including sectoral economic accounts, international trade data, environmental and resource use data.

GLORIA was built using the IELab infrastructure at the University of Sydney for the UN International Resource Panel (UN IRP) in the context of updating the material footprint accounts that form part of the UN IRP Material Flows Database. To exploit synergies across different UNEP initiatives, GLORIA has also been used as the underlying MRIO model for the Sustainable Consumption and Production Hotspots Analysis Tool (SCP-HAT), supporting the identification of environmental hotspots along global supply chains. In addition, GLORIA serves as the analytical backbone of the UNEP Global Footprint Tool (GFT), which was developed to assess the environmental and social pressures associated with countries' final demand on global resources and ecosystems.

This presentation introduces the GLORIA MRIO database and its main principles behind its construction, including data collection, harmonisation procedures, implementation of engineering constraints, balancing techniques, and the integration of environmental and socio-economic extensions. Its application in research on resource use and environmental pressures along the supply chain, including the assessment of material and carbon footprint, as well as policy-relevant economic analysis, will also be highlighted. These applications enable sector- and region-specific analysis and facilitate evidence-based decision-making for researchers, policymakers and other stakeholders engaging in advancing the Sustainable Development Goals.

The presentation will also discuss the ongoing challenges in maintaining and updating a large-scale MRIO database, including limitations in data availability, inconsistencies across official statistics, evolving statistical classification systems, and the presence of macroeconomic outliers and isolated spikes in footprint data. Future work will explore the incorporation of more constraints from other data sources where available, and regular updating, especially in the current context of changes and uncertainties in global production and trade structures. Finally, we reflect on the future development of MRIO databases and the role of collaborative efforts within the MRIO and industrial ecology research community in improving data transparency, accessibility, and analytical applications.