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A fine-scale assessment of the geographies of global mining

Sebastian Luckeneder
Institute for Ecological Economics, WU Vienna
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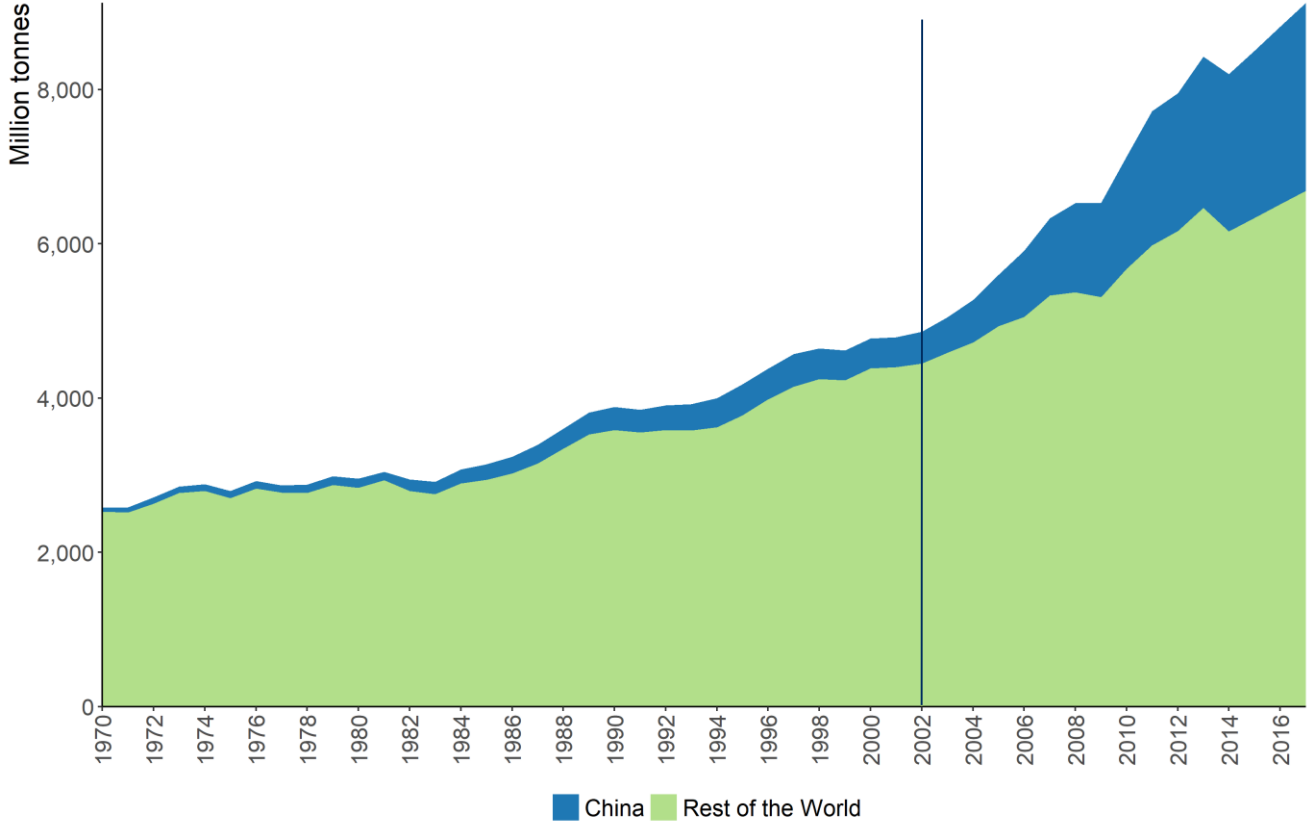
Introduction

1970: 2.6 billion tonnes **2017: 9.1 billion tonnes**



Global metal ore extraction; 1970-2017; UN IRP (2017)

Introduction

- The geographies of global mining cannot be reduced to a national perspective
  - Expansion into formerly hardly accessible and “unproductive” areas
  - Regionally specific environmental and social impacts

http://intradayfun.com/2011/01/10-world-biggest-holes-created-by-human-and-nature/

http://www.dw.com/image/0%2C%2C19318441_302%2C00.jpg

→ Need for a spatially disaggregated perspective on resource extraction and its related impacts.

Introduction

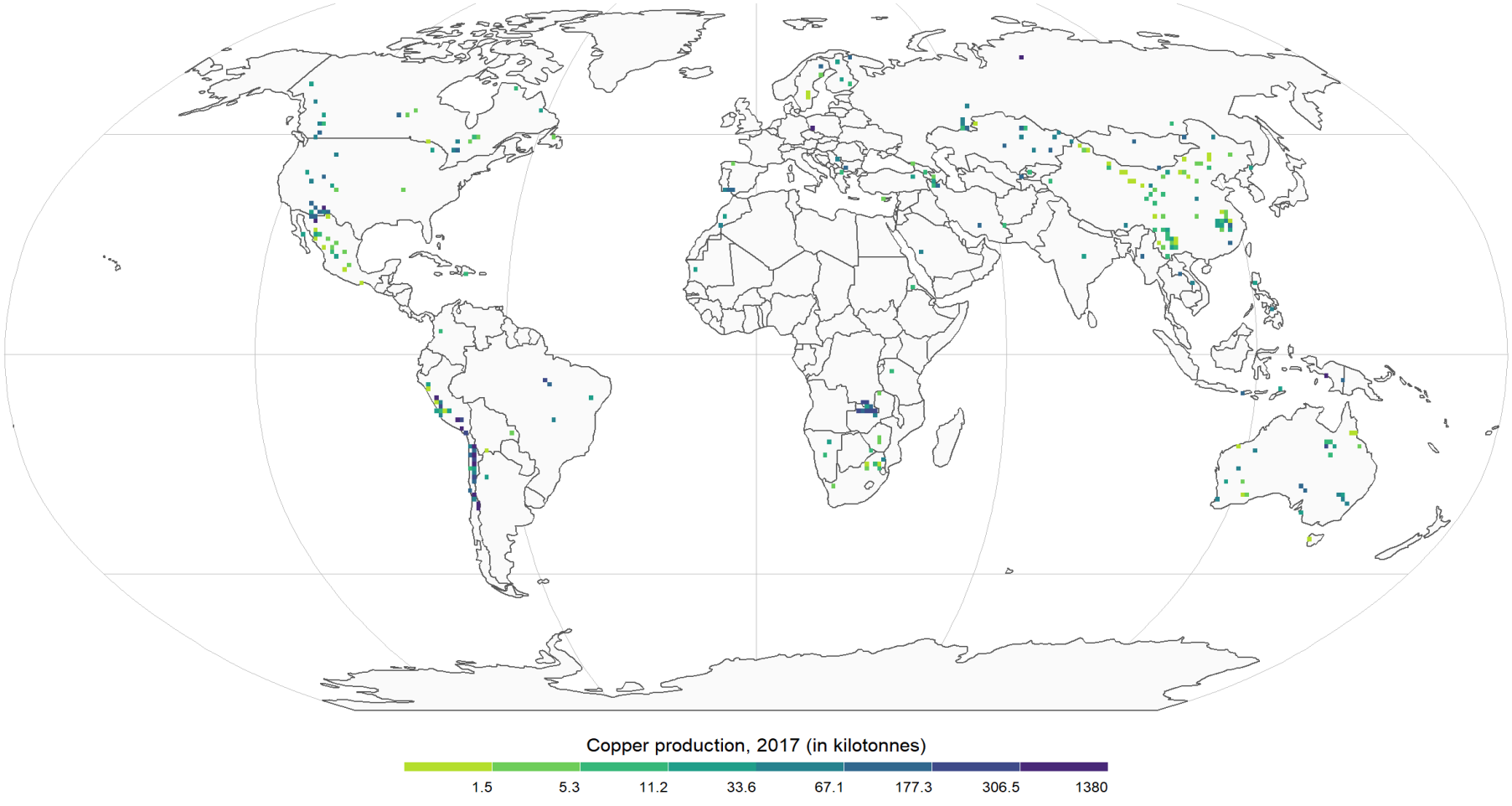
- Missing global picture across the whole metal mining sector
  - selected metals (e.g. Duran et al., 2013; Murguia et al., 2016)
  - selected countries (e.g. Brazil: Sonter et al., 2016; Tofoli et al., 2107; Peru: Asner and Tupayachi, 2017)
  - selected impacts (e.g. water: Northey at al., 2017)
- Research questions
  - Spatial patterns across different commodities and geographic entities?
  - Shifts over time since 2000?

    (a) intensities within regions, (b) spread to new regions

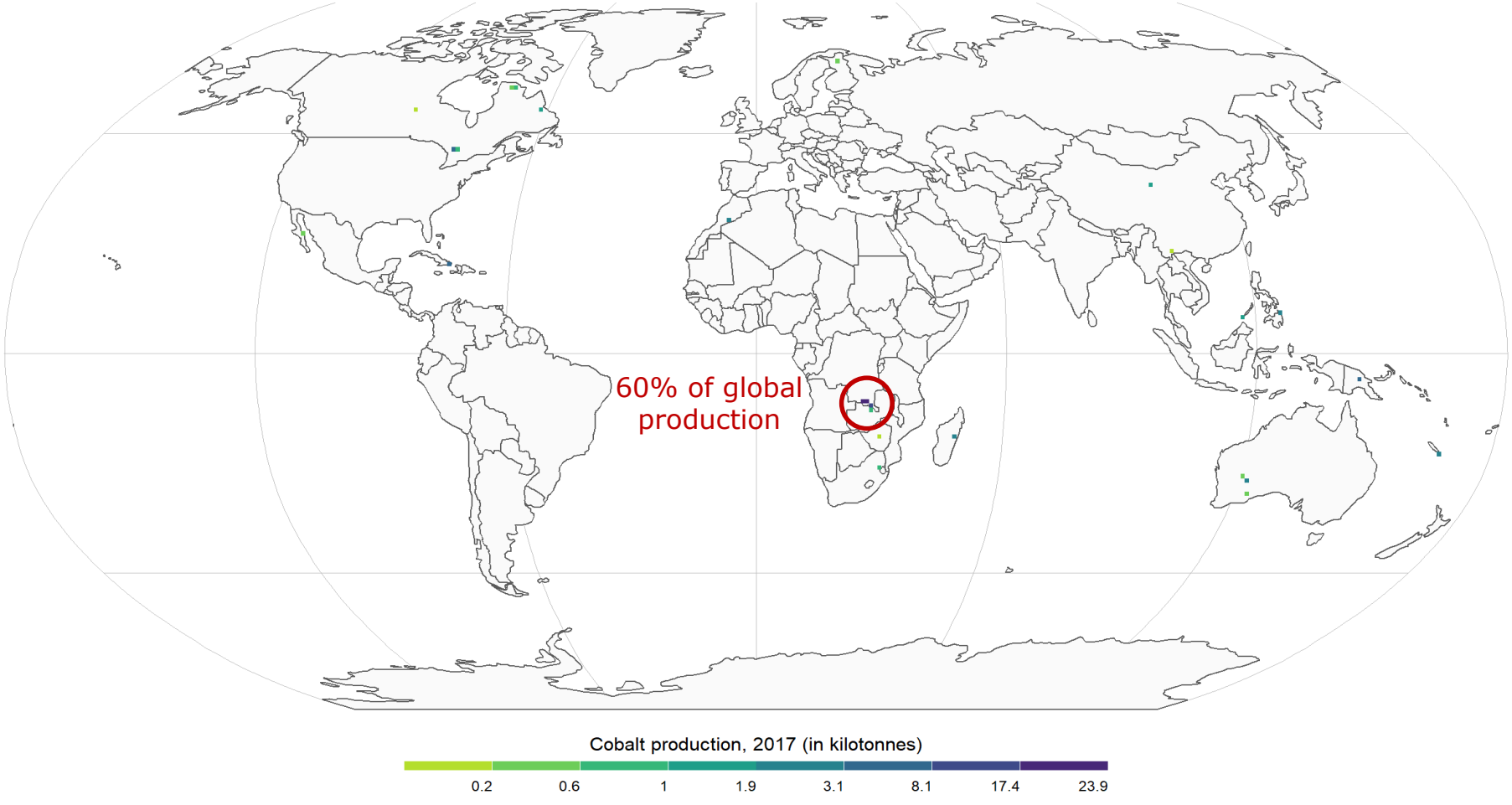
Method & data

- Geospatial assessment and multilayer analysis
  - Foundation for statistical inference and in-depth case analysis
- Data:
  - SNL Metals & Mining database: profiles on over 36,000 mining properties
  - 30 raw materials, 2000-2017
  - Strong copyright restrictions oppose open science approach (motivates use of mine-specific national statistics; company reports)

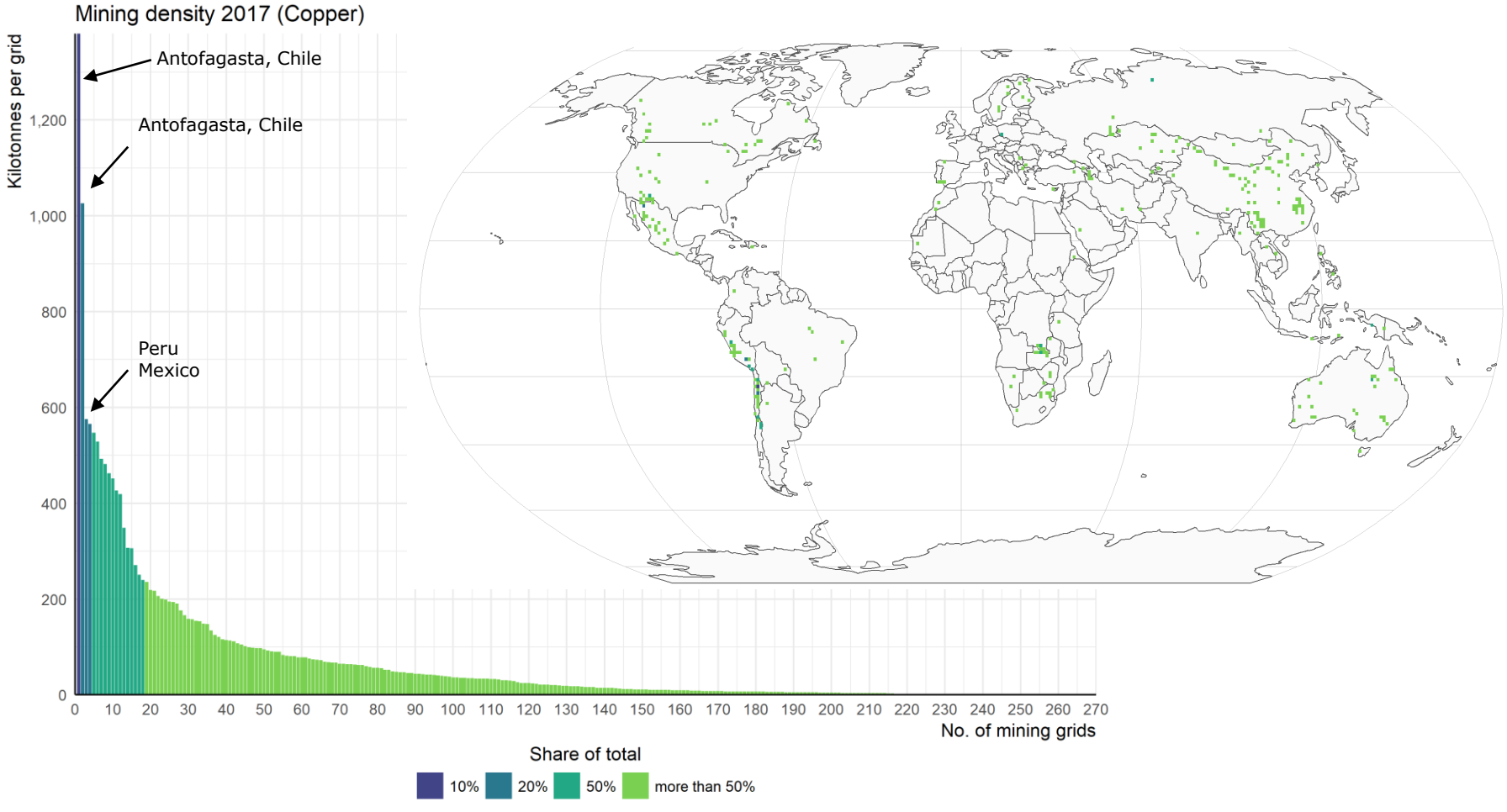
Global copper production 2017



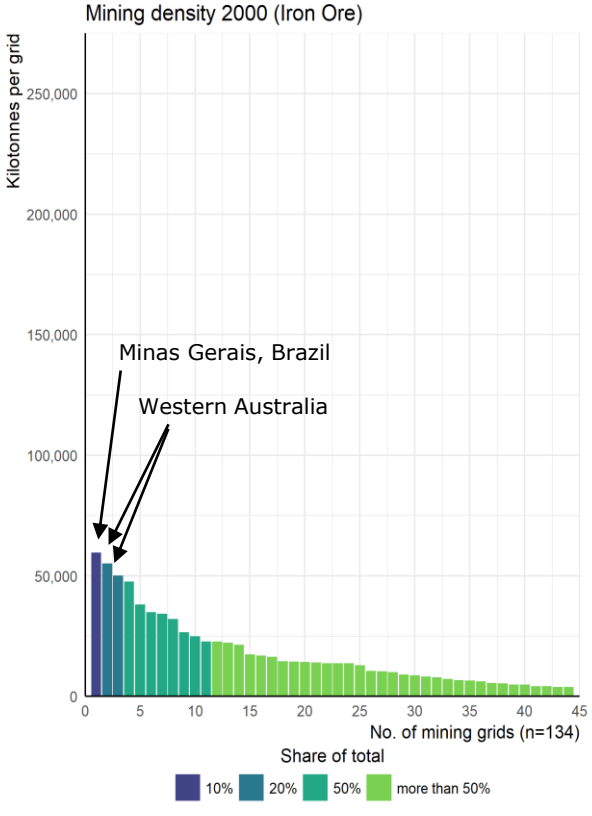
Global cobalt production 2017



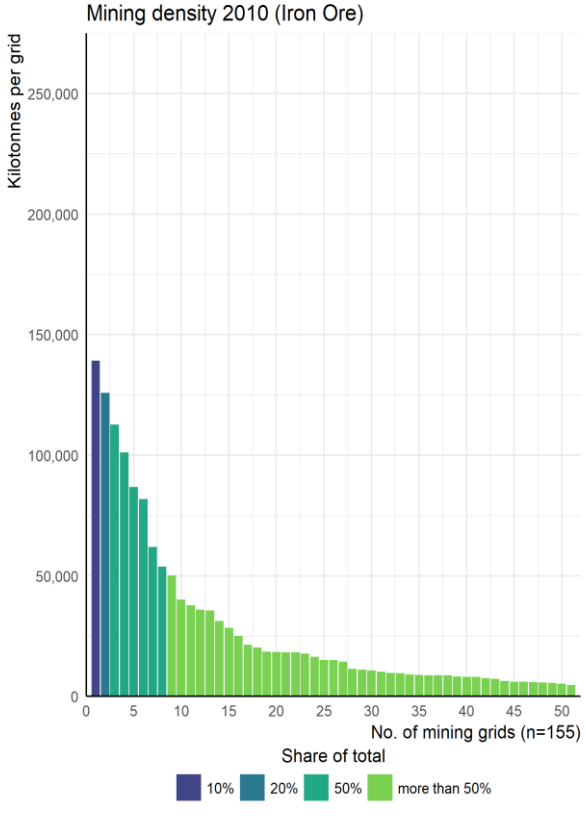
Global copper production per grid



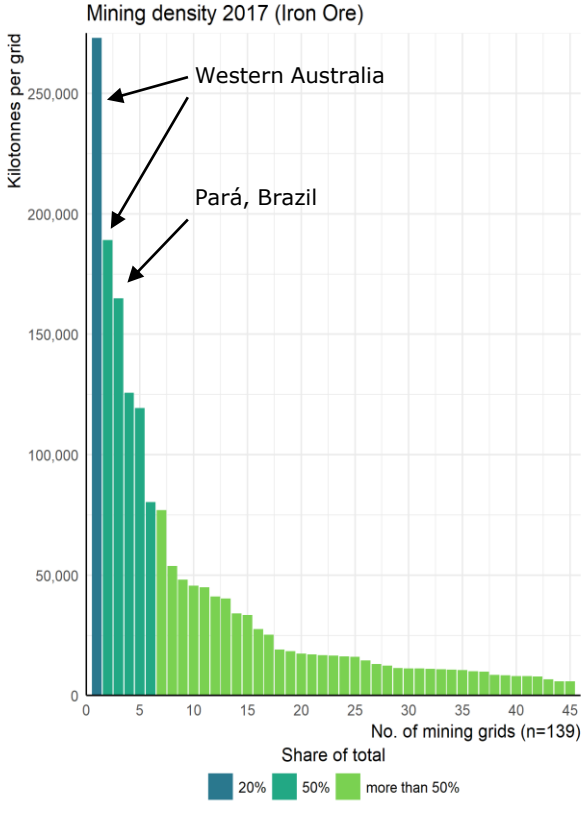
Global iron ore production per grid



2000 total: 0.88bn tonnes

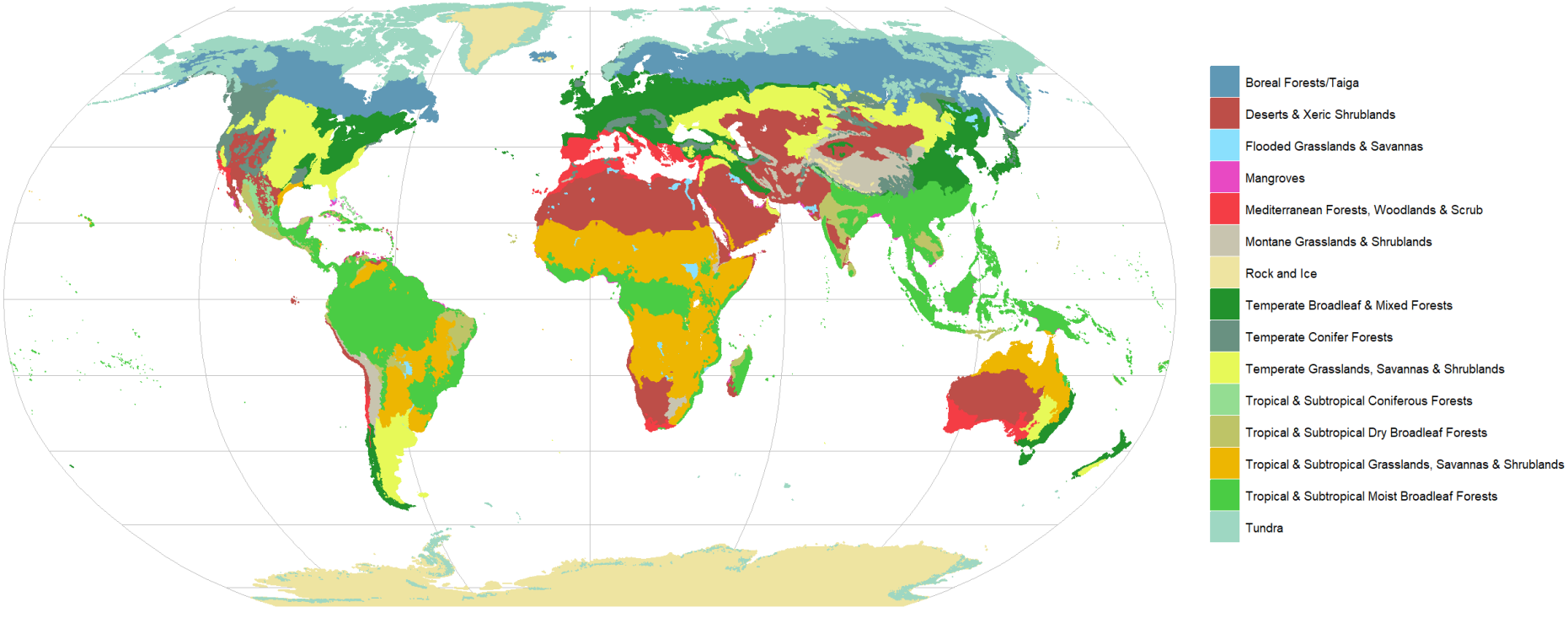


2010 total: 1.58bn tonnes



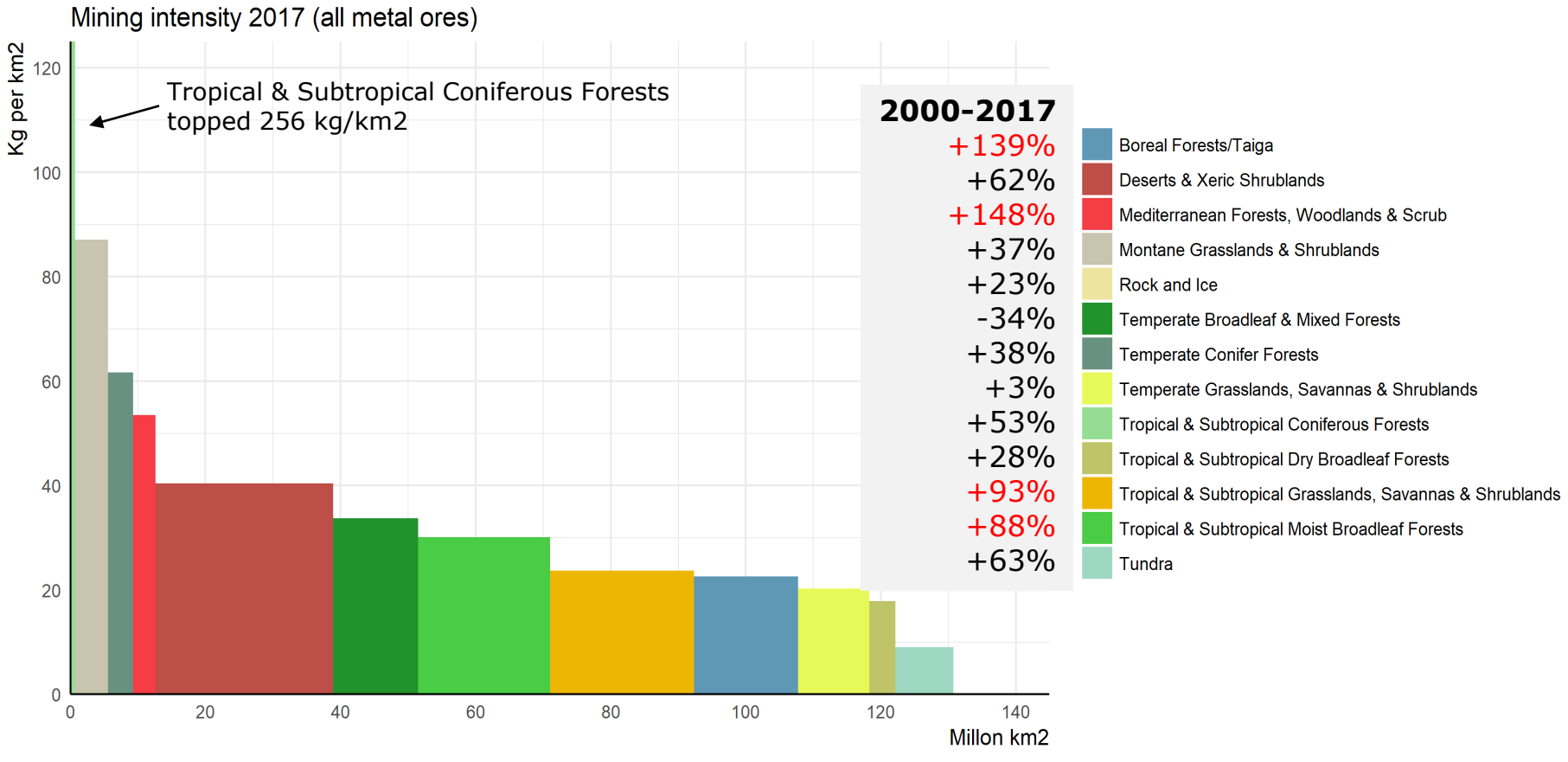
2017 total: 1.93bn tonnes

Intersect with biomes



(Dinerstein et al., 2017, http://ecoregions2017.appspot.com)

Intersect with biomes

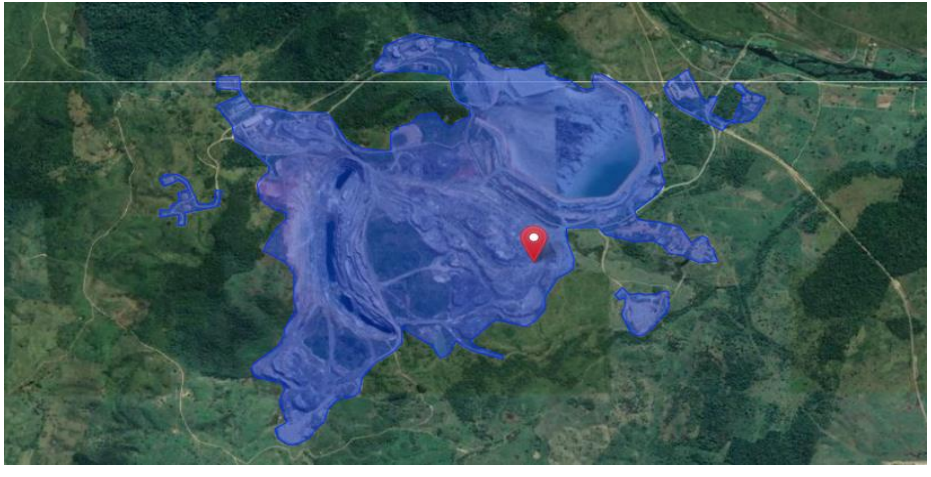


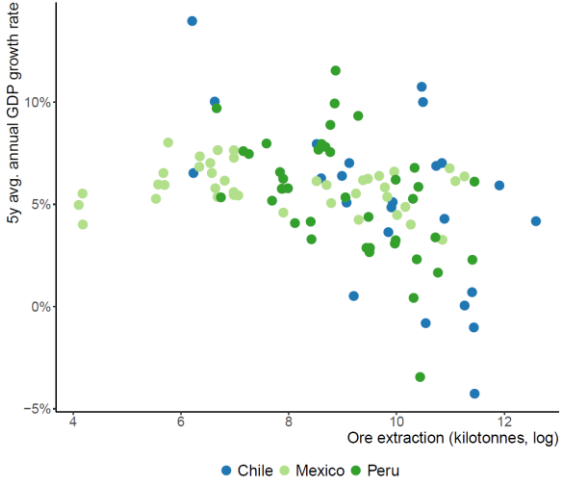
Key Takeaways

- High and increasing **spatial concentration** of mined raw materials
- Global trend of expanding extraction and consumption increasingly puts **pressure** on specific regional entities
- Highest **mining intensities** in tropical & subtropical coniferous forests; strong expansion in tropical and subtropical biomes, Mediterranean and boreal forests

Upcoming applications

- Fine-scale impact assessment
  - Mining and deforestation (forthcoming)
  - Mining and regional development (forthcoming)





Upcoming applications

- Fine-scale impact assessment
  - Mining and deforestation (forthcoming)
  - Mining and regional development (forthcoming)
- Fine-scale MRIO / supply-chain assessment and spatially explicit global trade models and footprinting

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Sebastian Luckeneder
Sebastian.luckeneder@wu.ac.at
+43 1 31336 6168