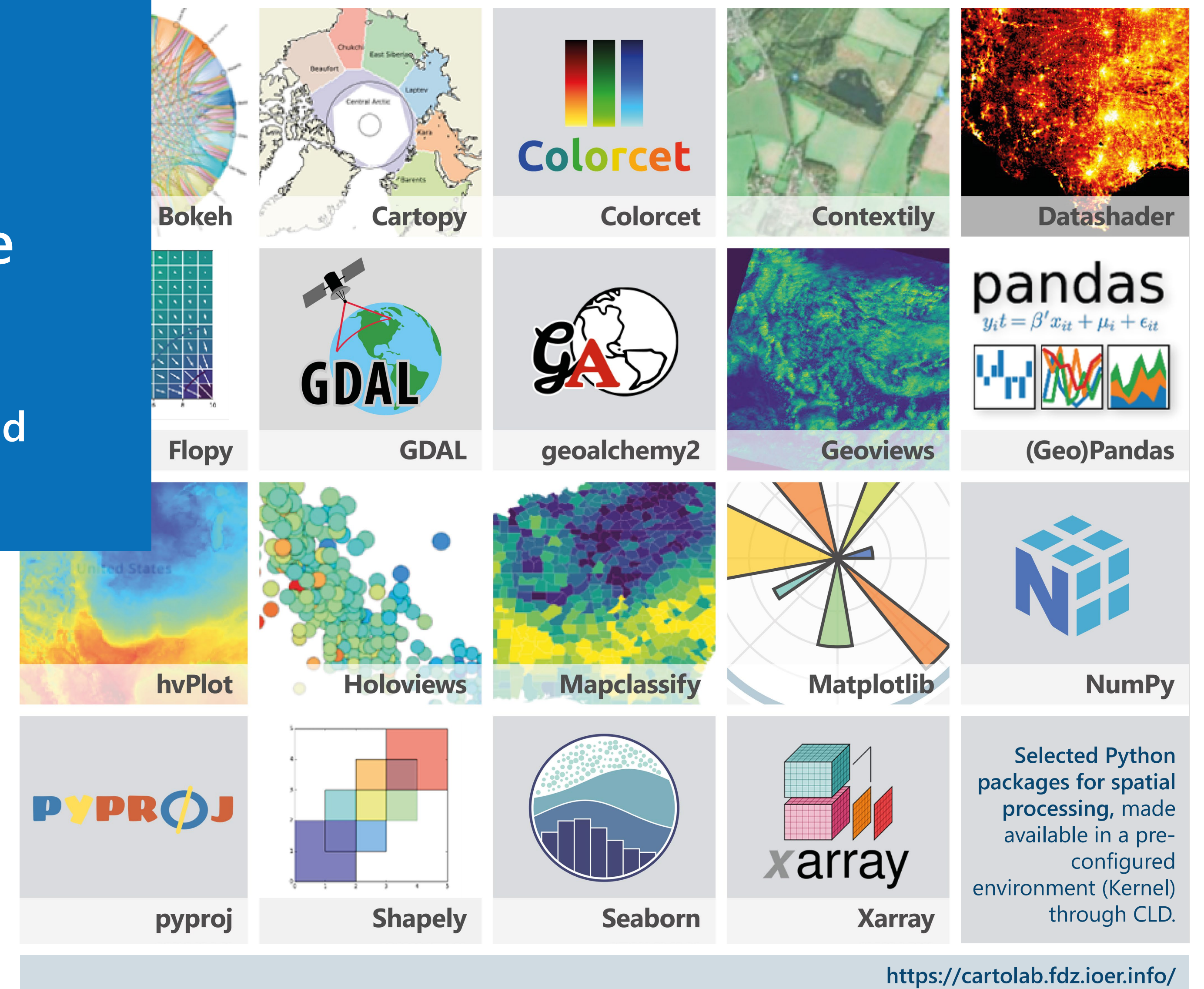


# IOER Carto-Lab Docker

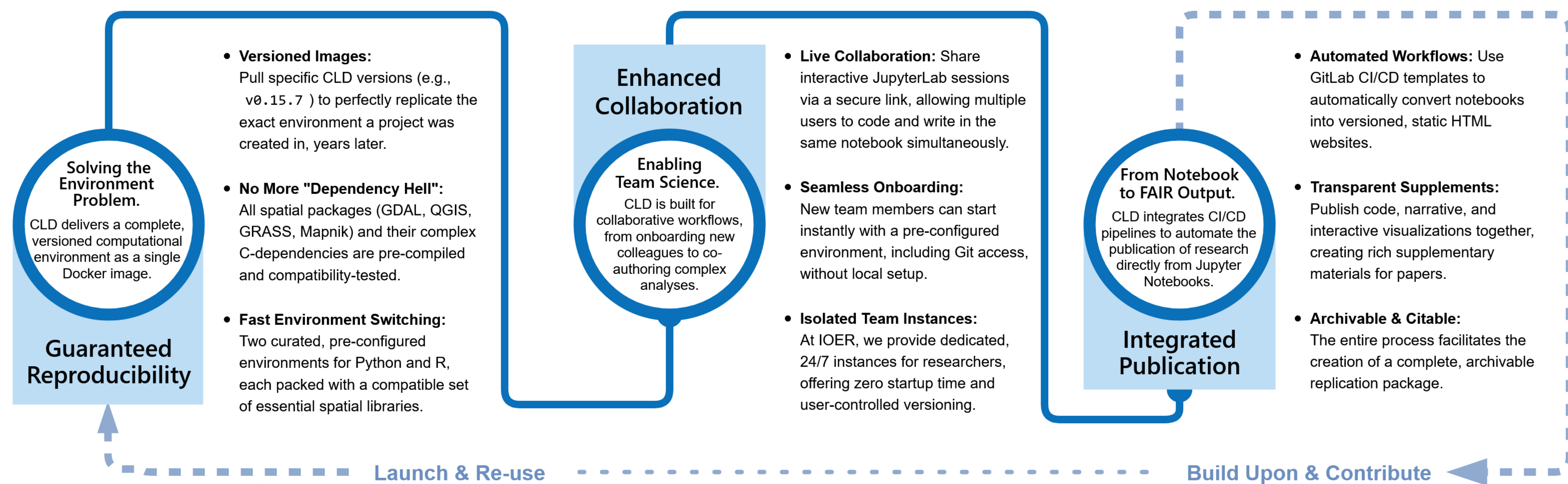
## An RDM Infrastructure for Transparent, Open, and Reproducible Spatial Data Science

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Spatial data science faces significant RDM hurdles: complex software dependencies ("dependency hell"), ensuring long-term computational reproducibility, and facilitating collaborative, transparent research. Carto-Lab Docker (CLD) is a practical RDM infrastructure designed as a FAIR-enabling environment. It provides a versioned, pre-configured Docker container running JupyterLab to empower researchers and streamline workflows from analysis to publication.



## Our Approach: A Three-Pillar RDM Infrastructure



## Carto-Lab Docker in Action

### Training & Education Materials

- Multiple authors used CLD's collaborative features and pre-configured Git access to co-develop the *NFDI4Biodiversity* Jupyter Book. The entire book is generated and deployed automatically from Jupyter Notebooks via a CI/CD pipeline.
- You can run and interact with these materials directly in your web browser via the *Base4NFDI* Jupyter Hub
- URL: [training.fdz.ioer.info](https://training.fdz.ioer.info)
- URL: [doi.org/10.71830/6ILS40](https://doi.org/10.71830/6ILS40)

### Mobile Cartography Workshops

- Carto-Lab Docker serves as the backbone for the annual 'Mobile Cartography Workshops' at the *TU Dresden Institute of Cartography*.
- In a hybrid format, students can immediately start experimenting with complex visualizations using Jupyter and Tagmaps, without any local software installation, focusing on creative tasks rather than environment setup.
- URL: [code.ad.ioer.info/jupyter\\_python\\_datascience/](https://code.ad.ioer.info/jupyter_python_datascience/)

### Reproducible Publications

- CLD was used to create and publish the complete set of supplementary notebooks for a peer-reviewed paper in *Land*.
- This allows readers to replicate every figure and analysis, ensuring full transparency and adherence to FAIR principles.
- For further publications authored with CLD, see URL: [cartolab.fdz.ioer.info/notebooks/](https://cartolab.fdz.ioer.info/notebooks/)
- URL: [doi.org/10.3390/land13071091](https://doi.org/10.3390/land13071091)

### Advanced Spatial Analysis

- CLD is extensible. We provide workflows and dedicated container images that include complex tools that are difficult to install or cloud deploy, such as QGIS, GRASS GIS for large-scale raster analysis, and *Mapnik* for custom *OpenStreetMap* rendering.
- See these QR-Codes for two examples:

## Past (Origin), Present (Stability), and Future (Community)

From Research, for Research	Long-Term Stability & Support	Open & Community-Driven
Born from the needs of the DFG VGIscience program, Carto-Lab Docker was started in 2018 to solve the practical challenges of creating consistent and shareable environments for spatial analysis.	Since 2025, Carto-Lab Docker is officially hosted and supported by the Research Data Centre at the IOER. This institutional backing guarantees long-term maintenance, sustainability, and its integration into a professional RDM service portfolio.	Built on a foundation of open-source principles (MIT/CC BY 4.0), Carto-Lab Docker welcomes community engagement. Our public GitHub mirror serves as the central hub for reporting issues, starting discussions, and contributing code or documentation to shape the project's future.

## Integration with the RDM Ecosystem

Carto-Lab Docker is not a monolithic system but a flexible component that integrates with standard tools and platforms across the open research data lifecycle.

