What does Research Software look like?

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<ReSA>
Research Software Alliance

netherlands
eScience center

What is Research Software?

Source code files, algorithms, scripts, computational workflows and executables that were created during the research process or for a research purpose.

Source: Barker, Chue Hong & Katz et al. Introducing the FAIR Principles for research software, Nature Scientific Data, 2022. https://doi.org/10.1038/s41597-022-01710-x

Research Software comes in many smells and flavours

Sometimes …

software is a component in our scientific instruments

software _is_ the instrument

software analyses research data

software presents research results
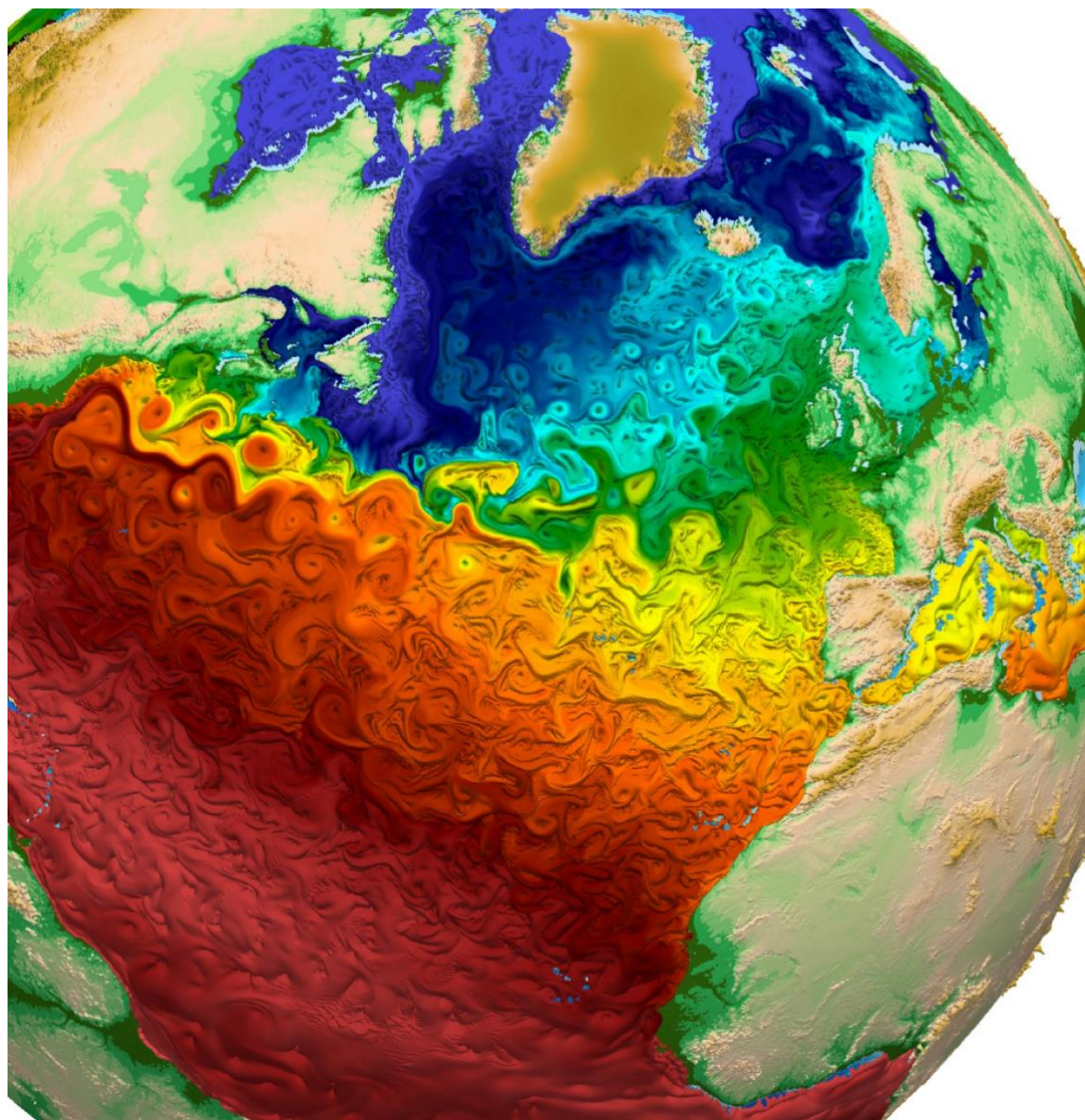
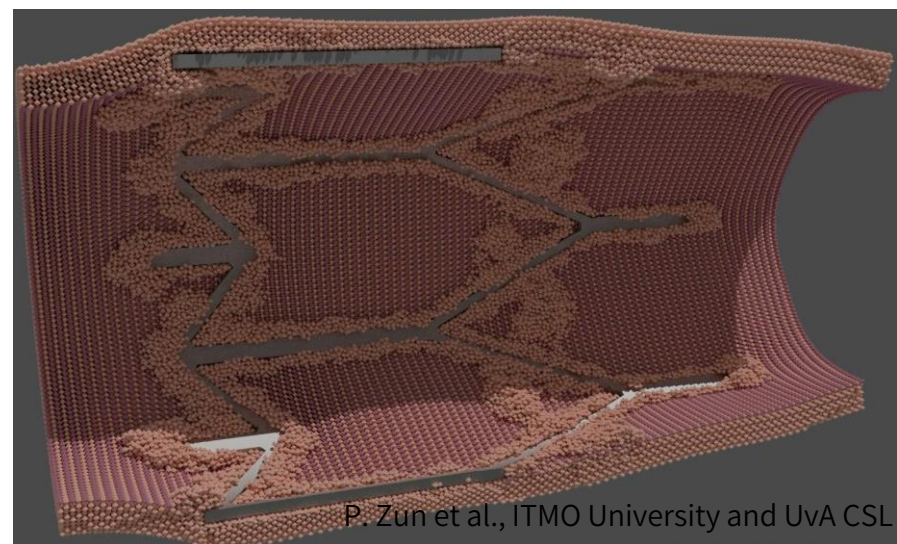software is superglue, duct tape and lubricant
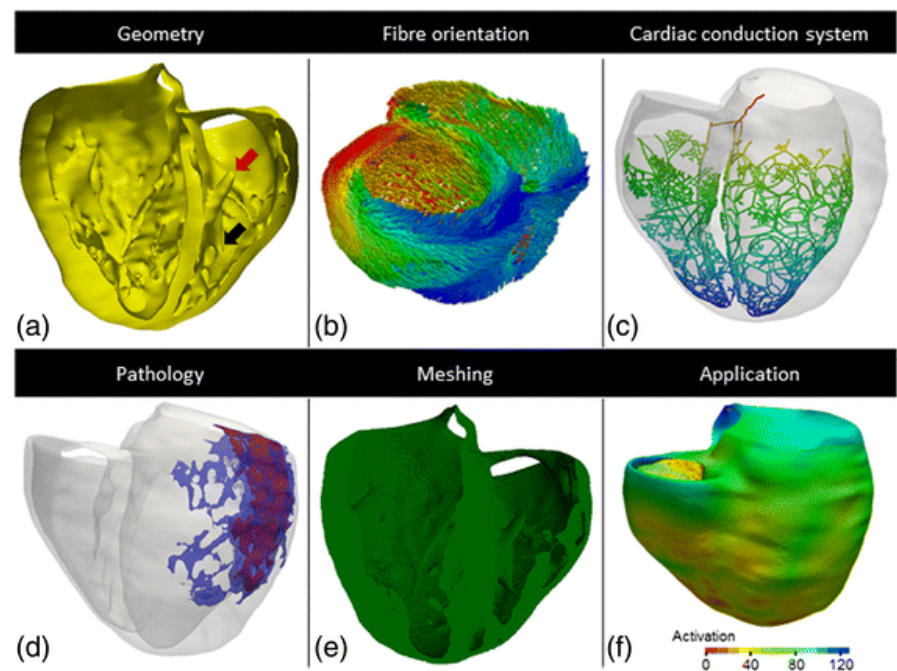
Software is a crucial part of our instruments

Software is the instrument

P. Zun et al., ITMO University and UvA CSL

Courtesy Henk Dijkstra, et al.

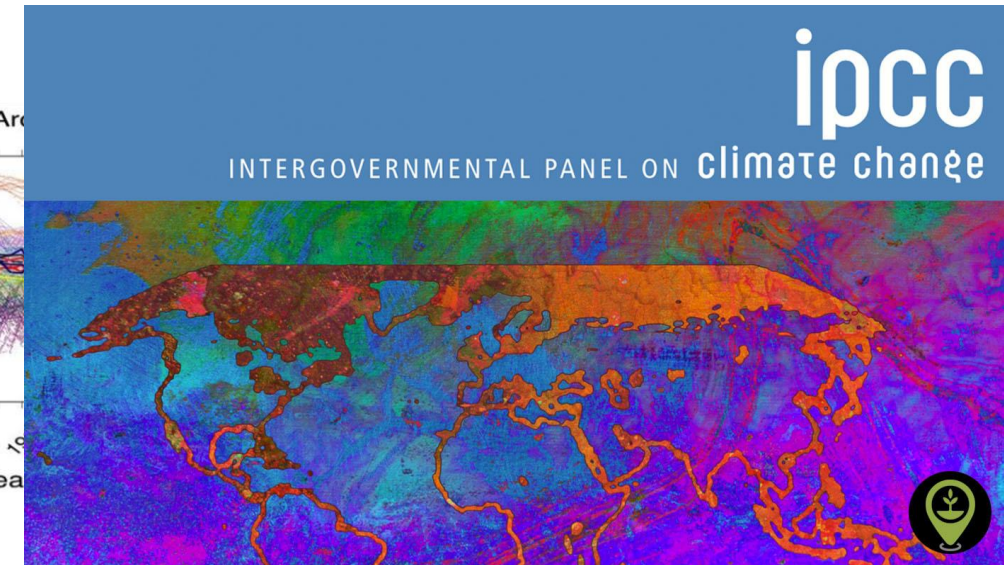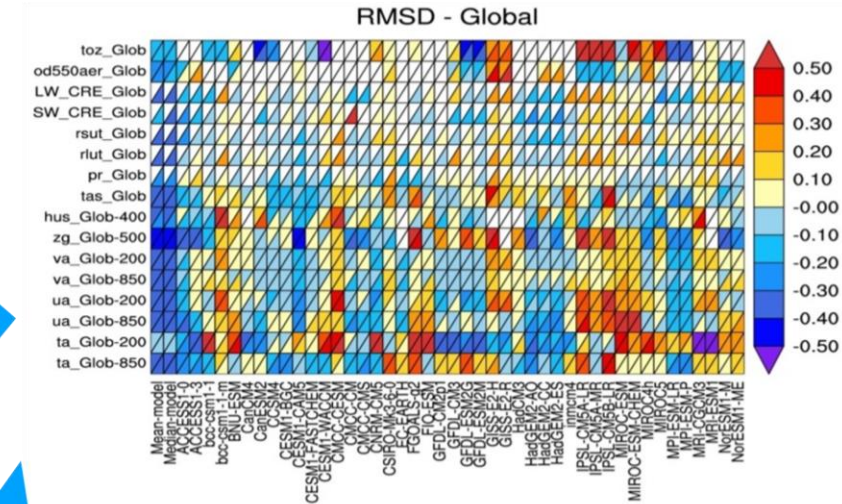| Geometry	Fibre orientation	Cardiac conduction system
(a)	(b)	(c)
Pathology	Meshing	Application
(d)	(e)	(f)

Activation
0   40   80   120

Courtesy Alejandro Lopez-Perez et al.

Software analyses research data

https://www.esmvaltool.org
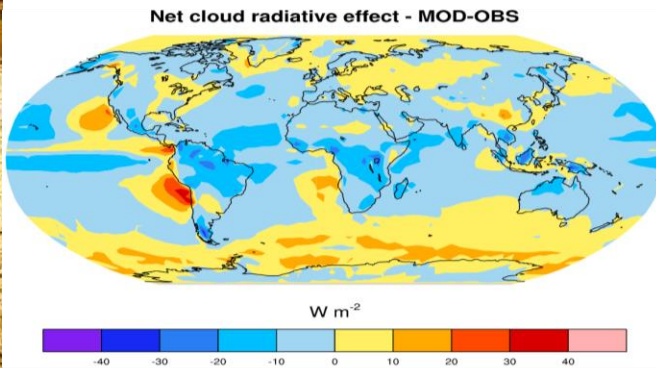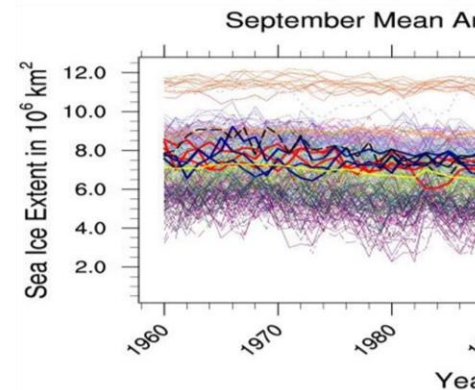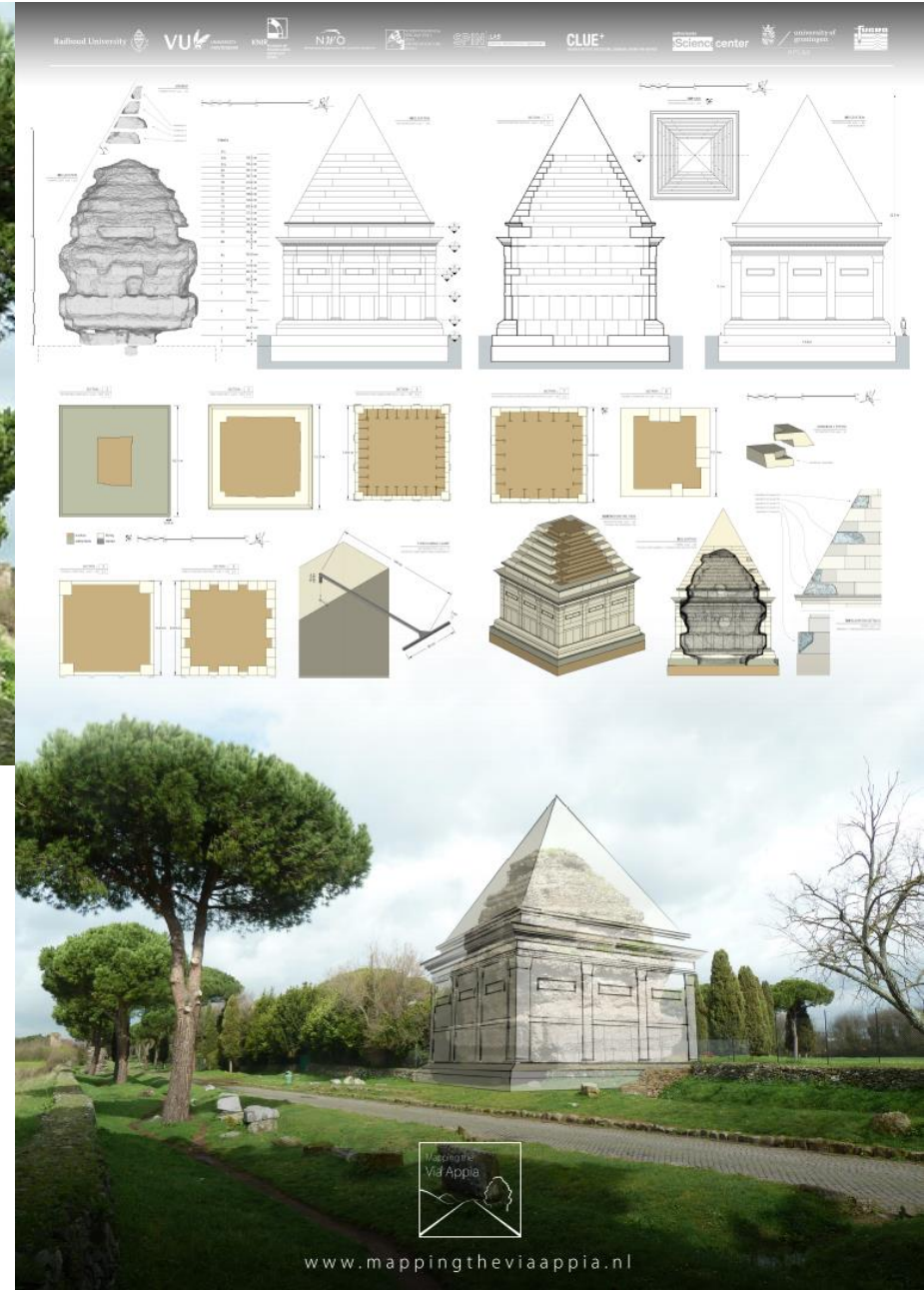
Software presents research results

www.mappingtheviaappia.nl

Software is superglue, duct tape, lubricant

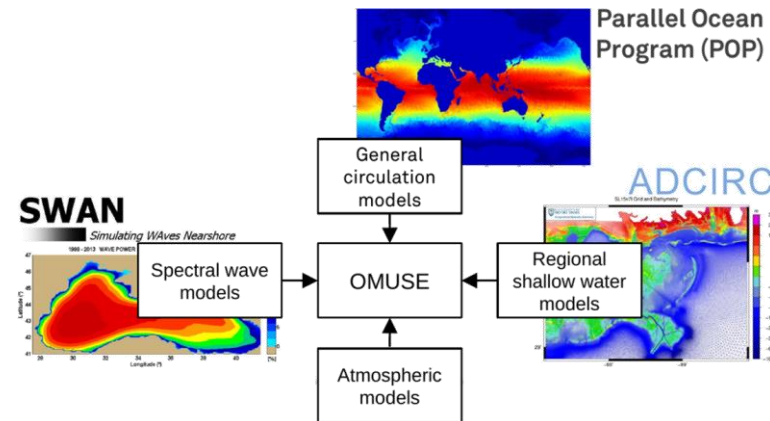**Automation**
Workflows, deployment
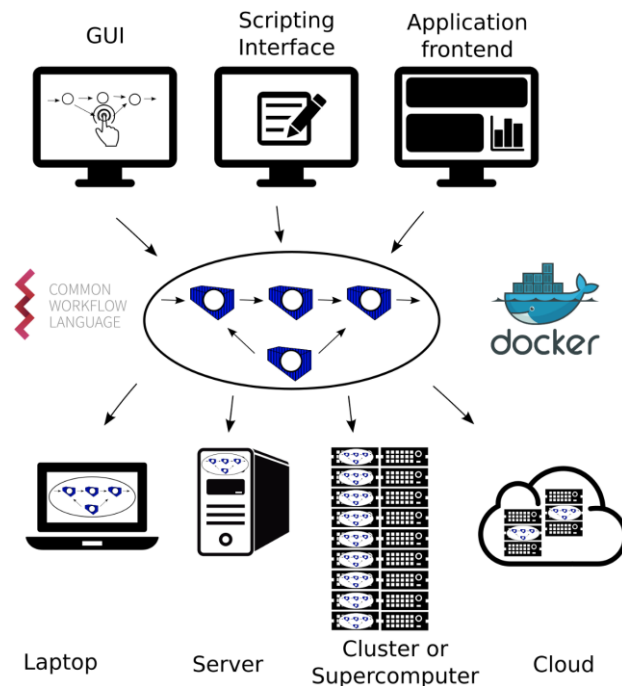
Integration
coupling models,
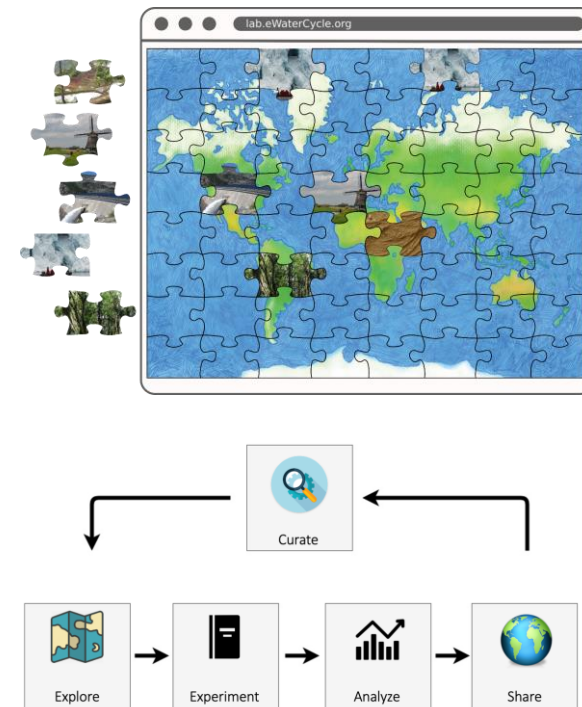combining models and observations,
linking data sets

Research sharing
share, reproduce and reuse

Courtesy Henk Dijkstra, et al.

Courtesy Nick vd Giesen, et al.

Without software…

We cannot build and operate our scientific instruments

We cannot model climate change, our ecosystems, our bodies,
virus outbreaks, our social interactions, inequality, …

We cannot process our research data

We cannot automate, share, reproduce and reuse our methods

Software is …

sometimes very prominent

sometimes a cog in a machine

sometimes invisible

But always important.

Rob van Nieuwpoort, 2022