Date

﻿Numerical and software Tools for palaeoclimate analysis

# Introduction

## Learning from the past – Why we study Palaeoclimates

## The importance of software and numeric for climate science

### History of Software development in Earth System Science

* Development of Climate models
* Statistics
* Visualization
* Distribution and Synthesis of Data
* Quantitative and large-scale reconstructions through proxies

### An overview on open-source Software Development Standards

* Version control
* Transparency
* Automated tests through Continuous Integration
* Accessible and extensive documentation
* Distribution of Software through Package managers (conda, PyPi, Docker)

## Challenges tackled by this thesis

* Visual analysis of large amounts of data (psyplot)
* Synthesizing and Distributing large amounts of proxy data (straditize, EMPD/POLNET viewer)
* Understanding and modelling past climates with statistical methods (Teleconnections, GWGEN)

# Software Tools

## Psyplot – A flexible framework for interactive data analysis

### Summary (from JOSS Paper)

### Other visualization frameworks (short review)

### The psyplot framework design

### Integration into a graphical user interface

## Straditize – A digitization software for pollen diagrams (quaternary paper)

* straditize builds upon the psyplot GUI
* fill the gaps for large-scale climate reconstructions

## The EMPD- and POLNET web-interface to pollen data

### The community database EMPD (JOSS Paper, Includes a description of the tools)

### The POLNET database viewer (builds upon EMPD)

# Numerical Tools

## GWGEN – A global weather generator for daily climate (GMD paper)

## A model analysis on the stability of northern hemispheric teleconnections

# Conclusions

* New tools that have been developed
* Quality standards of the tools
* Further development and potential usage

# Appendix

## IUCM paper (Cremades and Sommer, 2019)

## Other co-authored peer-reviewed publications

## Overview on Software packages developed during the PhD

This section mainly contains the latest version of the package, a short summary and an information table about where to find everything (Documentation, source code, etc.)

### Main packages

#### Psyplot

#### Psy-simple

#### Psy-maps

#### Psy-reg

#### Psyplot-gui

#### Straditize

#### Psy-strat

#### Gwgen

#### Iucm

#### EMPD

##### EMPD-admin

##### EMPD-viewer

##### EMPD-data

#### POLNET

##### POLNET-viewer

##### POLNET-data

### Other packages

#### docrep

#### sphinx-nbexamples

#### model-organization

#### funcargparse

#### autodocsumm

## Timeline of the PhD

## CV of Philipp Sommer