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二〇一八年十月

A Dissertation Submitted to China University of Geosciences

For the Doctor Degree of Science

Manual of CugThesis

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摘　要

论文的摘要是对论文研究内容和成果的高度概括。摘要应对论文所研究的问题及其研究目的进行描述，对研究方法和过程进行简单介绍，对研究成果和所得结论进行概括。摘要应具有独立性和自明性，其内容应包含与论文全文同等量的主要信息。使读者即使不阅读全文，通过摘要就能了解论文的总体内容和主要成果。

论文摘要的书写应力求精确、简明。切忌写成对论文书写内容进行提要的形式，尤其要避免“第 1 章……；第 2 章……；……”这种或类似的陈述方式。

本文介绍中国地质大学（武汉）论文模板 CugThesis 的使用方法。本模板符合学校的本科、硕士、博士论文格式要求。

本文的创新点主要有：

- 用例子来解释模板的使用方法；
- 用废话来填充无关紧要的部分；
- 一边学习摸索一边编写新代码。

关键词是为了文献标引工作、用以表示全文主要内容信息的单词或术语。关键词不超过 5 个，每个关键词中间用分号分隔。（模板作者注：关键词分隔符不用考虑，模板会自动处理。英文关键词同理。）

关键词：TEX；LATEX；CJK；模板；论文；CUG

Abstract

An abstract of a dissertation is a summary and extraction of research work and contributions. Included in an abstract should be description of research topic and research objective, brief introduction to methodology and research process, and summarization of conclusion and contributions of the research. An abstract should be characterized by independence and clarity and carry identical information with the dissertation. It should be such that the general idea and major contributions of the dissertation are conveyed without reading the dissertation.

An abstract should be concise and to the point. It is a misunderstanding to make an abstract an outline of the dissertation and words “the first chapter”, “the second chapter” and the like should be avoided in the abstract.

Key words are terms used in a dissertation for indexing, reflecting core information of the dissertation. An abstract may contain a maximum of 5 key words, with semi-colons used in between to separate one another.

Key words: TEX; LATEX; CJK; template; thesis;CUG

Contents

Chapter 1 Introduction

This chapter shows the format of chapter-section-subsection, et al.

1.1 Background

The discovery of seafloor hydrothermal systems in the 1970s has led to a major reassessment of the Earth's thermal and geochemical budgets and has revolutionized our understanding of biological processes . These hydrothermal systems are found in the deep ocean along mid-ocean ridge spreading centers where new oceanic crust is continuously created. Hydrothermal circulation of seawater is driven by magmatic heat which is ultimately coming from radiogenic decay within the Earth's deep interior. Seawater percolates into the crust, slowly heats up on its way down and reacts with the basaltic rock. Near the base of the system, at the magmatic-hydrothermal inter- face, fluids are expected to reach their hottest temperature, after which they rise vigorously and vent as hydrothermal fluids at so-called black-smokers. When the hot fluids discharge and contact cold seawater, minerals precipitate to form the black ”smoke”and build large chimney structures. Energy fluxes associated with black-smoker hydrothermal systems are large, accounting for approximately 25% of Earth's total heat flux (Stein and Stein, 1994; Fisher, 2001). To dissipate this heat, it is estimates that the total mass of the oceans is circulated through the crust in less than one million years (Wolery and Sleep, 1976). These large mass fluxes indicate that chemical fluxes between ocean and crust, due to the reaction of fluid with the rock, are also substantial. Therefore, black-smoker systems play a fundamental role in regulating the chemistry of the oceans through geologic time.

1.2 Direct observational constraints

During the last decades direct observational data from both manned and unmanned sub- mersibles has become available , giving constraints on the size of sub-seafloor convection cells and the magnitude of energy- and mass transport. By now, active black-smoker fields have been identified along all spreading margins, irrespective of the spreading rate, at depths ranging from 800m to 3600m below sea level . Generally a distinction is made between black-smoker systems along fast spreading and slow spreading ridges. The latter have a substantially lower heat supply and seem controlled by tectonic rather than magmatic processes. In contrast to fast spreading systems, slow spreading ridges are located at much deeper ocean depths, often lack clear magmatic melt lenses , and normally host fewer vent fields per kilometer of ridge axis. Nonetheless, black-smoker fields at both types of ridges share many of the same characteristics. Vent field size is typically on the order of 103 to 105 m2 (i.e. one to tens of football fields) hosting few to several tens of individual black-smoker chimneys .

1.2.1 Seismic Survey

Seismic surveys have given insight into the structure of the upper oceanic crust. A feature common to many fast spreading ridges is an axial reflector at a depth of 1 to 2 km, generally thought to represent the top of a melt lens . Below this melt lens, with a cross-ridge extent often no more than 2km, a larger mush zone has been identified, which, together with the melt lens, supplies the magma that forms the crust . The restricted width of this mush zone suggests that fluid flow and associated advective heat loss may occur through the full thickness of oceanic crust. Seismic studies of slow-spreading ridges have rarely revealed shallow axial reflectors indicative of melt lenses.

Chapter 2 How to Use CugThesis

For a thesis based on CugTehsis, we just focused on contents, e.g., text, figures, references, tables, equations and their cross reference. The other details about this template will be updated on 简书文章: CugTheis 使用说明 。

2.0.1 Incert Figure

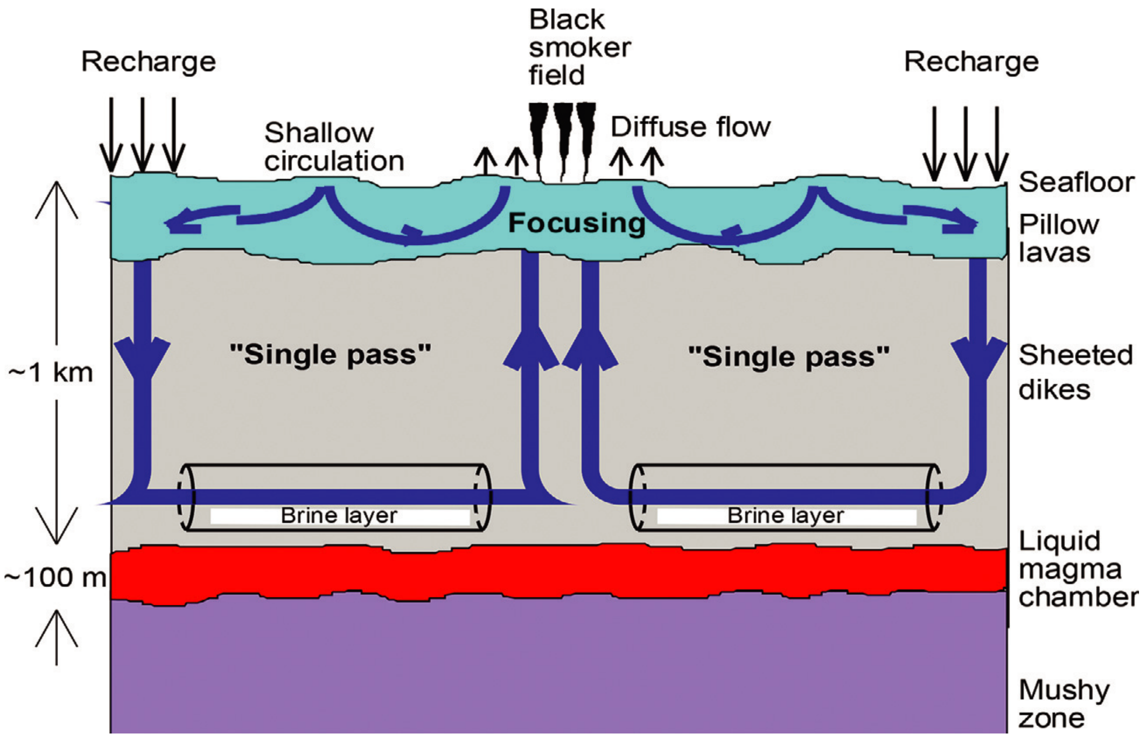

Figure 2.1 Single Pass Model

Diagrammatic sketch of single-pass model, which include recharge zone and discharge zone. The down flow fluid is heated up by deep magmatic heat soource and then phase seperation occurs.

Fig. 2.1 is a single figure ① (Andersen et al., 2017)。Each figure has a labe, caption and an alternative short caption。

Fig. 2.2 is a three-column figure, it has a main caption and three sub-captions and sub-numbers。For instance, following wechat 2.2(b) to get much more academic resoources.

① This is a foot note: note that reference citation

(a) Color CUG logo (b) Wechat (c) White-Black CUG logo

Figure 2.2 Three-column Figure

2.0.2 Table

Three-line table

Table 2.1 Symbols and Values

Symbol	Definition	Value	Unit
$\vec{g}$	Gravitational acceleration	9.8	m/s^2
ρ_f	Density of water	1.0	kg/m^3

Tab. 2.1 is a three-line table with label and caption。

2.0.3 Equations

Inline equation $E = MC^2$， the following is a independent equation,

$$\left(\phi\rho_f c_{pf} + (1-\phi)\,\rho_r c_{pr}\right)\frac{\partial T}{\partial t} = \nabla\cdot(K_r\nabla T) - \rho_f c_{pf}\vec{v}\cdot\nabla T + \frac{\mu_f}{k}\vec{v}^2 - \left(\frac{\partial\, ln\rho}{\partial\, lnT}\right)_p \frac{Dp}{Dt} \quad (2\text{-}1)$$

2-1 represents energy conservation of hydrothermal fluid flow。

2.0.4 References

First cite format： Vehling et al. (2018) noted that phase seperation occurs in deep。The second cite format： there are some research focus on 3-D simulation (Coumou et al., 2008, 2006)。

Index of Figures

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Reference

Andersen C, Theissen-Krah S, Hannington M, et al. Faulting and off-axis submarine massive sulfide accumulation at slow spreading mid-ocean ridges: A numerical modeling perspective[J]. Geochemistry, Geophysics, Geosystems, 2017, 18(6): 2305–2320.

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Vehling F, Hasenclever J, Rüpke L. Implementation strategies for accurate and efficient control volume-based two-phase hydrothermal flow solutions[J]. Transport in Porous Media, 2018, 121 (2): 233–261.

Appendix A Table

Table A.1 Symbols and Values

Symbol	Definition	Value/Unit
K	Permeability	m^2