

**DOCTORATE OF THE CHARLES UNIVERSITY IN PRAGUE AWARDED BY THE FACULTY  
OF SCIENCE**

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REPORT MADE OUT BY: MARTELET Guillaume

REGARDING THE AUTHORIZATION OF DEFENSE OF:

**Vaclav METELKA**

Thesis title: "Geophysical and remote sensing methodologies applied to the analysis of regolith and geology in Burkina Faso, West Africa"

**1°) GENERAL EVALUATION**

By comparison with recently defended PhD theses or PhD theses that you have personally heard of in the same field, do you think this one is:

♦ **WORTH BEING DEFENDED**

- YES (without any changes)
- YES (with minor changes AFTER the defense)
- YES (with minor changes BEFORE the defense)
- YES (with major changes)
- NO

*If yes, what would you say about the thesis:*

♦ **SCIENTIFIC LEVEL**

- |                                      |   |                                    |
|--------------------------------------|---|------------------------------------|
| <input type="checkbox"/> EXCEPTIONAL | <input checked="" type="checkbox"/> EXCELLENT | <input type="checkbox"/> VERY GOOD |
| <input type="checkbox"/> GOOD        | <input type="checkbox"/> FAIR                 |                                    |

♦ **PRESENTATION**

- |                                      |                                    |   |
|--------------------------------------|------------------------------------|---|
| <input type="checkbox"/> EXCEPTIONAL | <input type="checkbox"/> EXCELLENT | <input checked="" type="checkbox"/> VERY GOOD |
| <input type="checkbox"/> GOOD        | <input type="checkbox"/> FAIR      | <input type="checkbox"/> TO BE REDONE         |

## 2°) CRITICAL REVIEW AND COMMENTS

*This review of Vaclav Metelka thesis manuscript is an abridged version of the complete review provided in French.*

Vaclav Metelka thesis manuscript deals with the geology of a segment of a Paleozoic orogeny in West Africa, Burkina Faso. This work aims at updating the cartography and geological history of 3 Birimian greenstone belts Banfora, Houndé et Boromo, along eastern Taoudeni basin.

In this perspective, Vaclav Metelka follows a modern approach of regional geology mapping based both on standard field observations and lab analysis, and also, more originally, based on the analysis and interpretation of airborne geophysics, satellite imagery and gravimetry. This allows him to update the geological and structural map of SW Burkina Faso, together with a geodynamical framework and associated metallogeny.

While doing this, Vaclav Metelka naturally also addresses the influence of the regolith on the geophysical and satellite data. This fundamental component of the West African geology is also mapped using a numerical approach based on neural network.

The manuscript is well written and properly illustrated. After an introduction stating the context and objectives of the work, it is organized in 4 chapters, each being composed of an article (in English) introduced by a short synthesis (in French). This structure of the manuscript definitely attests for Vaclav skill to write scientific papers, which is good. On the other hand, this introduces repetitions between the articles and the synthesis, and more problematic, this does not allow Vaclav to present in detail some of his data acquisitions and processing. In my opinion, some data and processing would deserve at least annexes.

I have particularly appreciated the litho-structural mapping (Chapter 1) which attests for a surprising maturity of Vaclav Metelka in the processing and interpretation of the airborne gamma metric and satellite data for cartography.

Chapter 4, dealing with the numerical cartography of the regolith using the same datasets and a neural network classifier is also one of my favorites: the approach proposed and its statistical evaluation are of excellent level.

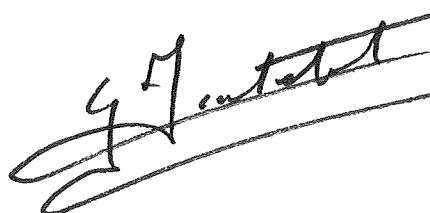
The spectral library of Chapter 2 also appears to me as a well-designed work and ultimately as a useful tool for a proper analysis of visible and infrared satellite data in the region. I was consequently a bit surprised that no such study was included in the thesis.

Altogether, the work proposed by Vaclav Metelka is of overall very good quality, with a lot of data acquisition, numerous processing, often sharp and apparently well appropriated. Vaclav also provides careful descriptions of the results and proper discussions in light of the literature, in order to obtain well established conclusions.

The manuscript is clear and well illustrated.

This work undoubtedly deserves to be defended in an oral presentation, in the perspective for Vaclav Metelka to obtain the diploma of doctorate.

Orléans, August the 19th, 2011

A handwritten signature in black ink, appearing to read 'G. Metelka', written over a horizontal line.