Objectives

The *Centre of Image and Material Analysis in Cultural Heritage* is an interuniversity research institution established at the beginning of 2014 within the framework of the HRSM*-project *Analysis and Conservation of Cultural Heritage – Modern Imaging and Material Analysis Methods for the Visualization, Documentation and Classification of Historical Written Material (Manuscripts)*. Specialized on research in the fields of imaging, image enhancement and analysis as well as the non-invasive chemical analysis of the materials used for the production of historical objects, CIMA represents an unique facility with an interdisciplinary approach to the investigation of cultural heritage. Besides manuscripts, also other kinds of cultural heritage objects will be investigated in the future, such as coins, paintings etc.

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CIMA

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Cultural heritage in the light of modern science

Philology

Philologists select and prepare the objects for analysis, take care of the right handling during the imaging process, describe the manuscripts and analyse their contents on the basis of the enhanced images, thereby evaluating the results of the imaging and enhancing process. Together with the chemists they also interpret the results of the various spectroscopic analyses.

Presently the selection comprises badly preserved or rewritten manuscripts (palimpsests) on the one hand, and manuscripts with a remarkable make up on the other, deriving from the 8th until the 14th century.

Stages of decipherment:

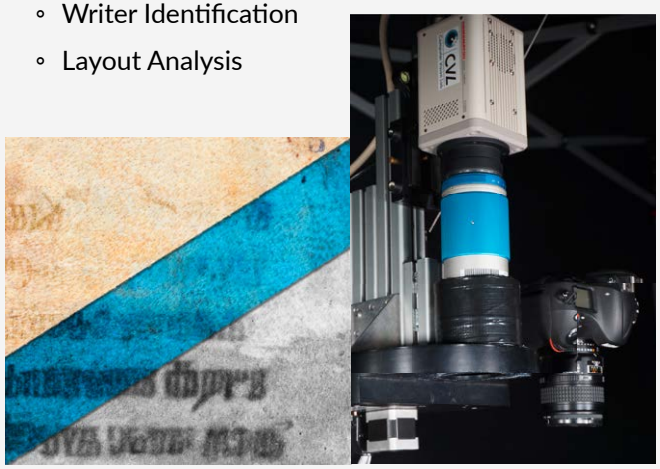
.....ван[ѥ]..ї мⷬкомъ [оⷧ]-
.....дннн[ѥ] ⁘ п[р̄]п[в]нъїмъ
в.се.нѣ ⁘ І рождьшⷭ[іⷭ] [тⷭ] вѣ-
нець · тв[он] миръ даждь на[.]ь
наставлѣыан покръїваіѫ ж[.]-
знь нашⷪ · І да съ мило....-
[іж] твоеіⷪ влагости съпо[д]..н-
мъ сѧ Въздревъноватн ..[ъ]-
[ѥ]пластемъ · І пнчастъ[н].-
цн т[евѣ] въївъше · оⷧлоⷧун [н]-
тн съ нмин прѣдълежащаа
благаа · тъї бо ѣсн датель
вс̑ѣуьскъїхъ благъ · й тевѣ
[с]л[а]вⷪ въсъїлаѣмъ · съ ве-
знауⷦльнъїмь тн о̄цⷩмь ·

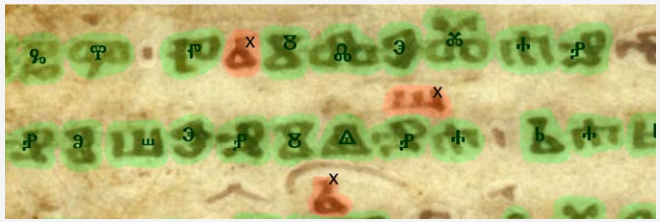
Improving the legibility of degraded manuscripts and OCR (Optical Character Recognition)

Image Analysis

The computer vision activities of CIMA comprise the following items:

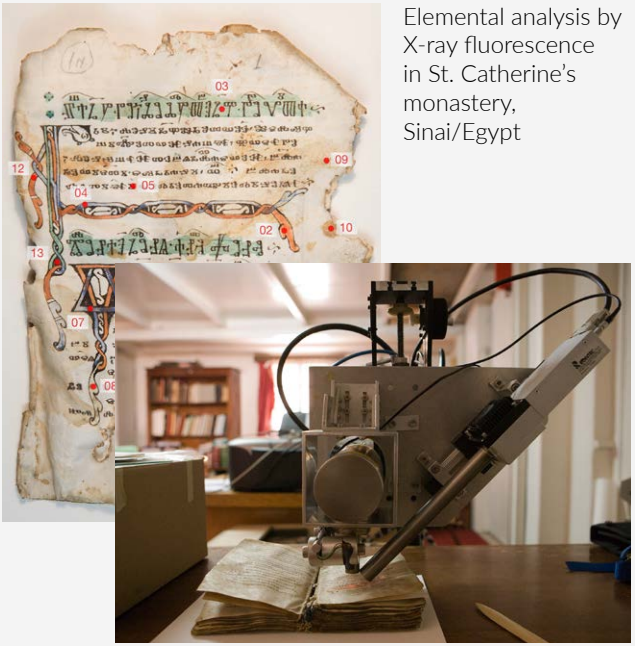
- Multispectral Imaging
  - Imaging in Spectral Ranges
  - From UltraViolet to InfraRed
- Image Enhancement
- Document Analysis
  - OCR
  - Writer Identification
  - Layout Analysis





Material Analysis

The material investigations aim at the determination of the inks and pigments used for writing and illuminating, in contrast to the support of the manuscripts (presently the focus is on parchment). Only non-destructive and non-invasive methods are required, such as X-ray fluorescence analysis (XRF), UltraViolet-Visible (UV-Vis), Fourier Transform Infrared (FTIR) and Raman spectroscopy. Above from the paradigmatic also the syntagmatic determination of the materials is important for the spatio-temporal interpretation of the cultural objects.



Elemental analysis by X-ray fluorescence in St. Catherine's monastery, Sinai/Egypt