A Field Experience in Ink Studies: Manuscripts from Northern Ethiopia (East Tigray)

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CENTRE FOR THE STUDY OF MANUSCRIPT CULTURES

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IDEAS

Ethiopia


ERITREA
Red Sea
YEMEN
SUDAN
DJIBOUTI
Gulf of Ad
SOMALI
Ogaden region
SOMALIA
KENYA
ADDIS ABABA
Dire Dawa
Lake Tana
Lake Turkana
KEY
National Park/Sanctuary
Historic Route
Place of Interest
Ethiopian Airlines Domestic Offices

Ethio-SPaRe

- The project “Cultural Heritage of Christian Ethiopia: Salvation, Preservation, Research”, 2009-2015

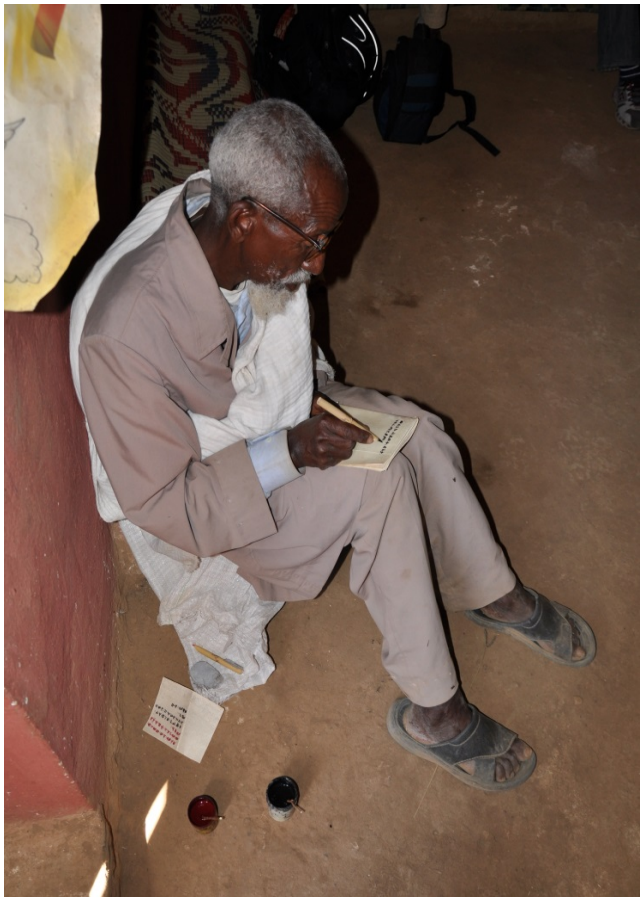
- Supported by European Research Council (EU 7th Framework Programme, ERC Starting Grant 240720)

- Based at the Hiob Ludolf Center for Ethiopian Studies

- In cooperation with the Tigray Culture and Tourist Agency, and the Diocese of East Tigray

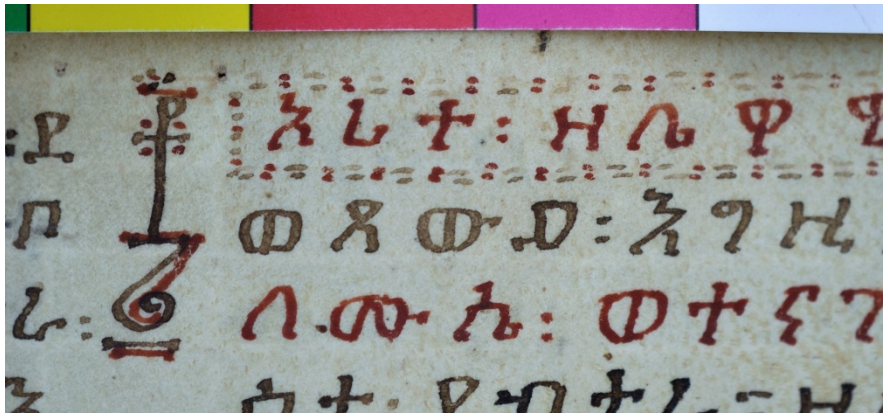
- 10 research and digitalization missions to North Ethiopia (Tigray)

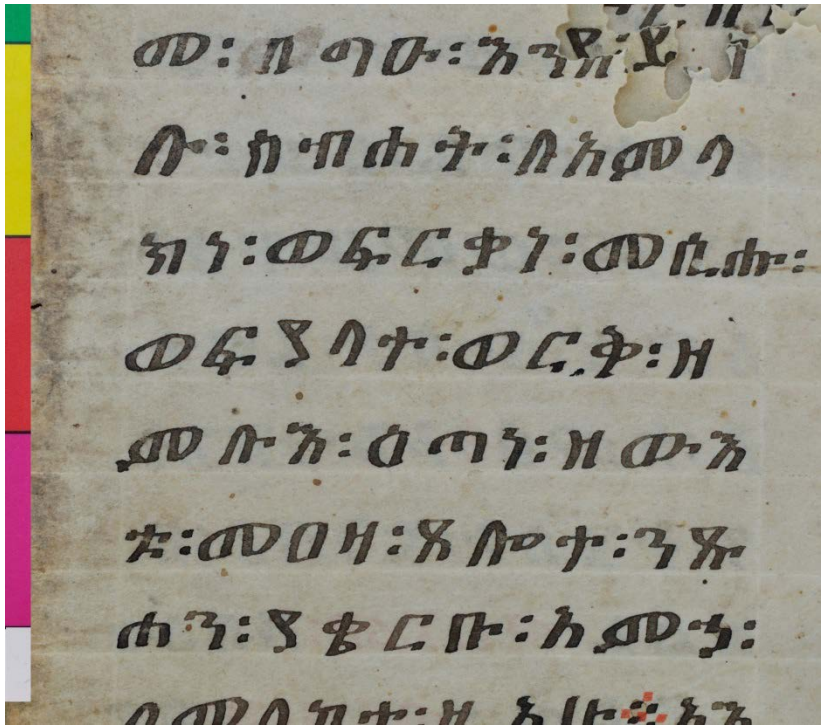
Theoretical propositions

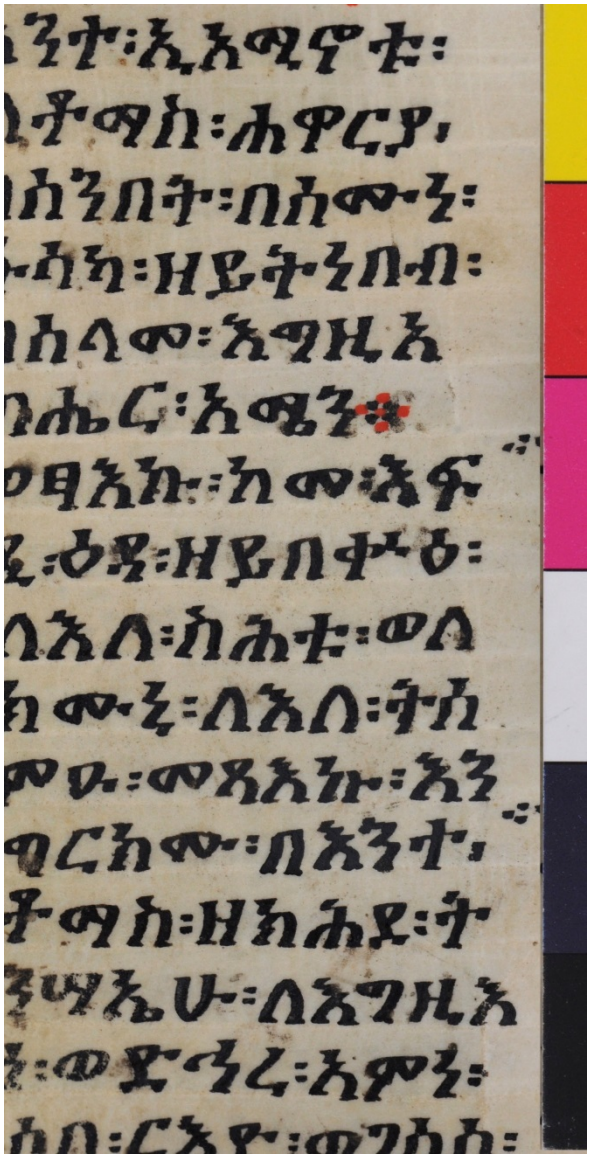


- **Carbon black inks** were used in Ethiopia ever since
- No original written ink recipes transmitted
- Secondary literature describes recent practice
- Only few studies on Ethiopian inks and pigments done
- No information on inks in the manuscript catalogues
- Differences in hue of inks visible in some manuscripts

Visible differences in inks’ colour and consistency







Instrumental Studies in the framework of Ethio-SPaRe: organisational background

- Cooperation with the specialists in material studies (I.Rabin, CSMC/BAM)
- Information exchange and cooperation with CSMC's projects and specialists (A. Bausi, A. Brita, O. Hahn)
- Cooperation with manuscript conservators (N. Sarris, M. Di Bella)
- Cooperation with the Tigray Culture and Tourism Agency, the Diocese of East Tigray, the University of Mekelle

Methods and instruments

Reflectography in field research:

- Simple reflectographic measuring with portable digital microscope Dinolite Pro2 AD413T-I2V
- Taking images in VIS, UV, NIR light modes from selected manuscripts, along with the digitization process
- Records from scores of manuscripts, with the their locations exactly recorded

Aims of the instrumental studies in Ethio-SPaRe plan of work

- Gathering of codicological data for the purpose of manuscript studies and conservation
- Were the carbon inks indeed the only type in use?
- Differences in ink properties detectable?
- Interpretation of the results in studies
- Introduction of results into the cataloguing scheme used by Ethio-SPaRe

Reflectography with Dinolite Pro2 AD413T-I2V

V. Pisani, ʿUra Qirqos, 08.06.2014

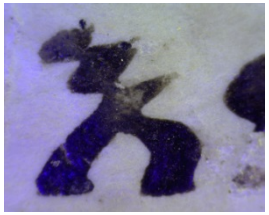
M. Krzyzanowska, Rubakusa Giyorgis, 29.11.2012

Reflectography

ʿUra Qirqos, UM-027, Four Gospels, late 14th-early 15th century

VIS **NIR**





Black ink: definitely carbon
Red ink: presence of pigment

Reflectography with Dinolite Pro2
Some interpretation principles

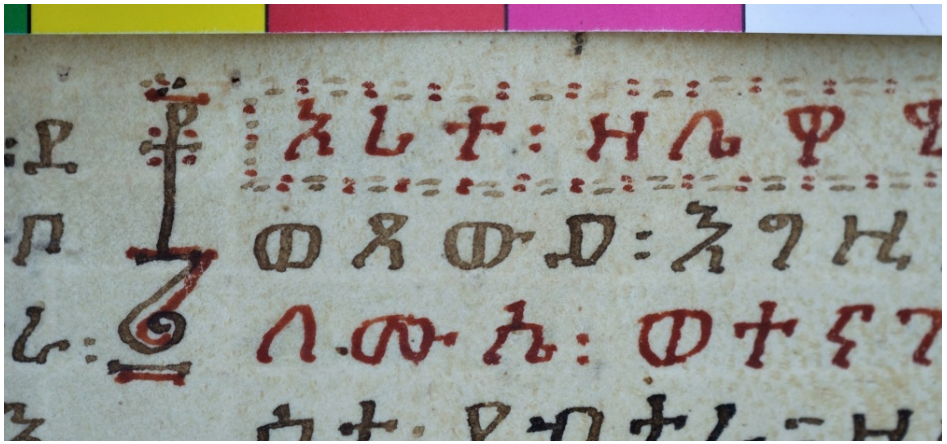
- Pure carbon inks retain opacity in NIR light
- Pure plant inks become invisible
- Iron-gall inks partly lose visibility
- Mixed inks might partly lose visibility and colour intensity
- Soot hides the presence of other components
- Red: mineral inks remain well visible
- Red: plant inks become nearly invisible
- Exact chemical composition remains unknown

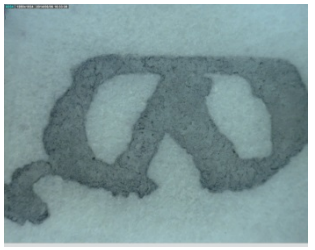
Results of reflectographic measurments

- Carbon inks attested in the absolute majority of the checked manuscripts (ca. 150, ca. 23 sites)
- Varying quality and consistency of the inks
- (Possible differences in writing tools and techniques)

- Different types of inks attested in a small number of pre-15th century manuscripts:
  - Carbon ink with admixture of plant ink or iron-gall ink?
  - Mixed inks with very small carbon component (one old fragment)
  - Definite presence of iron-gall inks‘ components in at least one manuscript

ʿUra Mäsqäl, UM-040 Octateuch (before mid-14th century?)



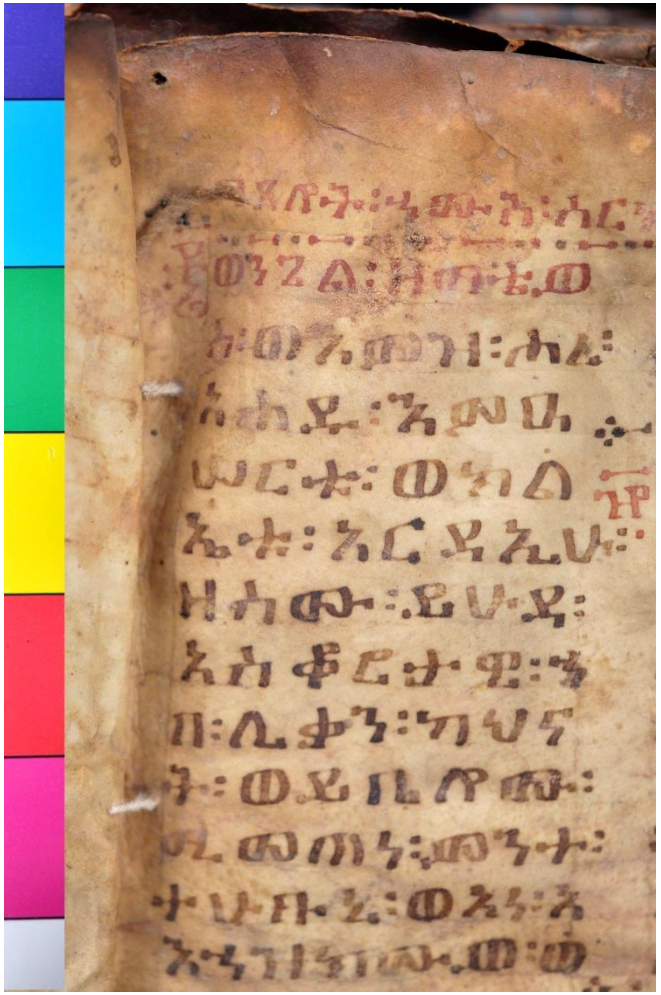




- Ink of the main text loses some colour and intensity in NIR
- Not a pure type
- Carbon component present
- <u>Mixture of carbon and plant inks</u>?

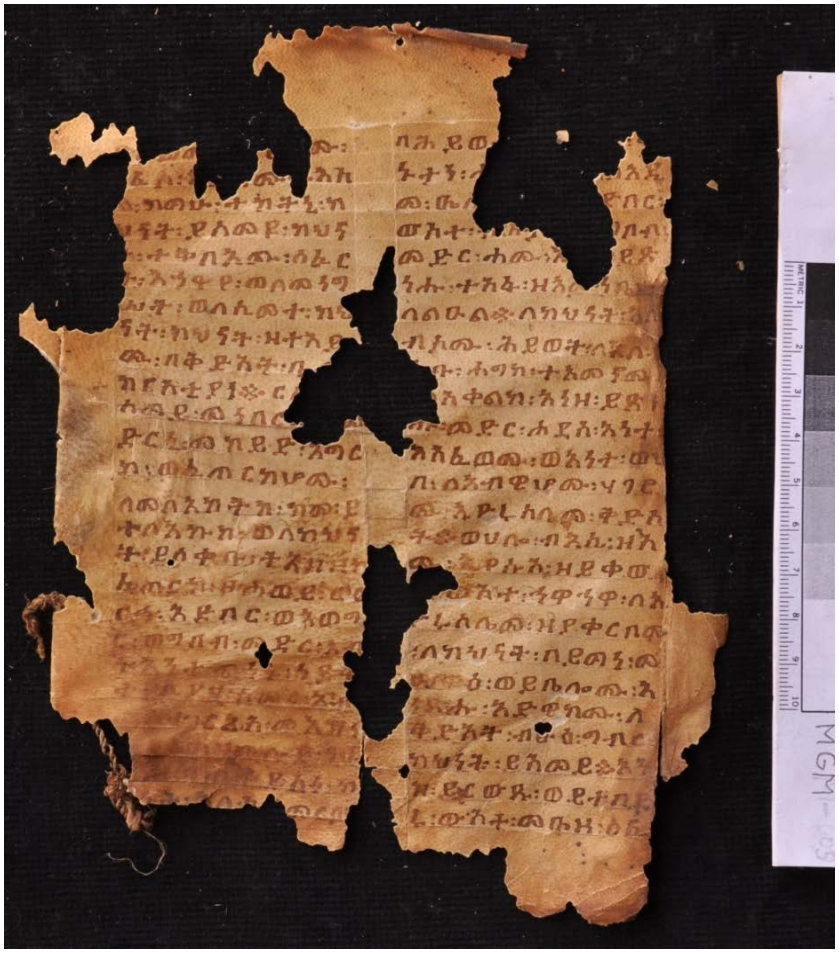
- Ink of the later correction of purely carbon type

Däbri Giyorgis, DGQ-002, Book of the Rite of the Holy Week (before mid-14th century?)



<u>Carbon ink</u> with admixture of plant or iron-gall ink?

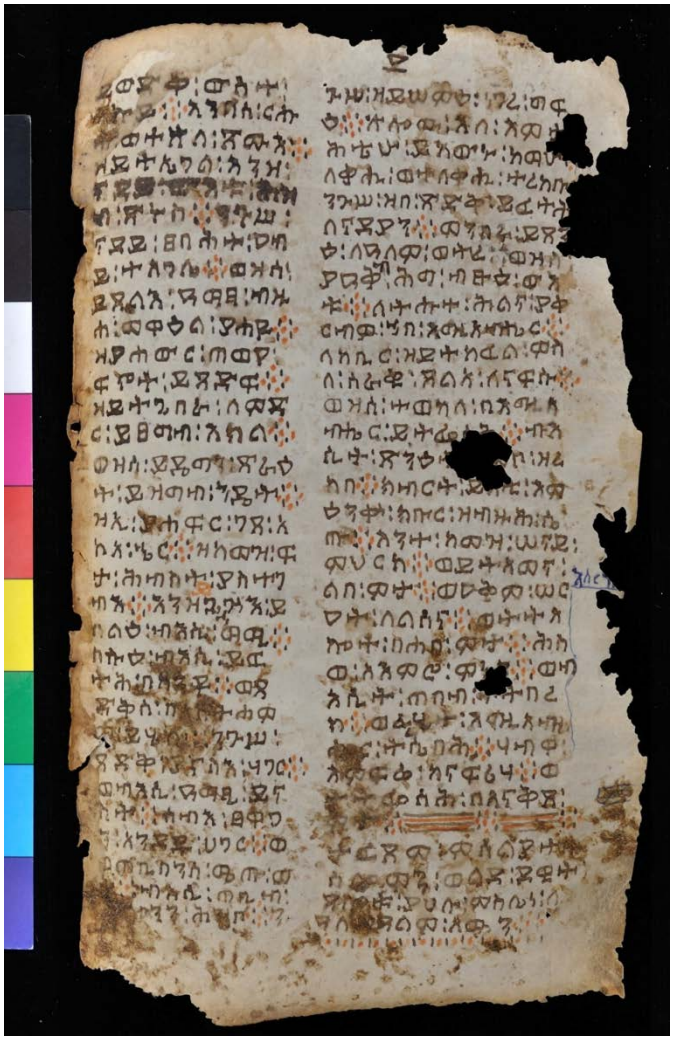
MGM-003, Fragment of a chant manuscript, Məʾəsar Gʷəḥila (before mid-14th century?)



Non-carbon ink

Plant or iron-gall ink?

Gʷaḥtärat Qirqos, GQS-002 Old Testament books (16th century?)



<u>Carbon ink</u> despite delusive brown colour

Methods and instruments

Spectrometry in North Ethiopia (7-9 June, 2014)

- I. Rabin, Ethio-SPaRe team, A. Bausi, A. Brita, the manuscript conservators
- Measurments with portable ED-XRF TRACER IIISD from 11 selected manuscripts
- Study of the chemical composition of the ink in the ancient MS ʿUra Qirqos, UM-039 “Senodos“
- Some results are published in on-line report (http://www1.uni-hamburg.de/ethiostudies/ETHIOSPARE/missions.html)

Ethio-SPaRe and CSMC joint mission (Ethiopia, June 2014)

Material analysis

Recording

Philology and Codicology

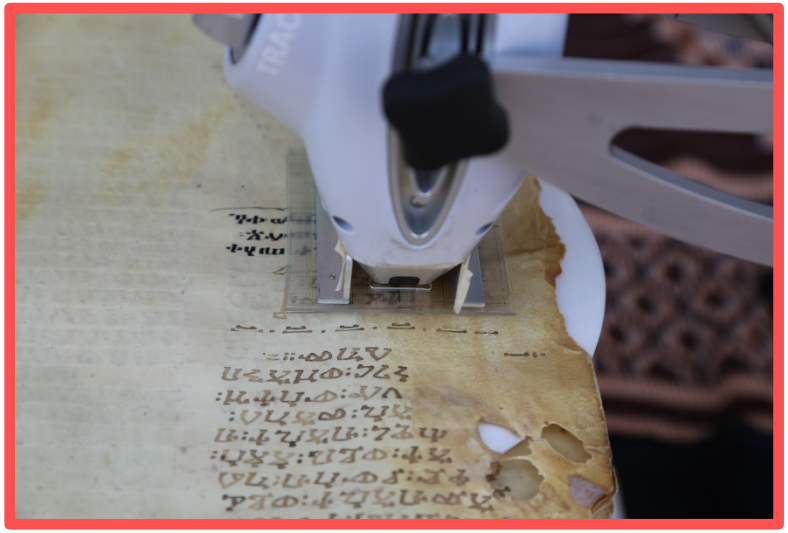
Book conservation

Reflectography

Church of ʿUra Qirqos (Tigray, north Ethiopia)

ED-XRF TRACER III-SD

Pointing the ED-XRF Tracer on the ink



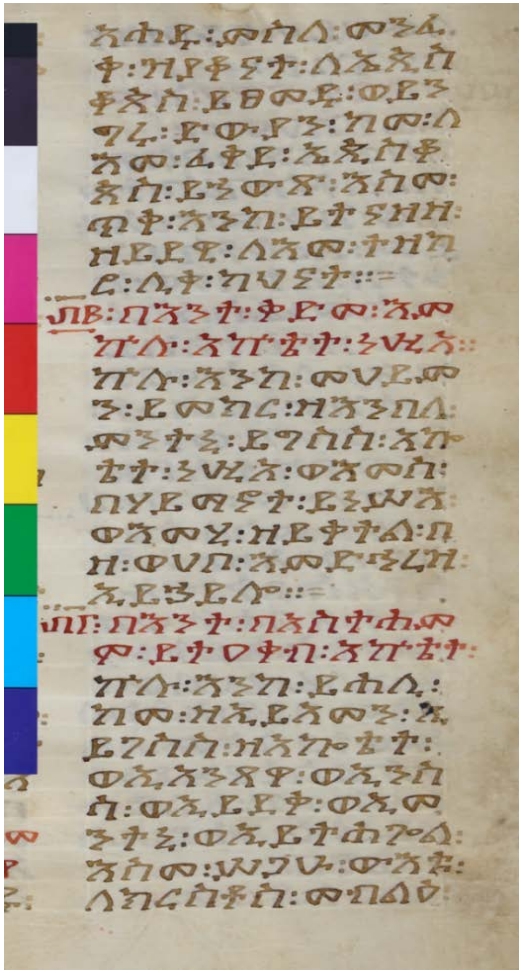
Ms. UM-39

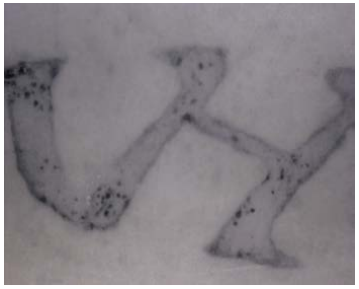
Canonico-liturgical collection
(Before and after conservation)

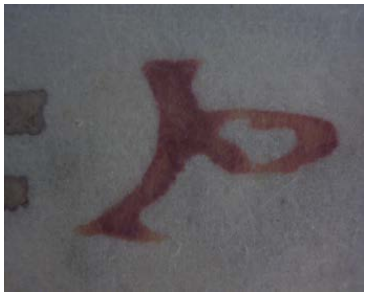
Ms. UM-18

Acts of the Martyrs
(Before and after conservation)

Reflectography of the unique UM-039



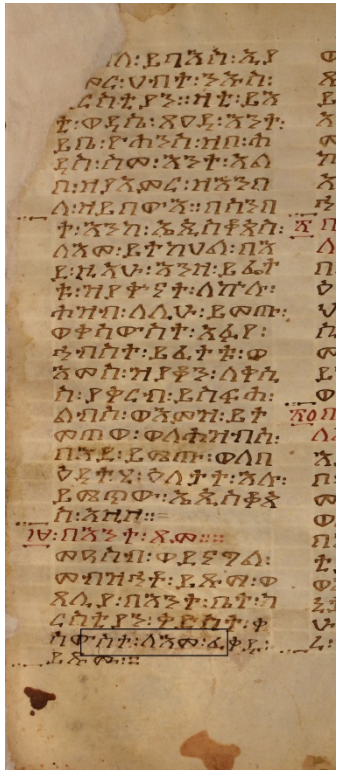


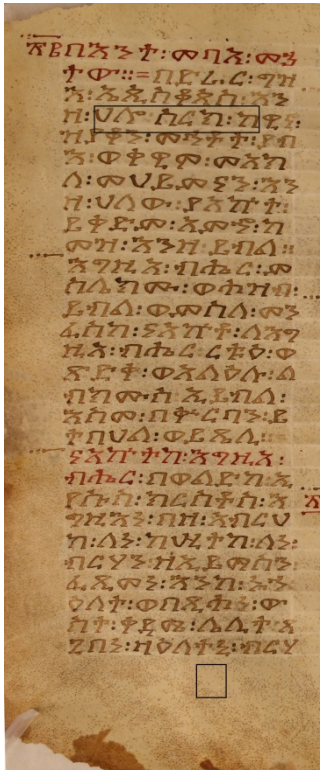


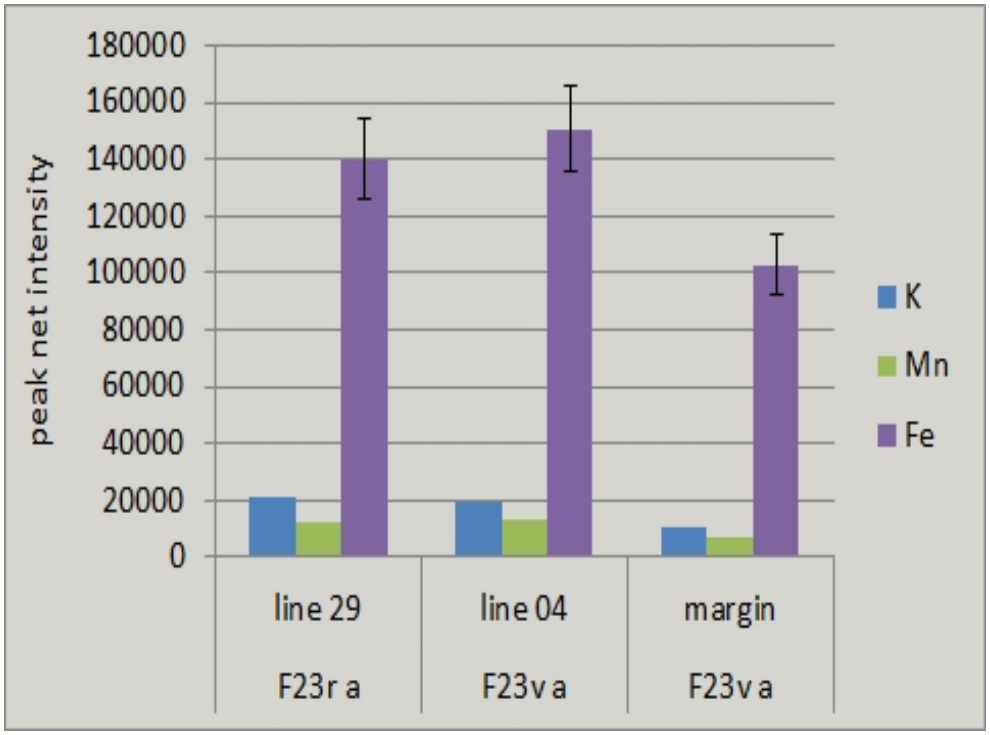
ʿUra Qirqos, UM-039 “Senodos“, before mid-14th century

Black ink: carbon part insignificant
Red ink: pigment and plant ink?

Spectrometry of UM-039







- Black ink: enhanced amount of Fe accompanied by Mn might indicate the presence of vitriol (raw material for iron-gall ink)
- Enhanced presence of K could indicate gum Arabic as binding medium

Thank you for your attention!

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