Characterisation of clays from the Kinshasa region (D.R.Congo) used for manufacture of raw earth products

Presented by Lavie Arsène MANGO ITULAMYA

MANGO ITULAMYA LAVIE ARSENE*, FREDERIC COLIN, FABIENNE COURTEJOIE AND FAGEL NATHALIE

16th International Clay Conference

Granada, 21 July 2017
Context and objective

- Challenging conventional construction methods
- Anticipating population growth
- Ecomaterials as solution

What?
- Natural material: clay
  - Raw earth blocks
    - Kinshasa region

Where?
- Developing a building material that takes into account the requirements of the current environmental context.
- Development of low cost alternative building materials
- Valuing local natural resources

Why?
Raw earth

- Present on all continents
- 50% of the world population
- 50% in developing countries (80% in rural areas, 20% in urban areas)

Shibam - Yemen

Great Wall of China

Sources: Lorea (2005); Broncart (2009); http://www.solidarite-afrique.lu/ (2016)
Molded earth

Adobe, the molded and sun dried brick

Cob, the earth built in layers

Wattle and daub, the earth used in filling load-bearing structures, usually made of wood.
Compressed earth (Rammed earth, CEB)

*Compressed Earth Brick (CEB): compacted earth, achieved using manual or mechanical presses.*
Evolution of the population
- 1957: \approx 440,000 \text{ hab.}
- 2015: \approx 12,000,000 \text{ hab.}

Built area:
Evolution \approx 10 \text{ times} between 1957 and now
Site selection

Sources: HVK (2007) ; MRAC (1963)
Results and discussion

MINERALOGY

- Muscovite
- Feldspath0K
- Quartz
- Kaolinite
- Illite
- Chlorite

Results and discussion
Results and discussion
Valorization of vegetable waste

Prospect

- Preventing drying cracks
- Lightening the material
- Increasing tensile strength

Manufacture and characterization of CEB
- Mechanical properties
- Hygrometric properties
- Thermal behavior

Sapuan (2014); Etambakonga (2012); Banyanga (2007)
Thank you for your attention