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# Geological exploration of Angola from Sumbe to Namibe: A review at the frontier between geology, natural resources and the history of geology

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### ABSTRACT

This paper provides a review of the Geological exploration of the Angola Coast (from Sumbe to Namibe) from pioneer's first geological descriptions and mining inventory to the most recent publications supported by the oil industry. We focus our attention on the following periods: 1875–1890 (Paul Choffat's work, mainly), 1910–1949 (first maps at country scale), 1949–1974 (detailed mapping of the Kwanza–Namibe coastal series), 1975–2000, with the editing of the last version of the Angola geological map at 1:1 million scale and the progressive completion of previous works. Since 2000, there is a renewal in geological fieldwork publications on the area mainly due to the work of university teams. This review paper thus stands at the frontier between geology, natural resources and the history of geology. It shows how geological knowledge has progressed in time, fueled by economic and scientific reasons.

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## 1. Introduction

This paper, based on already published books or articles, is intended to introduce the readers to the geological discovery of the coast of Angola, from Sumbe to Namibe (Fig. 1), and to show the evolution of geological knowledge over time. Papers published in the 19th century as in the colonial period when Angola was one of the Portuguese colonies in Africa up to 1974 are difficult to find, especially online. We thus made a special effort to collect them as extensively as possible.

## 2. The early geological exploration of Angola

Explorers of Angola during the XIXth century were adventurers, like Laszlo Magyar (1818–1864), who explored

Angola between 1849 and 1857—he was sufficiently instructed to make general scientific observations of the country (*i.e.* its inhabitants, fauna, flora and rocks), provincial governors, such as Fernando Costa Leal (1825–1869) who wrote a report of the journey he made in 1854 throughout the Cunene region, and naturalists. Sometimes, the expeditions were supported by Portuguese governments: D. Maria II recruited the Austrian botanist Friedrich Welwitsch (1806–1872) (*in* Morelet, 1868), who travelled through Angola between 1853 and 1860, describing the African shield and its sedimentary cover. When attempting to make stratigraphic attributions to the Kwanza sedimentary series, he made some errors by relating Angola's stratigraphy to European geology, but still, he was the first to give a reliable description of the Mesozoic strata succession.

John Joachim Monteiro (?–1878), a mining engineer educated in London at the newly created Royal School of Mines, travelled through Angola in 1853 and 1864. He was working for the Bembe Copper Mines, in the North of

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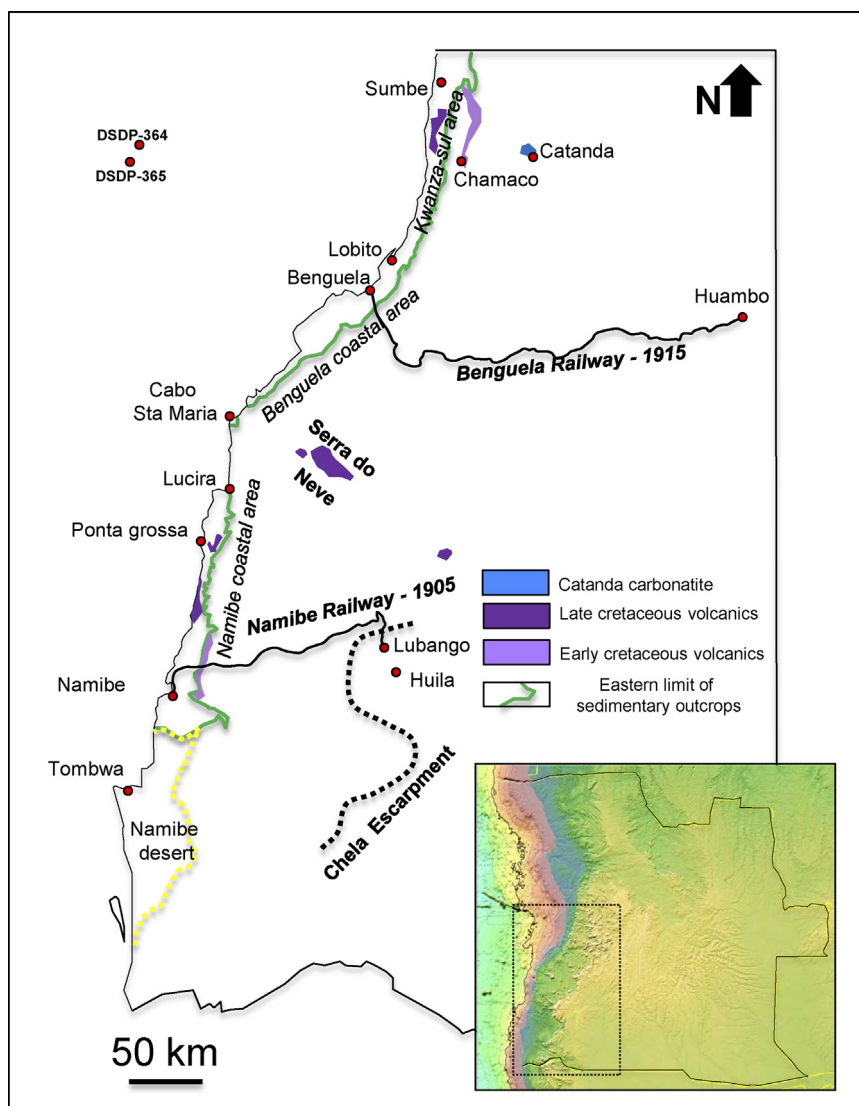


Fig. 1. (Color online). SW Angola simplified geological map, with main Cretaceous volcanics and coastal sedimentary outcrops. The locations are mentioned in the text

[http://topex.ucsd.edu/WWW\\_html/srtm30\\_plus.html](http://topex.ucsd.edu/WWW_html/srtm30_plus.html).

Angola, but he also visited the western part of the country up to Mossamedes (Namibe now) to make an inventory of its mineral resources. An extensive colonization along the coast between Lucira and Namibe by settlers arrived from Brazil in 1849 probably helped him to explore the region: there, he discovered basalt traps reaching the sea, a gypsum formation, and the volcanic rocks that underlie the latter near Namibe (Fig. 2).

Funding from the Geographical Society of Lisbon in November 1875 enabled several expeditions to reach South-West Angola. In July 1876, Hermann Von Barth (1845–1876), a German mountaineer and scientific explorer, led a campaign in the Kwanza region, which unfortunately ended abruptly due to exposure to tropical diseases. In the wake of this failure, Von Barth committed suicide in Luanda in December 1876 and all the materials collected during the expedition were lost. From 1877 to

1884, Portugal conducted other campaigns to promote its “historical rights” over African territories (Diogo & Amaral, 2012): two expeditions were set up by Hermenegildo Capello (1841–1917) and Roberto Ivens (1850–1898) in Kwanza, and by Alexandre de Serpa Pinto (1846–1900) in Huila. A third expedition was conducted by the first two officers, in 1883–1884, in Huila. All these expeditions yielded limited scientific results, at least on geology (Capello & Ivens, 1881, 1886). A strong debate confronting partisans of publicly exposed trans-Africa expeditions, mainly members of the Society of Geography of Lisbon, and those who advocated discrete but more efficient fieldwork, the Cartography Committee and the Minister of Overseas Territories (Madeira Santos, 1986), took place at that time.

Simultaneous, another mining engineer, Lourenço Antonio Pereira Malheiro (1842–1900), travelled to the

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