



Gold mineralisation in the Essakane goldfield in Burkina Faso, West African craton



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ABSTRACT

The West African craton is known for its structurally hosted Au deposits in Ghana, Burkina Faso, Côte d'Ivoire, Mali and Niger. The Essakane goldfield in northeast Burkina Faso has produced 1 606,000 oz of gold since 2010 from the Essakane Main Zone. The Essakane goldfield is made up of several exploration and artisanal sites that include; Essakane Main Zone, Gossey, Falagountou, Sokadie, Tin Zoubratan, Essakane North and South, Korizéna, Bom Kodjélé, Tin Taradat, Tassiri, Gaigou, and Takabangou. Gold mineralisation in sheeted and stockworks quartz–carbonate and tourmaline veins occurs with pyrite, arsenopyrite, and traces of pyrrhotite, galena and hematite. It is hosted in sheared, folded and contact metamorphosed volcanic, volcanoclastic and sedimentary Birimian Supergroup sequences. The maximum age of gold mineralisation in the Essakane goldfield is syn-deformational and formed during the Eburnean Orogeny (D2) at 2130–1980 Ma.

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1. Introduction

The Essakane goldfield is situated in the Oudalan-Gorouol volcano-sedimentary belt (OGB) in the northeast of Burkina Faso, 320 km north-east of the City of Ouagadougou (Fig. 1). It hosts numerous gold deposits and workings including those at Essakane, Gossey, Falagountou, Sokadie, Tin Zoubratan and Takabangou (Fig. 2). The Essakane Main Zone deposit is developed to a mine that reached production in late 2010. At full production, the Essakane mine will be one of the largest gold producers in West Africa. The goldfield is currently owned and operated by IAMGOLD Corporation (90%) and the Government of Burkina Faso (10%).

Gold mineralisation occurs in sheeted and stockwork quartz–carbonate veins in shears and dilational zones, principally associated with folded and sheared metamorphosed volcanic, volcanoclastic and sedimentary sequences. Since 1992, the deposits have been the focus of several geological and structural studies to establish the temporal and spatial relationship of gold-bearing quartz veins to the host rocks including those by Nikiéma (1992); Pons et al. (1995); Rogers and Dong (2000); Rogers (2001); Delisle (2003); Kerr (2004a–d); Tshibubudze et al. (2009, 2013, 2015) and Tshibubudze and Hein (2013).

2. Exploration history

Mining activities in the Essakane goldfield in Burkina Faso have been traced to the early 1960s, where mining was conducted by artisanal miners who, according to Gleeson and Poulin (1989) used quartz vein debris as indicators of gold prospectivity. However, modern artisanal gold mining began around 1980 (Jaques et al. 2006; Luning 2008; Werthmann 2009). In 1985 the State of Burkina Faso created an official structure to manage artisan gold mining and gold buying at Essakane known as “Le Projet Orpaillage”. In 1986 a private company Société Filière Or (SFO) in which the State of Burkina Faso had a 10% interest, was created to manage artisan gold mining and gold buying at Essakane. From 1989 to 1991, the metallurgical studies on the Essakane gold panning rejects were financed by the United Nation Development Program (UNDP) and the BUMIGEB (Bureau des Mines et de la Géologie du Burkina). In 1991 Compagnie d'Exploitation des Mines d'Or du Burkina (CEMOB) was created and was granted the Essakane exploration permit that covers most of the OGB in Burkina Faso. CEMOB was a Burkina Faso private company controlled by the French private company SIREX in which the State of Burkina Faso had a 30% interest. Formalized small-scale mining at Essakane was conducted by CEMOB from 1992. The principal operations conducted by CEMOB were the treatment of the mine tailings that were collected from artisans working gold. CEMOB operated a heap leach plant processing 500 tonnes per day of agglomerated gold panning rejects.

In 1993 to 1996, BHP minerals and CEMOB went into joint venture partnership, which led to the first modern exploration activities in the area including; airborne survey, reverse circulation (RC)

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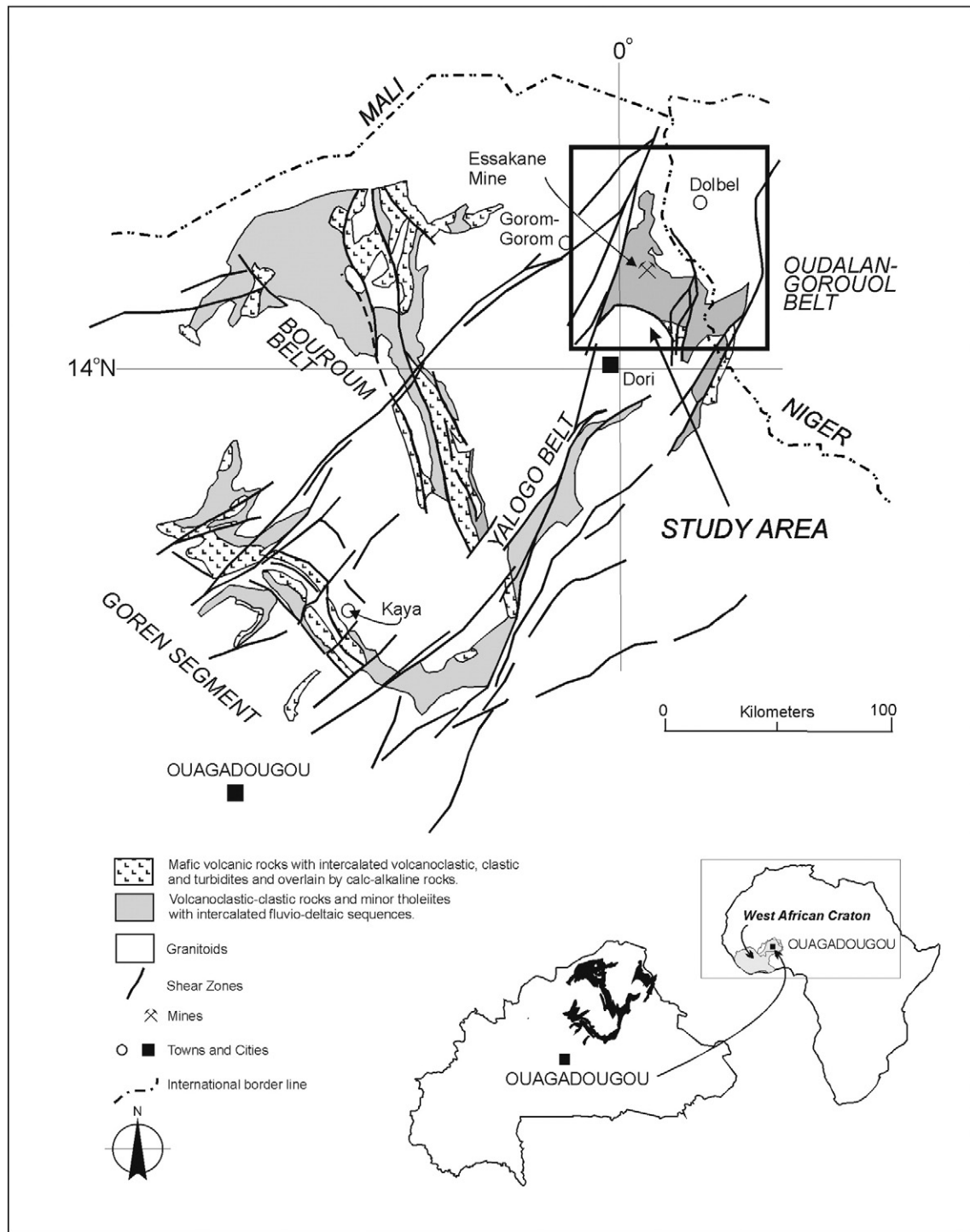


Fig. 1. Location of the Essakane goldfield in the northeast of Burkina Faso in the Oudalan-Gorouol belt.

and core drilling. BHP minerals withdrew from the project after liquidation of CEMOB in 1996. In July 2000, Coronation International Mining Corporation (CIMC) acquired the ex-CEMOB assets, including 6 exploration rights over an area of 1433 km², i.e., most of the OGB in Burkina Faso. In September 2000, Ranger Minerals Ltd. (RM) entered into an option agreement with CIMC for further exploration. Between October 2000 and July 2001, Ranger Minerals completed several phases of drilling and economic evaluation of artisanal mining sites including Essakane. The economic evaluation was negative and Ranger Minerals terminated their option agreement with CIMC in July 2001.

In March 2002, Orezone Resources Inc. acquired 100% of the Essakane assets from CIMC, and in July 2002 Gold Fields (GF) entered into an option agreement with Orezone Resources Inc. These joint venture partners completed pre-feasibility studies in 2006 and in September 2007 Gold Fields earned 60% of the Essakane Gold Project having completed a bankable feasibility study in that year. In November 2007, Orezone Resources Inc. bought back from Gold Fields their 60% interest in the Essakane Gold Project, thus Orezone Resources Inc. acquired the full rights over the Essakane permits in 2007. After intensive mapping, trenching, diamond and reverse circulation drilling programs the company reported approximately 4 million oz of Measured and Indicated

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