

Experimental report

27/02/2021

Proposal: CRG-2714

Council: 10/2019

Title: Texture analysis of metallic ores:the Serra da Borda gold (Brazil)

Research area:

This proposal is a continuation of CRG-2559

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Samples: Gold nuggets and related minerals (SiO₄)

Instrument	Requested days	Allocated days	From	To
D1B	2	2	24/02/2020	26/02/2020

Abstract:

Texture analysis of metallic ores 2: The Brazilian gold

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Introduction

A texture experiment in gold nuggets (Au-Ag alloys) collected in the Serra da Borda deposit (Brasil) have been allocated in D1B from 24/02/2020 to 26/02/2020 (Experimental number: CRG-D1B-19-380). In a previous experiment we explored the analysis of metallic ores plastically deformed in different contexts where contrasted viscosity ratios potentially results into significant variations of the activated deformation mechanisms. In the present one we needed to investigate the correlation between mechanical deformation as the hammering/rolling effect on gold particles severely transported (Dos Santos et al. in press; Gómez Barreiro et al. in prep.). The origin of gold nuggets (Au-Ag alloys) is not completely understood. They crop out in placer deposits, potentially derived from a primary source (hydrothermal/magmatic). Meteorization, erosion and transport of primary gold deposits result in the liberation of a variety of particle size. Following recent investigations in which both primary and secondary microstructural features seemed to be preserved after long transport and the general need to find independent criteria to distinguish between supergenic and hypogenic gold, we have conducted texture experiments in transmission at D1B to analyze selected samples from Serra da Borda (Brasil), as part of the PhD project of one of the co-proposers (K. Dos Santos). In an exploratory texture experiment (183_d1b_exp_CRG-2559) it was clear that textural information could be critical to constrain the origin of gold particles, but also to shed some light on the microstructural control of gold nuggets Ag-leaching mechanism.

Experiment design

The proposed experiment aims at quantify the texture in gold nuggets with different degrees of transport. As a result external dimensions where uses as a sample reference system. Experimental set up is equivalent to the previous CRG experiment (183_d1b_exp_CRG-2559) adapting the acquisition strategy (angular coverage) to the flattened morphology of most of the gold particles. A V- sample holder designed by the Tectonophysics group of the University of Salamanca has been used. Raw Data where processed with LAMP (d1b_2_F1B, macro) and refined in the MAUD software. ODF was calculated performed using Rietveld

method as implemented in Maud software (EWIMV) [Gómez Barreiro et al. 2010; Zucali et al. 2012].

Results

An example of gold texture is showed in Fig. 1. Overall the more elongated the particle the higher the intensity. However, it is clear that texture is complex, particularly when shape parameters move away from fibrous or pure discoidal ziggs morphologies. A fact that needs to be analyzed in detail in the next period and compared to the textural components observed in gold nuggets from Western Spain.

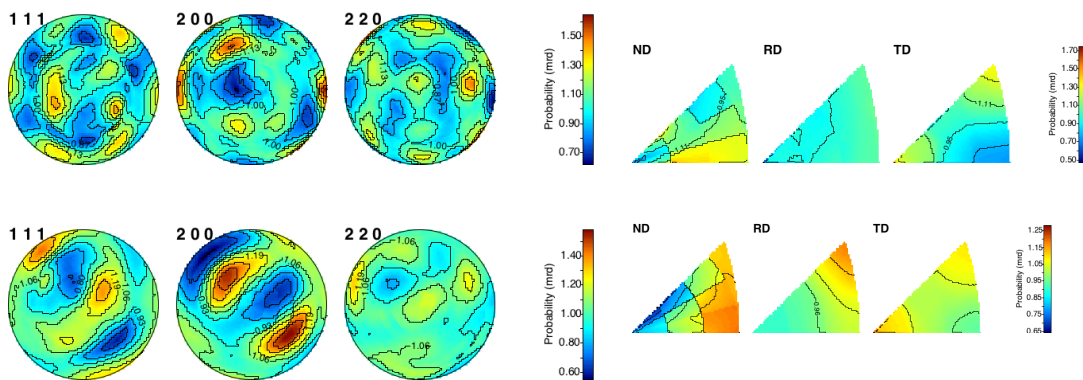


Fig. 1: Pole figures (left) and inverse pole figures (right) from gold nugget collected in Serra da Borda (Brasil)

References:

- Gómez Barreiro et al., 2015. *Journal of Structural Geology*,
 Stewart et al. 2017. *Ore Geology Reviews* 88: 43-56.