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TEXTURAL VARIATIONS IN THE EAGLE'S NEST Ni-Cu-(PGE) DEPOSIT IN ONTARIO AND IMPLICATIONS FOR MAGMA DYNAMICS IN A BLADE-SHAPED DYKE

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INTRODUCTION

The **Ring of Fire Intrusive Suite** in northern Ontario is well known for its remarkable **chromite endowment**, but it also hosts significant **Ni-Cu-(PGE) mineralization**. This predominantly occurs in the Eagle's Nest deposit, a structurally rotated **komatiitic body** that measures ~200m NE-SW x ≤50m NW-SE x >1600m deep, but was originally emplaced as **a blade-shaped dyke.** The location and variety of sulphide textures present suggests an active conduit-type feeder into the sill-like chromite-bearing intrusions. Characterizing these textures is critical to **understand magma dynamics in the conduit** and mineralization styles in the Ring of Fire as a whole.

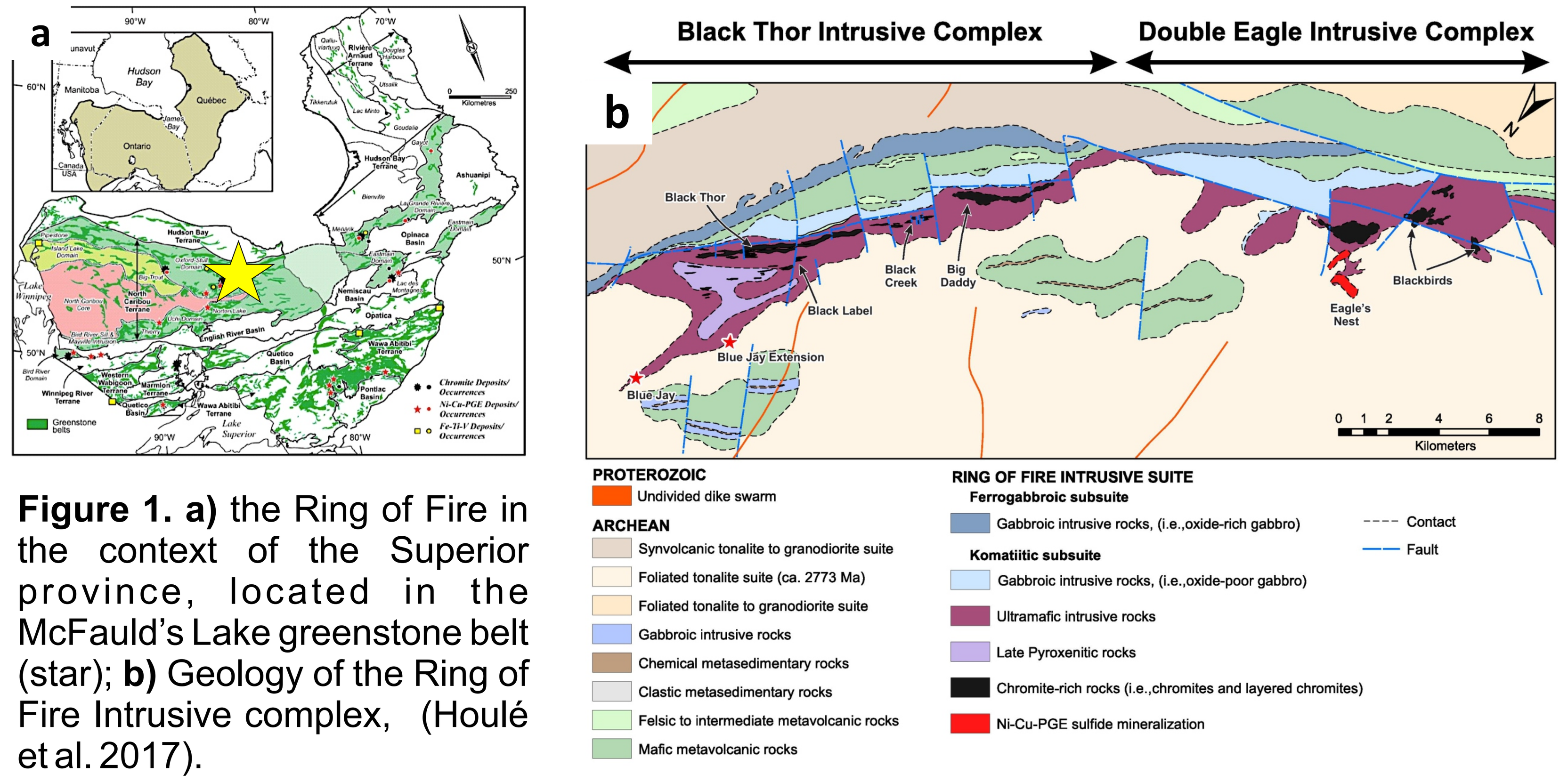

Figure 1. a) the Ring of Fire in the context of the Superior province, located in the McFauld's Lake greenstone belt (star); **b)** Geology of the Ring of Fire Intrusive complex, (Houlé et al. 2017).

MAIN SULPHIDE TEXTURES

Texture	Sulphide (%)	Sulfur (S_{38}%)
Massive	> 80	> 30
Semi-Massive	30-80	12-30
Net-Textured (Leopard Net, Disrupted Net, Patchy Net, Inclusion/Pinto net)	15-30	5-12
Disseminated	5-15	2-5

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3D INTRUSION MODEL

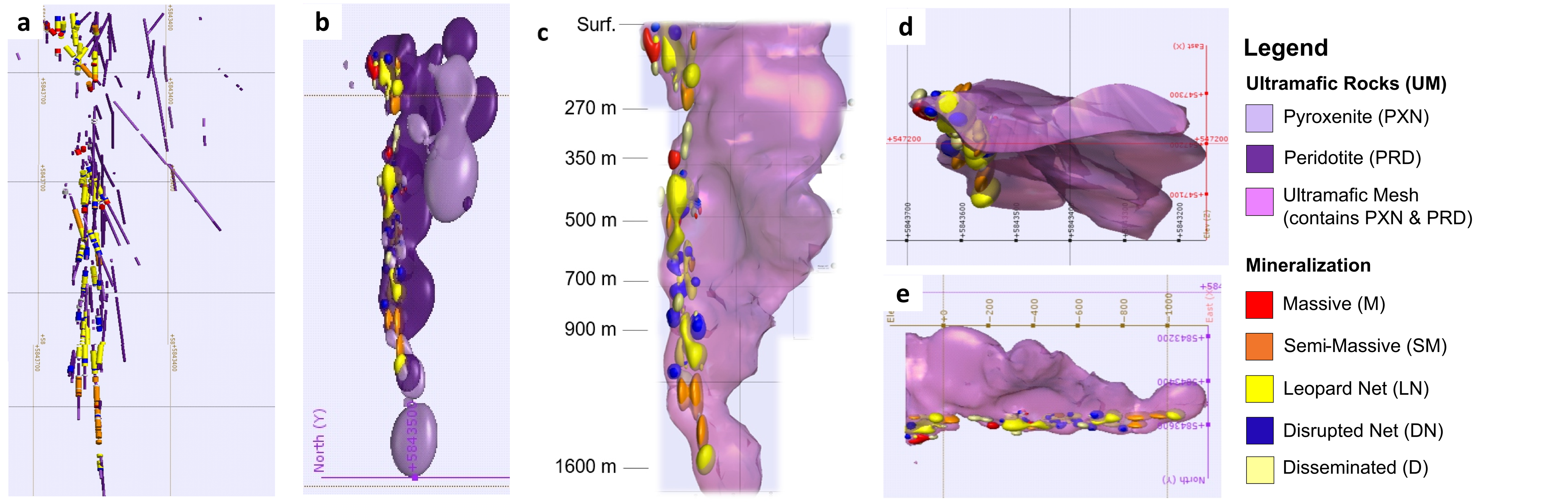

Figure 2. 3D model of Eagle's Nest intrusion based on drill core and existing company mesh, facing East. **a)** drill holes logged, **b)** ultramafic/sulphide texture volumes, **c)** conduit mesh containing intrusion with sulphide volumes, **d)** view of intrusion looking down **e)** side view of the original orientation at emplacement.

SULPHIDE TEXTURES AND DISTRIBUTION

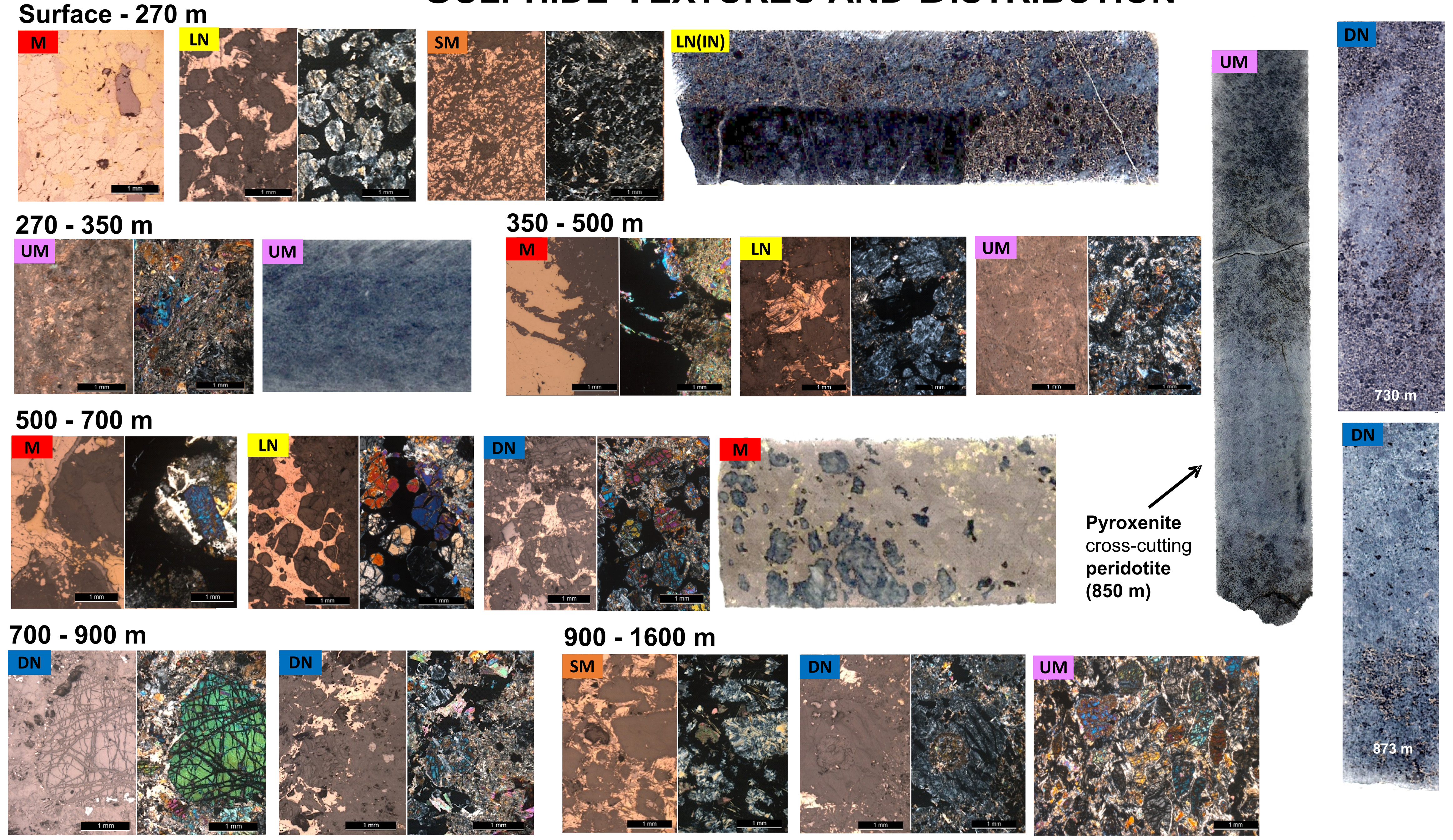

Figure 3. Thin section and core images (size NQ) of various sulphide textures/ultramafic rocks through different depth intervals

SUMMARY OF SULPHIDE TEXTURES VERSUS DEPTH

- **Surface-270m:** 'Normal' sulphide profile (massive/net/disseminated)
- **270-350m:** 'Bulge' with no sulphides present
- **350-500m:** Massive sulphides overlain by leopard net (little disrupted net texture)
- **500-700m:** Massive sulphides containing 'silica' inclusions (chert component of iron formation overlain by leopard net textured sulphides, less alteration of olivine and pyroxenes
- **700-900m:** Leopard net textured sulphides containing many zones of 'disrupted net' textured sulphides, fresh olivine preserved in non-mineralized parts
- **900-1600m:** Common semi massive overlain by altered leopard net textured sulphides

IMPLICATIONS

Eagle's Nest was emplaced as a **sub-horizontal, 'blade shaped' dyke** with mineralization in the **'keel'** (Mungall et al. 2010) There is evidence for **multiple magma pulses** in **pyroxenite-invaded** disrupted net and disrupted peridotite (Zuccarelli et al. 2017). The lack of sulphides adjacent to (above) the bulge at 270-350m suggest non-deposition on a topographic high. Determining the location of specific sulphide textures, particularly disrupted net, is critical for both understanding **conduit dynamics** and **optimizing mine operations**.

FUTURE WORK

More work is planned on the **disrupted net textured mineralization to further constrain its origin**. We will test whether whole-rock geochemical data can be used to distinguish between different net textures (which contain different non-sulphide phases) and used to map out textures in the very large whole-rock analytical database. **S isotope analyses are in progress to aid in determining potential sulfur sources.** The 3D model of the conduit will also be refined.

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