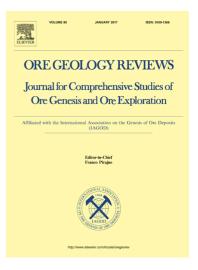
## Accepted Manuscript

Changes in tourmaline composition during magmatic and hydrothermal processes leading to tin-ore deposition: The Cornubian Batholith, SW England

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## ACCEPTED MANUSCRIPT

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12 Abstract

To investigate the potential of tourmaline as a geochemical monitor, a comprehensive dataset on major, minor and trace element concentrations as well as  $Fe^{3+}/\Sigma Fe$  ratios of tourmaline is presented. The dataset includes samples from five plutonic complexes related to diverse magmatic to hydrothermal stages of the Cornubian Batholith (SW England). Tourmaline composition found in barren and cassiterite-bearing samples include all three primary tourmaline groups and tourmaline species with the general endmembers schorl, dravite, elbaite, uvite, feruvite, foitite and Mg-foitite.

19 Based on textures and compositions, it is possible to distinguish not only between late-magmatic and 20 hydrothermal tourmaline, but also between several formation stages. Hence, tourmaline monitors late-21 magmatic processes and the partitioning of elements during exsolution of an aqueous phase. For 22 example, in hydrothermal tourmaline Sn is strongly enriched, while Ti, Cr, V and Sc are depleted 23 compared to late-magmatic tourmaline of the same sample. Several tourmaline generations that 24 precipitated from magmatic fluids can be distinguished with differing major and minor elements and 25 REE patterns depending on the composition of the melt from which they were expelled from. Strongly 26 zoned tourmaline allows for unraveling the hydrothermal history of a distinct location including ore 27 precipitation. The precipitation of SnO<sub>2</sub> in the study area was probably caused by mixing between 28 acidic, reduced, Sn-bearing magmatic fluids and oxidized meteoric fluids, which is in agreement with 29 London and Manning (1995) and Williamson et al. (2000). Hence, the ability of tourmaline 30 composition to monitor changes in Sn concentration and redox conditions in hydrothermal fluids has 31 potential as an exploration tool.

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