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Bi-annual to decadal ^{10}Be variability in firn cores from Dronning Maud Land (DML) and Berkner Island (BI), Antarctica

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Cosmogenic Beryllium-10 (^{10}Be) changes archived in ice cores may constitute a proxy record of solar activity beyond the era of known sunspot numbers, thus complementing concurrent radiocarbon records. The ^{10}Be-variability at a given drill site reflects however not only the (spatially varying) production rate changes, but also atmospheric transport and local depositional patterns. This fact basically complicates straightforward interpretations of ^{10}Be ice core records in terms of net solar activity changes. Aimed at assessing the properties of the ^{10}Be variability at two EPICA drill sites over the last 6 centuries (covering known production rate indices including the 11-years cycle and the prominent Maunder & Spörer sunspot minima) we investigated seasonally dated firn cores at the central DML site and supplemented these ^{10}Be -observations with a concurrent core from the more maritime BI position. Major glacio-meteorological differences of the sites concerns the ca. 2000m higher elevation of DML associated with a mean annual snow accumulation, which is lower by a factor of 2-3 compared to BI. At DML, ^{10}Be concentrations were empirically corrected for snow accumulation changes and showed clear increases of about 30% and 40% during the Maunder and Spörer solar activity minima. Comparable enhancements are already seen at South Pole and South Greenland, whereas a surprisingly high 50% increase was observed at BI during the Maunder minimum. A significant ^{10}Be decline during late 20^{th} century as expected from production rate indices and clearly demonstrated for Greenland firn cores could not be found in Antarctica, however. Also the last three

11 years Schwabe-cycles investigated at DML showed significantly higher amplitudes, than what would be expected from production rate changes or from atmospheric long term observations of ^{7}Be or ^{10}Be at the coastal Neumayer Station.