The El Niño-Southern Oscillation (ENSO) is a major climate mode, yet defining ENSO teleconnections with high southern latitudes is limited by sparse meteorological records. Ice core records can provide useful proxies for atmospheric processes, but must be well-dated to accurately detect influences from processes like ENSO. The Law Dome (LD) record is well dated with sub-annual resolution to ~2ka, allowing investigation of seasonal variability. LD summer sea salts (SSS - Dec-Mar average chloride) are significantly correlated with SOI. NCEP/NCAR reanalyses (SLP, geopotential height and wind anomalies) show clear La Niña-like patterns in high SSS years and ENSO-like patterns in low SSS years. Composite maps of extreme SSS (upper and lower quartile years) for SLP, 850/500 GPH and wind vector anomalies show the likely mechanism for these correlations. During high SSS years (La Niña pattern), a strengthened Amundsen-Bellingshausen Sea (ABS) low and deepened circumpolar trough produces enhanced zonal flow around the continent. Low pressure anomalies extend inland through the Ross Sea and across Wilkes Land. A deepened and northward extension of the circumpolar trough in the Wilkes Land region marks increased storminess associated with this high SSS mode. During low SSS (ENSO) conditions, there is a weakening of the ABS low, an overall reduction in zonal flow with reduced polar easterly winds and a tendency to offshore flow in the LD region.