

Phase structure of radar stratigraphic horizons within Antarctic firn

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The majority of strong-amplitude events within stratigraphic radar profiles of firn recorded at several widely spaced Antarctic locations are solitary wavelets with the same form and phase polarity sequence as their successive half-cycles. These wavelets were recorded with 400-MHz short-pulse radar in December over several years. The locations include the South Pole and two ice divides in West Antarctica. They can be tracked for hundreds of kilometers near the more northerly divide, where an accumulation rate of about 45 cm water equivalent per year exceeds the radar resolution. Here, the stronger wavelets are not numerous enough to indicate annual events, while all horizons are too numerous. With the help of modeling, we interpret the horizons to represent a thin, double layer of ice over hoar, which conforms with the standard model of firn stratification and can form anywhere in Antarctica.