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Observations of the Brunt Ice Shelf and Macdonald Ice Rumples

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This poster provides an update to the Lifetime of Halley Project, whose aim is to monitor the ongoing stability of the Brunt Ice Shelf (upon which the British research Station, Halley V, is built). Previous monitoring has shown the primary tongue of the Brunt to generally exhibit mild net positive strains in all directions that one would associate with a typically stable unconstricted ice shelf. Recent work has therefore focused upon the region around the Macdonald Ice Rumples, a three square kilometer region where the Brunt locally grounds itself along its northern ice front. This location provides critical support to the Brunt, but is also an area of elevated strain which has experienced significant local calving events in the past. To monitor this region, five new dual-band GPS stations have been installed with solar and wind power, to allow operation through the majority of the year. The stations can be operated continuously or for timed periods each day. Typically, each station is run continuously for a full month upon installation, to capture station motion through an entire tidal cycle. They are then rescheduled to operate for an hour per day for long-term monitoring.

One station is on the top of the Rumples; this station shows motion on the order of centimeters/day rather than meters/day. This lack of significant motion confirms that the Macdonald Ice Rumples may instead be classified as an ice rise, as the motion of the ice on top of the so-called Rumples is strongly independent of the motion in the surrounding shelf. Another station is located in an area of rippling near the periphery of the Rumples. The ripples in this region suggest a building stress level that may precede a mini-calving event near the Rumples; the last time such rippling was observed was the period immediately preceding a comparable calving event in 1970. This station was installed at the top of a ripple in December 2009, and preliminary data will be displayed from this season. The three remaining stations are located from five to ten kilometers from the Rumples, and will be used as vertices in a strain network to show activities to the east and north of the Rumples (the west and south having already been covered by existing monitoring networks). In particular, one station is located on the far side of the dormant N9 chasm, which formed during the last local calving event. This station will provide critical monitoring to this area of weakness should a local calving event reactivate the chasm.

Data will be shown from all these sites, along with displacements calculated from long-term satellite SAR data, to build a comprehensive velocity and strain profile in the region. This data will be maintained for several years, in anticipation of a possible mini-calving event in the near future which may upset the status quo of the entire Brunt Ice Shelf.