



Simultaneous Geomagnetic and Auroral Observations in the Northern and Southern Polar Cap During the Winter of 1903-04.

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During the 1903-06 Gjøa Expedition, Roald Amundsen established an observatory at Gjøahavn, Canada (geographic coordinates: $68^{\circ} 37' 10'' \text{N}$; $95^{\circ} 53' 25'' \text{W}$; geomagnetic coordinates: 245°W , 81°N). In the opposite hemisphere, at the nearly geomagnetic conjugate location was the base observatory for Richard Scott's 1902-04 Discovery Expedition at Cape Armitage (geographic coordinates: 77.85°S , 166.76°E ; geomagnetic coordinates: 260°E , 81°S). The first systematic magnetometer measurements and visual auroral observations inside the polar cap were carried out at these stations. The observations at Gjøahavn have been compared with simultaneous measurements at the Scott station. There is a large difference of nearly seven hours in solar time, but hardly any difference in magnetic time, between the two stations. The significance of this is clearly marked in the comparisons of the observations. A survey of Amundsen's visual auroral observations from the central polar cap during the winter of 1903-04 indicates very high activity with visual auroras nearly 50 % of the days in December 1903, and, not surprisingly, auroras were simultaneous at both stations. Auroral forms that have much later been categorized as sun-aligned arcs, auroral patches, and poleward-moving auroral forms were described in the records left by the expeditions. The average daily variations of the intensity and direction of the H-component at both stations mimic one another almost exactly. The disturbances in the Antarctic were generally more intense, due to a more highly conducting ionosphere during the southern summer. The Svalgaard-Mansurov Effect (SME) is manifested both at Gjøahavn and Cape Armitage near noon geomagnetic time. Thus the SME is entirely a magnetic phenomenon and not a solar, or UT feature. These data offer much more than a glimpse of the solar wind-magnetosphere-ionosphere interaction 60 years before it was discovered.