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Holocene climate and environmental changes, recorded in terrestrial deposits and lake sediments on the Fildes Peninsula, King George Island (West Antarctica)

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Fildes Peninsula is the largest ice-free part (ca. 38 km2) of King George Island, South Shetland Islands (West Antarctica). Holocene deposits on land, bottom sediments in lakes of the peninsula contain various information on the postglacial environmental conditions, and are objects for paleogeographic research since 70-s of XX century. During austral summer seasons 2008–2009, 2010–2011 and 2011–2012, new outcrops of Holocene deposits were found and studied in16 points on ice-free territory and on moraine ridge at the edge of Bellingshausen ice dome, which bounding Fildes Peninsula from north; in 2015, new bottom sediment cores were sampled from the Long and Kitezh lakes. The laboratory studies of the collected material included radiocarbon dating, diatom analysis and taxonomic determination of fossil mosses (for deposits on land); radiocarbon dating, determination of X-ray grey scale and magnetic susceptibility, GDGT, measurements δ13C and δ15C, diatom analysis (for lake sediments). The interpretation of the obtained analytical data was compared with the results of previous paleogeographic studies (Barsch & Mäusbacher, 1986; John & Sugden, 1971; Hall, 2007; Martinez-Macchiavello et al., 1996; Matthies et al., 1990; Mäusbacher et al., 1989; Schmidt et al., 1990; Tatur et al., 2004; Watcham et al., 2011, and others), which allowed us to clarify the concept of Holocene climate change and the environment on the peninsula. Deglaciation of the Fildes Peninsula began no later than 11500 cal a BP; the Bellingshausen ice dome shrank to a modern size to ca. 10,000 cal a BP. The climatic conditions were relatively warm from the beginning of Holocene to ca. 6,000 cal a BP. (the maximum warming in the early Holocene to 8000 BP), in the periods ca. 4200-3700, 3300-2300, and probably 1400-800 cal a BP. Relative cold snaps took place during the periods 6000-4200, 3700-3300, 2300-1400 BP, and probably during the little ice age. In general, during the last 2000 years, relatively cold conditions prevailed. The deglaciation of the peninsula was most rapid from the beginning of Holocene to ca. 6,000 BP cal a BP, when relatively warm conditions coincided with an increase in the relative sea level. During the periods of relative cooling, the deglaciation process was slowed down. The dimensions of the Bellingshausen ice dome were significantly reduced in the middle Holocene (up to 2300 BP), between ca. 1,400 and 800 cal a BP. The growth of the glacier to the present-day boundaries took place ca. 2300-1400 cal a BP and over the past 600 years.