

# Supplementary Material

## List of images used for terminus delineation

Table S1: List of images used for terminus delineation. “This work” provides the file name of the Landsat images delineated in this study, and “McNabb et al. (2015)” refers to the Landsat scene (lsat\_scene) given by that study.

Glacier	Year	This work	McNabb et al. (2015)
Alsek	1984	LT05.L2SP_060019_19840907_20200918_02_T1	—
	1985	LT05.L2SP_061018_19850715_20200918_02_T1_SR_B2	—
	1986	LT05.L2SP_061018_19860718_20200917_02_T1_SR_B2	—
	1987	LT05.L2SP_061019_19870822_20201014_02_T1_SR_B2	—
	1988	LT05.L2SP_061019_19880909_20200917_02_T1_SR_B2	—
	1989	LT05.L2SP_061018_19890827_20200916_02_T1_SR_B2	—
	1990	LT05.L2SP_061019_19901001_20200915_02_T1	—
	1992	LT05.L2SP_061018_19920904_20200914_02_T1_SR_B2	—
	1993	LT05.L2SP_060019_19930714_20200914_02_T1_SR_B2	—
	1994	LT05.L2SP_061018_19940809_20200913_02_T1_SR_B2	—
	1995	LT05.L2SP_061018_19951015_20200912_02_T1	—
	1996	LT05.L2SP_061019_19961017_20200911_02_T1_SR_B2	—
	1998	LT05.L2SP_061018_19980804_20200908_02_T1_SR_B2	—
	1999	LE07.L2SP_060019_19990909_20200918_02_T1_SR_B2	—
	2000	LE07.L2SP_060019_20000810_20200917_02_T1	—
	2001	LE07.L1TP_060019_20010813_20200917_02_T1_B8	—
	2002	LE07.L1TP_060019_20020731_20200916_02_T1_B8	—
	2003	LT05.L2SP_060019_20030710_20200904_02_T1_SR_B2	—
	2004	LE07.L2SP_060019_20040805_20200915_02_T1	—
	2005	LT05.L2SP_061018_20050908_20200901_02_T1_SR_B2	—
	2006	LT05.L2SP_060019_20060702_20200831_02_T1_SR_B2	—
	2007	LE07.L2SP_061018_20071008_20200913_02_T1_SR_B2	—
	2008	LT05.L2SP_061018_20080730_20200829_02_T1_SR_B2	—
	2009	LT05.L2SP_061018_20090717_20200827_02_T1_SR_B2	—
	2010	LT05.L2SP_060019_20100814_20200823_02_T1	—
	2011	LT05.L2SP_061018_20110723_20200822_02_T1_SR_B2	—
	2012	LE07.L2SP_061018_20121021_20200908_02_T1_SR_B2	—
	2013	LC08.L1TP_060019_20130806_20200912_02_T1_B8	—
	2014	LE07.L2SP_061018_20141027_20200905_02_T1	—
	2015	LC08.L1TP_060019_20150913_20200908_02_T1_B8	—
	2016	LC08.L2SP_060019_20161001_20200906_02_T1_SR_B2	—
	2017	LC08.L1TP_060019_20170918_20200903_02_T1_B8	—
	2018	LC08.L1TP_060019_20180905_20200831_02_T1_B8	—
	2019	LC08.L1TP_060019_20190908_20200826_02_T1_B8	—
	2020	LC08.L1TP_060019_20200910_20200919_02_T1_B8	—
	2021	LC08.L2SP_060019_20210929_20211013_02_T1	—
	2022	LC08.L1TP_061018_20220705_20220722_02_T1_B8	—
Barry	1985	—	LM50680171985277AAA03
	1986	—	LT50670171986289XXX03
	1987	—	LT50670171987196XXX01
	1989	—	LT40680181989232XXX02
	1991	—	LT50680171991166XXX03
	1992	—	LM40680171992273AAA03
	1993	—	LT40680171993195XXX02
	1994	—	LT50680171994270XXX02
	1995	—	LT50670171995282AAA03
	1999	—	LE70670171999269AGS00
	2000	—	LE70670172000208AGS00

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Glacier	Year	This work	McNabb et al. (2015)
Barry	2001	–	LE70670172001258EDC00
	2002	–	LE70670172002277EDC00
	2003	–	LT50670172003288PAC01
	2004	–	LT50680172004282PAC00
	2005	–	LT50670172005261PAC01
	2006	–	LE70680172006263EDC00
	2007	–	LE70680172007282EDC00
	2008	–	LE70670172008294EDC00
	2009	–	LT50680172009215GLC00
	2010	–	LE70670172010267EDC00
	2011	–	LE70670172011270EDC00
	2012	LE07_L1TP_068017_20120718_20200908_02_T1_B2	–
	2013	LC08_L1TP_067017_20130326_20200913_02_T1_B8	–
	2014	LC08_L1TP_067017_20140826_20200911_02_T1_B8	–
	2015	LC08_L1TP_067017_20150813_20201015_02_T1_B8	–
	2016	LC08_L1TP_067017_20160831_20200906_02_T1_B8	–
	2017	LC08_L1TP_067017_20170919_20200903_02_T1_B8	–
	2018	LC08_L1TP_067017_20180720_20200831_02_T1_B8	–
	2019	LC08_L1TP_067017_20190808_20200827_02_T1_B8	–
	2020	LC08_L1TP_067017_20200911_20200919_02_T1_B8	–
	2021	LC08_L1TP_067017_20210813_20210819_02_T1_B8	–
	2022	LC08_L1TP_067017_20220731_20220805_02_T1_B8	–
Columbia	1985	–	LM50670171985254AAA03
	1986	–	LT50660171986266XXX03
	1987	–	LT50660171987237XXX01
	1989	–	LT40680171989232XXX01
	1991	–	LT50680171991166XXX03
	1992	–	LM40680171992273AAA03
	1993	–	LT40680171993195XXX02
	1994	–	LT50660171994272XXX02
	1995	–	LT50660171995275AAA02
	1996	–	LT50660171996278PAC00
	1997	–	LT50660171997280PAC00
	1998	–	LT50660171998283PAC00
	1999	–	LE70670171999269AGS00
	2000	–	LE70670172000208AGS00
	2001	–	LE70670172001258EDC00
	2002	–	LE70670172002277EDC00
	2003	–	LT50670172003288PAC01
	2004	–	LT50680172004282PAC00
	2005	–	LT50670172005261PAC01
	2006	–	LT50660172006273PAC00
	2007	–	LE70680172007282EDC00
	2008	–	LE70670172008294EDC00
	2009	–	LT50680172009215GLC00
	2010	–	LE70670172010267EDC00
	2011	–	LE70670172011270EDC00
	2012	LE07_L2SP_067017_20120828_20200908_02_T1_SR_B2	–
	2013	LC08_L1TP_067017_20130326_20200913_02_T1_B8	–
	2014	LC08_L2SP_067017_20140826_20200911_02_T1	–
	2015	LC08_L1TP_067017_20150813_20201015_02_T1_B8	–
	2016	LC08_L1TP_067017_20160831_20200906_02_T1_B8	–
Columbia	2017	LC08_L1TP_067017_20170919_20200903_02_T1_B8	–

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Glacier	Year	This work	McNabb et al. (2015)
	2018	LC08.L1TP_067017_20180720_20200831_02_T1.B8	–
	2019	LC08.L1TP_067017_20190808_20200827_02_T1.B8	–
	2020	LC08.L1TP_067017_20200911_20200919_02_T1.B8	–
	2021	LC08.L2SP_067017_20210813_20210819_02_T1	–
	2022	LC08.L2SP_066017_20220724_20220802_02_T1_SR.B2	–
Ellsworth	1985	LT05.L2SP_068018_19851004_20200918_02_T1_SR.B2	–
	1986	LT05.L2SP_067018_19860728_20200917_02_T1_SR.B2	–
	1989	LT04.L2SP_067018_19890712_20200916_02_T1.mb	–
	1992	LT04.L2SP_068018_19920828_20200914_02_T1_SR.B2	–
	1994	LT05.L2SP_068018_19940927_20200912_02_T1_SR.B2	–
	1995	LT05.L2SP_067018_19951009_20200912_02_T1_SR.B2	–
	1999	LE07.L1TP_067018_19990926_20200918_02_T1.B8	–
	2000	LE07.L2SP_067018_20000726_20200917_02_T1_SR.B2	–
	2001	LE07.L2SP_068018_20010805_20200917_02_T1_SR.B2	–
	2002	LE07.L1TP_067018_20020902_20200916_02_T1.B8	–
	2003	LT05.L2SP_067018_20031015_20200904_02_T1_SR.B2	–
	2004	LE07.L2SP_068018_20040813_20200915_02_T1_SR.B2	–
	2005	LT05.L2SP_068018_20050808_20200902_02_T1_SR.B2	–
	2006	LT05.L2SP_068018_20060726_20200831_02_T1_SR.B2	–
	2007	LT05.L2SP_068018_20070830_20200830_02_T1_SR.B2	–
	2008	LE07.L2SP_068018_20080808_20200912_02_T1_SR.B2	–
	2009	LT05.L2SP_068018_20090803_20200827_02_T1_SR.B2	–
	2010	LT05.L2SP_067018_20100831_20200823_02_T1_SR.B2	–
	2011	LT05.L2SP_068018_20111012_20200820_02_T1_SR.B2	–
	2012	LE07.L2SP_068018_20120803_20200908_02_T1_SR.B2	–
	2013	LC08.L2SP_067018_20130823_20200912_02_T1_SR.B2	–
	2014	LC08.L1TP_067018_20140826_20200911_02_T1.B8	–
	2015	LC08.L2SP_068018_20150719_20201015_02_T1_SR.B2	–
	2016	LC08.L1TP_067018_20160831_20200906_02_T1.B8	–
	2017	LC08.L2SP_067018_20170919_20200903_02_T1_SR.B2	–
	2018	LC08.L1TP_067018_20180906_20200831_02_T1.B8	–
	2019	LC08.L1TP_067018_20190808_20200827_02_T1.B8	–
	2020	LC08.L1TP_067018_20200911_20200919_02_T1.B8	–
	2021	LC08.L1TP_067018_20210829_20210909_02_T1.B8	–
	2022	LC08.L2SP_067018_20220731_20220805_02_T1	–
Grand Plateau	1984	LT05.L2SP_060019_19840907_20200918_02_T1	–
	1985	LT05.L2SP_060019_19850926_20200918_02_T1_SR.B2	–
	1986	LT05.L2SP_059019_19860821_20200917_02_T1_SR.B2	–
	1987	LT05.L2SP_061019_19870822_20201014_02_T1_SR.B2	–
	1988	LT05.L2SP_061019_19880909_20200917_02_T1_SR.B2	–
	1989	LT05.L2SP_060019_19891023_20200916_02_T1_SR.B2	–
	1990	LT05.L2SP_061019_19901001_20200915_02_T1	–
	1992	LT05.L2SP_059019_19920821_20200914_02_T1_SR.B2	–
	1993	LT05.L2SP_060019_19930714_20200914_02_T1_SR.B2	–
	1994	LT05.L2SP_059019_19941014_20200913_02_T1_SR.B2	–
	1995	LT05.L2SP_059019_19950915_20200912_02_T1	–
	1996	LT05.L2SP_061019_19961017_20200911_02_T1_SR.B2	–
	1998	LT05.L2SP_061019_19980804_20200908_02_T1_SR.B2	–
	1999	LE07.L2SP_060019_19990909_20200918_02_T1_SR.B2	–
	2000	LE07.L2SP_060019_20000810_20200917_02_T1	–
	2001	LE07.L1TP_060019_20010813_20200917_02_T1.B8	–
	2002	LE07.L2SP_059019_20020708_20200916_02_T1_SR.B2	–
	2003	LT05.L2SP_060019_20030710_20200904_02_T1_SR.B2	–

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Glacier	Year	This work	McNabb et al. (2015)
Grand Plateau	2004	LE07.L2SP_060019_20040805_20200915_02.T1	–
	2005	LT05.L2SP_060019_20051003_20200901_02.T1_SR.B2	–
	2006	LT05.L2SP_059019_20060913_20200831_02.T1_SR.B2	–
	2007	LT05.L2SP_059019_20070815_20200830_02.T1_SR.B2	–
	2009	LT05.L2SP_059019_20090804_20200827_02.T1_SR.B2	–
	2010	LT05.L2SP_060019_20100814_20200823_02.T1.mb	–
	2011	LT05.L2SP_059019_20110927_20200820_02.T1_SR.B2	–
	2012	LE07.L2SP_061019_20121021_20200908_02.T1_SR.B2	–
	2013	LC08.L1TP_060019_20130806_20200912_02.T1.B8	–
	2014	LE07.L2SP_059019_20141013_20200905_02.T1.mb	–
	2015	LC08.L1TP_060019_20150913_20200908_02.T1.B8	–
	2016	LC08.L2SP_060019_20161001_20200906_02.T1_SR.B2	–
	2017	LC08.L1TP_060019_20170918_20200903_02.T1.B8	–
	2018	LC08.L1TP_060019_20180905_20200831_02.T1.B8	–
	2019	LC08.L1TP_060019_20190908_20200826_02.T1.B8	–
Portage	2020	LC08.L2SP_059019_20200701_20200913_02.T1_SR.B2	–
	2022	LC08.L2SP_060019_20220916_20220922_02.T1_SR.B2	–
	1985	LT05.L2SP_061018_19850715_20200918_02.T1	–
	1986	LT05.L2SP_067018_19860728_20200917_02.T1_SR.B2	–
	1989	LT04.L2SP_068018_19890804_20200916_02.T1	–
	1994	LT05.L2SP_068017_19940927_20200912_02.T1	–
	1999	LE07.L1TP_067018_19990926_20200918_02.T1.B8	–
	2000	LE07.L2SP_067018_20000811_20200917_02.T1	–
	2001	LE07.L2SP_068018_20010821_20200917_02.T1_SR.B2	–
	2002	LE07.L1TP_067018_20020902_20200916_02.T1.B8	–
	2003	LT05.L2SP_069017_20030927_20200904_02.T1_SR.B2	–
	2004	LE07.L2SP_068018_20040813_20200915_02.T1_SR.B2	–
	2005	LT05.L2SP_068018_20050808_20200902_02.T1	–
	2006	LT05.L2SP_068018_20060726_20200831_02.T1_SR.B2	–
	2007	LT05.L2SP_069017_20070906_20200829_02.T1_SR.B2	–
	2008	LE07.L2SP_068018_20080808_20200912_02.T1_SR.B2	–
	2009	LT05.L2SP_068018_20090803_20200827_02.T1_SR.B2	–
	2010	LT05.L2SP_068017_20100923_20200823_02.T1	–
	2011	LT05.L2SP_068018_20110926_20200820_02.T1_SR.B2	–
	2012	LE07.L2SP_068018_20120803_20200908_02.T1_SR.B2	–
	2013	LC08.L2SP_067018_20130823_20200912_02.T1_SR.B2	–
	2014	LE07.L2SP_068018_20140926_20200905_02.T1	–
	2015	LC08.L2SP_068018_20150719_20201015_02.T1_SR.B2	–
	2016	LC08.L1TP_067018_20160831_20200906_02.T1.B8	–
	2017	LC08.L1TP_068017_20170926_20200903_02.T1.B8	–
	2018	LC08.L1TP_069017_20180702_20200831_02.T1.B8	–
	2019	LC08.L1TP_067018_20190808_20200827_02.T1.B8	–
	2020	LC08.L1TP_067018_20200911_20200919_02.T1.B8	–
Portage	2021	LC08.L2SP_067018_20210829_20210909_02.T1	–
	2022	LC08.L1TP_069017_20221001_20221005_02.T1.B8	–
	1984	LT05.L2SP_063018_19840912_20200918_02.T1	–
	1986	LT05.L2SP_062018_19860911_20200917_02.T1_SR.B2	–
	1987	LT05.L2SP_062018_19870829_20201015_02.T1_SR.B2	–
	1988	LT04.L2SP_062018_19880823_20200917_02.T1_SR.B2	–
	1990	LT05.L2SP_063018_19900812_20200915_02.T1	–
	1991	LT05.L2SP_063018_19910714_20200915_02.T1_SR.B2	–
	1992	LT05.L2SP_062018_19920810_20200914_02.T1_SR.B2	–
	1993	LT05.L2SP_062018_19930728_20200913_02.T1_SR.B2	–



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Glacier	Year	This work	McNabb et al. (2015)
	1994	LT05_L2SP_062018_19940731_20200913_02_T1_SR_B2	–
	1995	LT05_L2SP_062018_19950904_20200912_02_T1	–
	1996	LT05_L2SP_062018_19960906_20200911_02_T1_SR_B2	–
	1997	LT05_L2SP_063018_19970916_20200909_02_T1_SR_B2	–
	1998	LT05_L2SP_062018_19981030_20200908_02_T1_SR_B2	–
	1999	LE07_L1TP_063018_19990728_20200918_02_T1_B8	–
	2000	LE07_L2SP_062018_20000909_20200917_02_T1	–
	2001	LE07_L1TP_063018_20010802_20200917_02_T1_B8	–
	2002	LE07_L1TP_063018_20020805_20200916_02_T1_B8	–
	2003	LT05_L2SP_062018_20030926_20200904_02_T1_SR_B2	–
	2004	LE07_L2SP_063018_20040911_20200915_02_T1_SR_B2	–
	2005	LT05_L2SP_062018_20050814_20200902_02_T1	–
	2006	LT05_L2SP_063018_20060925_20200831_02_T1_SR_B2	–
	2007	LT05_L2SP_063018_20070811_20200829_02_T1_SR_B2	–
	2008	LT05_L2SP_063018_20080712_20200829_02_T1_SR_B2	–
	2009	LT05_L2SP_062018_20090708_20200827_02_T1_SR_B2	–
	2010	LT05_L2SP_063018_20100920_20200823_02_T1	–
	2011	LT05_L2SP_063018_20111009_20200820_02_T1_SR_B2	–
	2012	LE07_L2SP_063018_20121019_20200908_02_T1_SR_B2	–
	2013	LC08_L1TP_063018_20130811_20200912_02_T1_B8	–
	2014	LE07_L2SP_063018_20140923_20200905_02_T1	–
	2015	LC08_L1TP_063018_20150902_20200908_02_T1_B8	–
	2016	LC08_L1TP_063018_20160904_20200906_02_T1_B8	–
	2017	LC08_L1TP_062018_20170730_20200903_02_T1_B8	–
	2018	LC08_L1TP_063018_20180926_20200830_02_T1_B8	–
	2019	LC08_L1TP_062018_20190906_20200827_02_T1_B8	–
	2020	LC08_L1TP_063018_20200729_20200908_02_T1_B8	–
	2021	LC08_L2SP_063018_20210801_20210810_02_T1	–
	2022	LC09_L1TP_062018_20220906_20220906_02_T1_B8	–
Yale	1985	–	LM50680171985277AAA03
	1986	–	LT50660171986266XXX03
	1987	–	LT50670171987196XXX01
	1989	–	LT40680181989232XXX02
	1991	–	LT50680171991166XXX03
	1993	–	LT40680171993195XXX02
	1994	–	LT50660171994272XXX02
	1995	LT05_L2SP_067017_19950721_20200912_02_T1	–
	1999	–	LE70670171999269AGS00
	2000	–	LE70670172000208AGS00
	2001	–	LE70670172001258EDC00
	2002	–	LE70670172002277EDC00
	2003	–	LT50670172003256PAC01
	2004	–	LT50680172004282PAC00
	2005	–	LT50670172005261PAC01
	2006	–	LE70670172006256EDC00
	2007	–	LE70680172007282EDC00
	2008	–	LE70660172008271EDC00
	2009	–	LT50680172009215GLC00
	2010	–	LE70670172010267EDC00
	2011	–	LE70670172011270EDC00
Yale	2012	LE07_L1TP_068017_20120718_20200908_02_T1_B2	–
	2013	LC08_L1TP_067017_20130326_20200913_02_T1_B8	–
	2014	LC08_L2SP_067017_20140826_20200911_02_T1	–

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Glacier	Year	This work	McNabb et al. (2015)
	2015	LC08_L1TP_067017_20150813_20201015_02_T1_B8	—
	2016	LC08_L1TP_067017_20160831_20200906_02_T1_B8	—
	2017	LC08_L1TP_067017_20170919_20200903_02_T1_B8	—
	2018	LC08_L1TP_067017_20180720_20200831_02_T1_B8	—
	2019	LC08_L1TP_067017_20190808_20200827_02_T1_B8	—
	2020	LC08_L1TP_067017_20200911_20200919_02_T1_B8	—
	2021	LC08_L2SP_067017_20210813_20210819_02_T1	—
	2022	LC08_L2SP_068017_20220706_20220722_02_T1_SR_B2	—

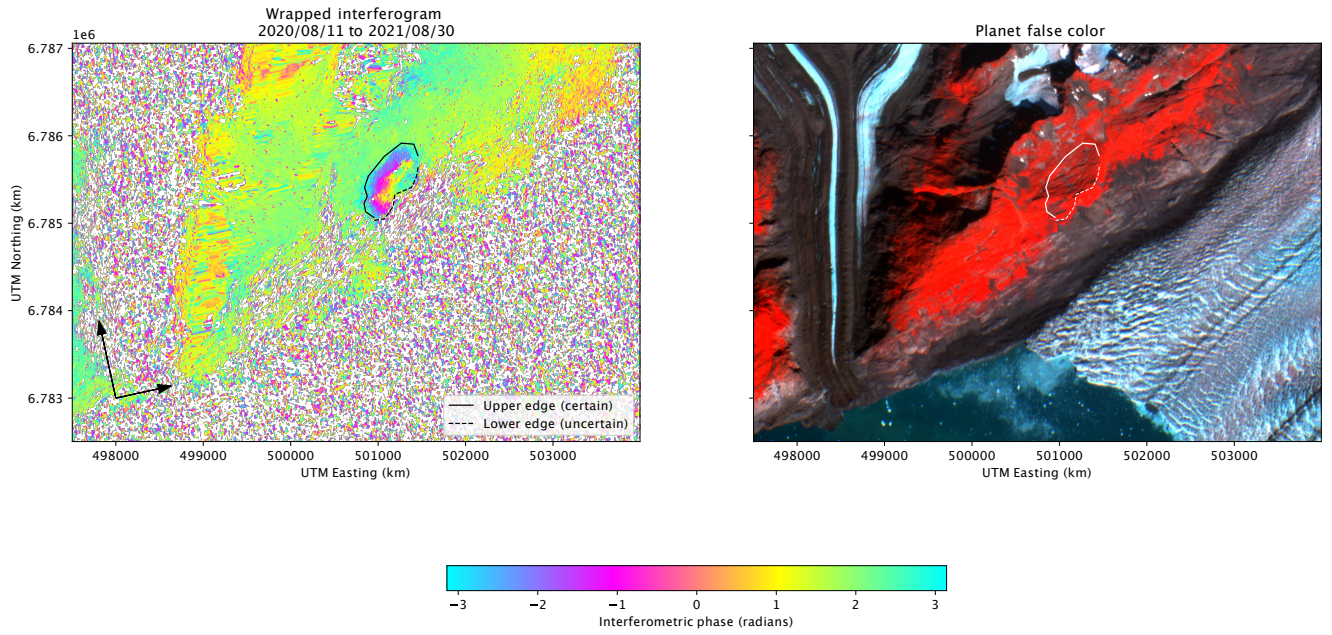


Figure S1: Data snapshot of the movement at Columbia Glacier. Interferogram at Columbia Glacier (left) shows movement over an approximately 1 year time period. A false color image (right) from Planet Labs PBC serves as a visual reference. Note the landslide outline showed in both images differs slightly from the one used in this work.

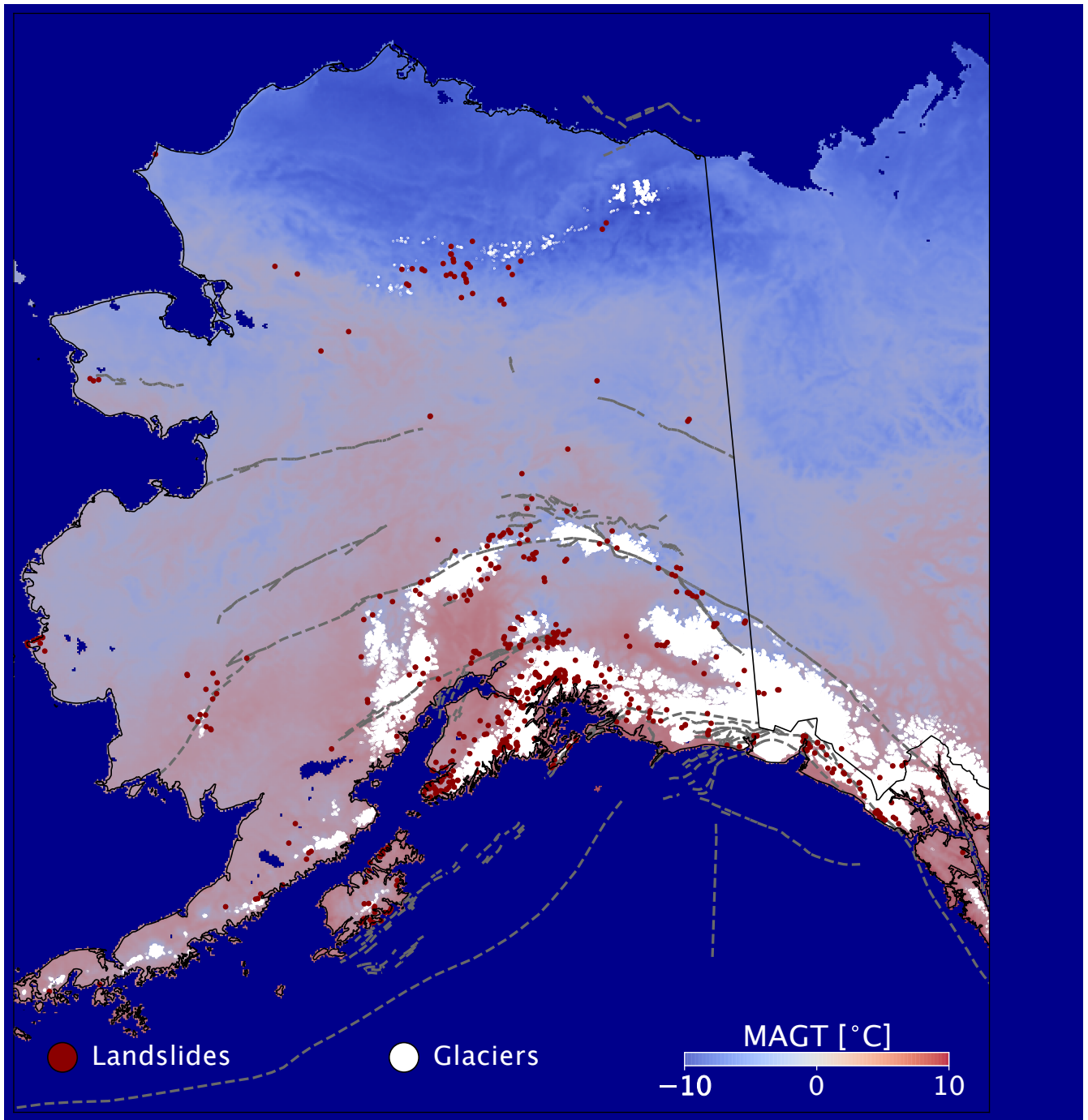


Figure S2: Larger version of Figure 1e. Overview of the sites of interest. Ocean area (dark blue) is from © OpenStreetMap contributors 2024. Distributed under the Open Data Commons Open Database License (ODbL) v1.0. Mean annual ground temperature (MAGT) (Obu et al., 2018), along with all sites from Higman (2022) (red dots), the glacierized area from RGI Consortium (2017) (white area), and faults from U.S. Geological Survey and Alaska Department of Natural Resources (2024) (gray dashed lines).