Sub-arctic palsa mire degradation and the role of climatic drivers in the largest coherent palsa complex in Sweden (Vissátvuopmi), 1955-2016

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Supplementary

Table 1. Key information about the aerial photos used in the study. GSD is the Ground Surface Distance, i.e. the distance between the centres of two adjacent pixels measured on the ground. A) palsa plateau, B) dome-shaped palsa and C) ridge-shaped palsa.

| Date of registration | Cover (area) | Source | Image scale | GSD (m) | Film type         |
|----------------------|-------------|--------|-------------|---------|------------------|
| 1955 July 28         | A, B, C     | Swedish Land Survey | 1: 29 000 | 0.64    | Panchromatic (B/W) |
| 1959 July 20         | C           | Swedish Land Survey | 1: 30 000 | 0.68    | Panchromatic (B/W) |
| 1963 August 1        | A, B, C     | Swedish Land Survey | 1: 30 000 | 0.49    | Panchromatic (B/W) |
| 1983 June 28         | A           | Swedish Land Survey | 1: 15 000 | 0.61    | Panchromatic (B/W) |
| 1994 July 28         | A, B, C     | Swedish Land Survey | 1: 30 000 | 0.99    | Panchromatic (B/W) |
| 2010 August 18       | A, B, C     | Swedish Land Survey | ND        | 0.5     | Digital IR-colour |
| 2016 August 18       | A, B, C     | Swedish Land Survey | ND        | 0.5     | Digital RGB      |

Table 2. Comparison of interpretations of lateral extension of palsas in area A between the three independent interpreters.

| Year     | Interpreter 1 | Interpreter 2 | Interpreter 3 | I 1/2 | I 1/3 | I 2/3 |
|----------|---------------|---------------|---------------|-------|-------|-------|
| 1955     | 648018 m²     | 636203 m²     |               | 1.02  |       |       |
| 1963     | 626667 m²     | 608182 m²     | 605398 m²     | 1.03  | 1.04  | 1.00  |
| 1983     | 607977 m²     | 596127 m²     | 598396 m²     | 1.02  | 1.02  | 1.00  |
| 1994     | 574462 m²     | 564806 m²     | 564614 m²     | 1.02  | 1.02  |       |
| 2010     | 502555 m²     | 517443 m²     | 486629 m²     | 0.97  | 1.03  | 1.06  |
| 2016     | 487824 m²     | 471473 m²     |               | 1.03  |       |       |
Table 3. Calculated yearly palsa decay rates (%a⁻¹) in Borge et al. (2017) and Mamet et al. (2017)

| Palsa areas (ha) | Change (%a⁻¹) |
|------------------|---------------|

**Mamet et al. (2017)**

| Palsa | year | area (ha) | Change (%a⁻¹) |
|-------|------|-----------|---------------|
| HF    | 1944 | 0.35      | -0.73         |
|       | 1974 | 0.28      | -1.67         |
|       | 1981 | 0.25      | -2.32         |
|       | 2010 | 0.13      | -4.14         |
| BP    | 1944 | 0.62      | -0.43         |
|       | 1972 | 0.55      | -0.60         |
|       | 1981 | 0.52      | -1.40         |
|       | 2010 | 0.35      | -2.47         |
| D6    | 1949 | 0.39      | -2.60         |
|       | 1972 | 0.21      | -2.67         |
|       | 1981 | 0.17      | -1.91         |
|       | 2013 | 0.09      | -4.66         |
| D2    | 1949 | 0.25      | -1.65         |
|       | 1972 | 0.17      | -0.90         |
|       | 1981 | 0.15      | -1.40         |
|       | 2013 | 0.10      | -7.33         |
| GF    | 1944 | 1.21      | -6.50         |
|       | 1949 | 0.86      | -2.58         |
|       | 1974 | 0.45      | -8.86         |
|       | 2010 | 0.23      | -5.18         |
|       | 2016 | 0.05      | -4.80         |

**Borge et al. (2017)**

| Palsa | year | area (ha) | Change (%a⁻¹) |
|-------|------|-----------|---------------|
| Karlebotn | 1957 | 217       | -1.60         |
|        | 2005/08 | 100     | -1.51         |
| Laxelv | 1959 | 95        | -1.34         |
|        | 2008 | 49        |               |
| Goatheluoppal | 1958 | 50        | -1.64         |
|        | 1980 | 35        | -2.13         |
|        | 2003 | 21        | -4.04         |
|        | 2012 | 15        | -2.25         |
| Suossjavri | 1956/59 | 74      | -0.50         |
| all palsa | 1982 | 65        | -0.73         |
| domes and small plateaus | 2003 | 55        | -0.77         |
|              | 2011 | 50        | -0.30         |
|              | 2012 | 49        | -0.31         |
|              | 2013 | 48        | -1.18         |
|              | 2014 | 47        | -1.25         |