

## **New observations of the distribution, morphology, and dissolution dynamics of cryogenic gypsum in the Arctic Ocean**

### **Supplements:**

Fig. S1: Cryogenic gypsum crystals (total  $>30\ \mu\text{m}$  size fraction) from ROV samples of station 32 at 0 m (A and B) and 5 m water depth (C).

Fig. S2: Cryogenic gypsum crystals (total  $>30\ \mu\text{m}$  size fraction) from ROV samples of station 45 at 0 m (A and B), 5 m (C) and 10 m (D) water depth.

Fig. S3: Cryogenic gypsum crystals from ROV samples of station 66 at 0 m (A ( $>63\ \mu\text{m}$ ) and B ( $>30<63\ \mu\text{m}$ )), 5 m (total  $>30\ \mu\text{m}$  size fraction) (C) and 10 m (total  $>30\ \mu\text{m}$  size fraction) (D) water depth.

Fig. S4: Cryogenic gypsum crystals from ROV samples of station 80 at 10 m (A ( $>63\ \mu\text{m}$ ) and B ( $>30<63\ \mu\text{m}$ )). C-F shows cryogenic gypsum crystals retrieved from the melted ice core sections of station 80. C ice core section 0-8 cm, D ice core section 11-22 cm, E ice core section 35-46 cm, F ice core section 46-57 cm.

Fig. S5: Example photos of dissolution experiments from the water mass simulation trials of Polar Surface Water (A) and Atlantic Water (B). Crystals are shown before the experiment (A-1, B-1) and after the termination (A-2, B-2).

Fig. S6: Example photos of dissolution experiments from the deep-water mass simulation trial running at 150 bar) before the experiment (A-1, B-1, C-1) and after the termination (A-2, B-2).

Fig. S7: Porosity of cryogenic gypsum crystals. A-C) Example photos from 0 m station 66 showing the high porosity and surface roughness of large cryogenic gypsum crystals. D) Solid non-porous crystals from the surface sample of station 45.























