

~~Sea Ice~~ Sea Ice:

Cumulative freezing days: $\Theta = \int_0^t (T_f - T_a)$

$$\text{Zubov: } H^2 + a_1 H = a_2 \Theta$$

$$\text{Lebedev: } h = 1.33 \Theta^{0.58} \rightarrow \text{cm}$$

Sea ice thickness + growth:

$$\frac{dH}{dt} = -\frac{F_c + F_w}{\rho L}, \quad \rho L \frac{dH}{dt} = \frac{k}{H} (T_0 - T_f)$$

$$H^2 = \frac{2k}{\rho L} \int_0^t (T_f - T_a) dt = \frac{2k}{\rho L} \Theta \Rightarrow H = \sqrt{\frac{2k}{\rho L} \Theta}$$

nein!

Thermal emissions: $F = \epsilon \sigma T_0^4$

$$(1-a)S = \epsilon \sigma T_0^4$$

$$\text{albedo: } a = \frac{\int S_{\text{sw}}(h) dh}{\int S_{\text{sw}}(h) dh}$$

$$\text{Polyngas: } \frac{dX_i}{dt} = V_i - \frac{X_i F_i}{H_i}$$

$$\text{Pease solution: } X_p = \frac{V_i H_i}{F_i} (1 - \exp(-t \frac{F_i}{H_i})), \quad F_i = \frac{dH}{dt}$$

$$X_{p(\max)} = \frac{V_i H_i}{F_i}$$

Know polynyas: Northwater, Storöfjord, Weddel, Lapter sea

$$-\rho_i L \frac{dH}{dt} = (1-a)Q_r + Q_{\text{ed}} - Q_{\text{eu}} + Q_s + Q_e$$

$$Q_{\text{eu}} = \epsilon \sigma T_w^4, \quad Q_{\text{ed}} = \epsilon \sigma T_a^4, \quad Q_s = \rho_a C_h C_p V_a (T_a - T_w) \quad \text{Sensible heat flux}$$

$$Q_e = \rho_a c_e L_e V_a (q_a - q_s)$$

~~Latent heat~~

New Ice - frezid

Miles dark, light 0-10 cm

Pancake 10 cm

young ice grey, grey-white 10-30 cm

first year thin, medium, thick 30 cm - 2 m

old ice second year, multiyear 3 m and above.