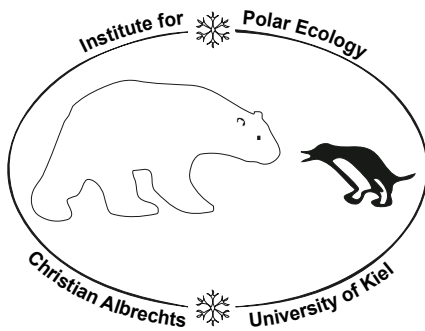


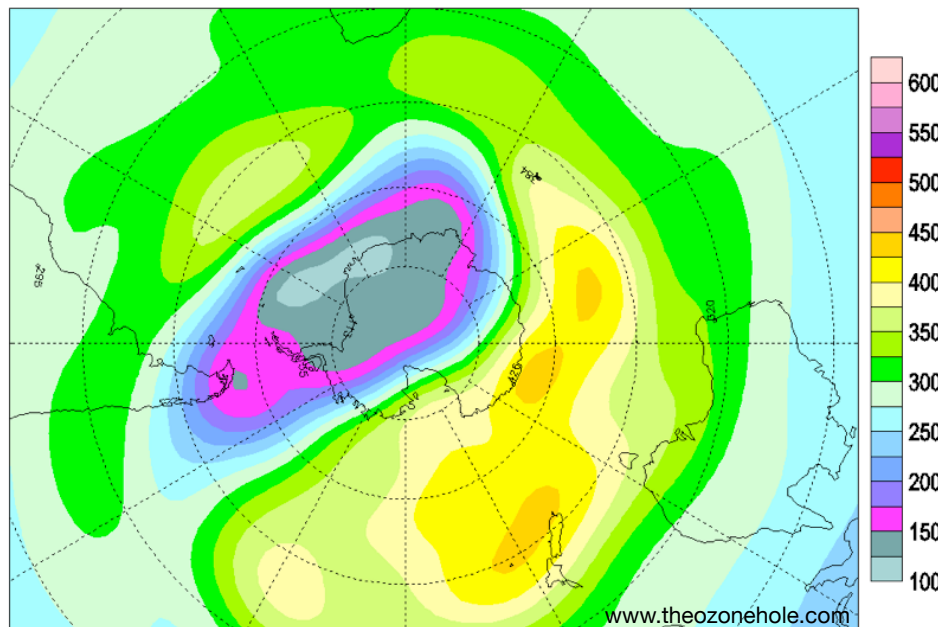
Impact of temperature on UV-susceptibility of two *Ulva* (Chlorophyta) species from Antarctic and Subantarctic regions



Ralf Rautenberger
Institute for Polar Ecology
Christian Albrechts University of Kiel (Germany)

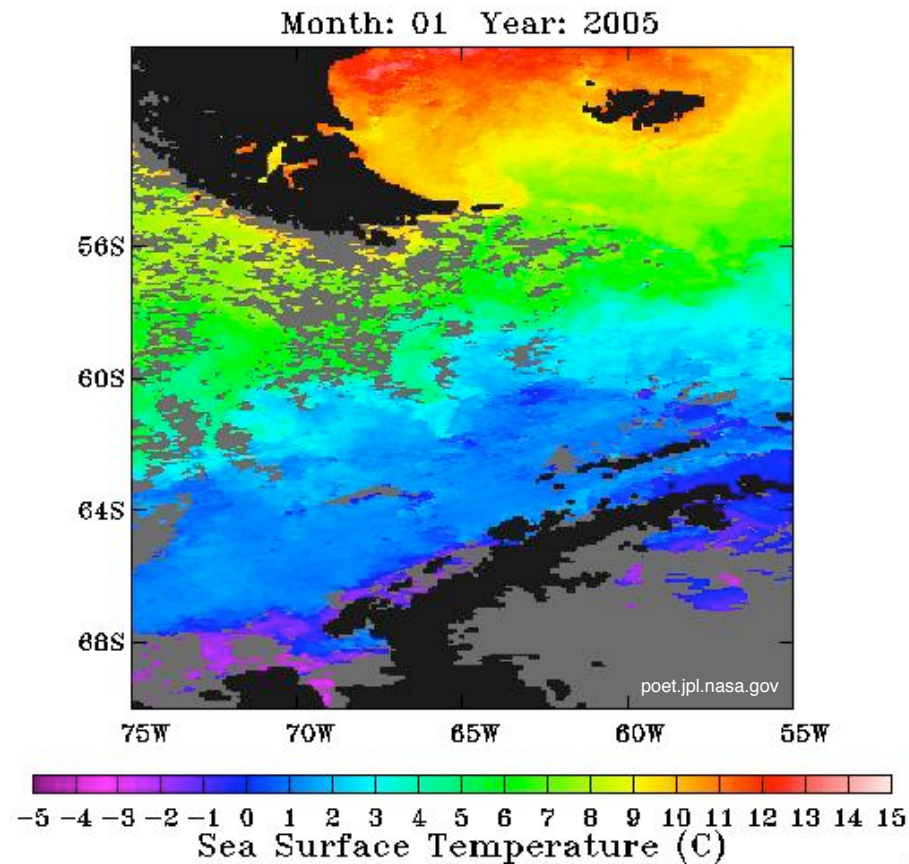
The „Antarctic ozone hole“

Total ozone (DU) / Ozone total (UD), 2005/10/08



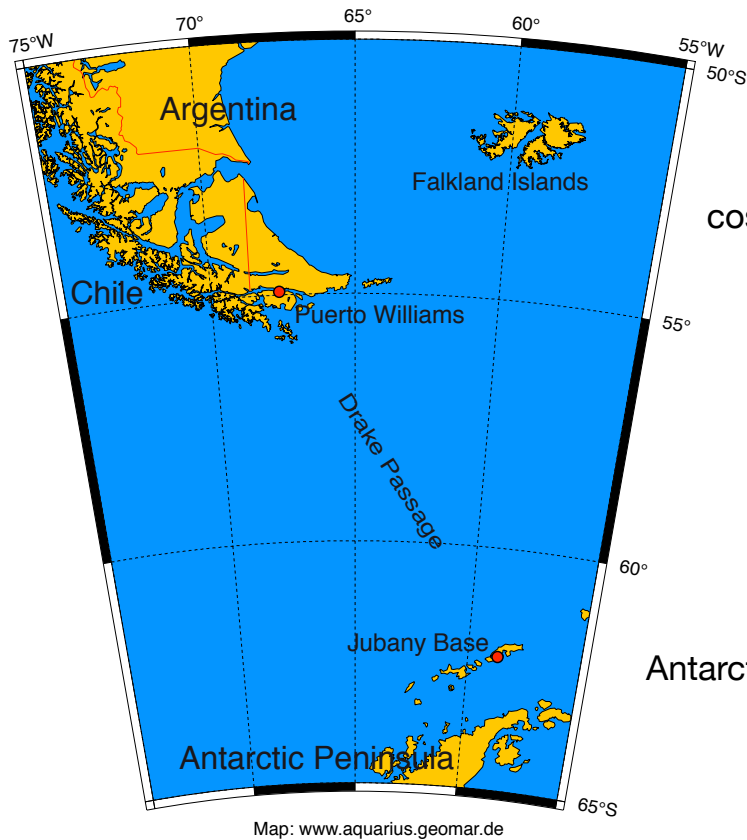
- Establishment in austral spring every year
- In 2000 and 2003: ≥ 28 million km²
- Extended to South America: 45°S
- Results in an increase of UV-B-radiation on earth's surface
- Increased UVB-radiation affects macroalgae as an important ecological component

Water temperatures



- Controlling macroalgal growth, distribution and stress
- Potential changes of water temperatures in Antarctica affect marine life, e.g. macroalgae

Algal material



Puerto Williams:

Ulva clathrata

cosmopolitan/cold-temperate species
cold-temperate waters: 5-10 °C

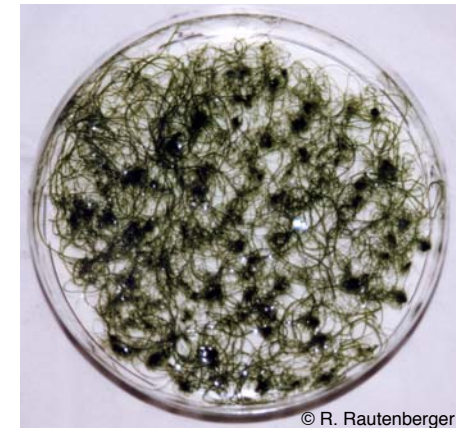


Ulva clathrata

Jubany Base:

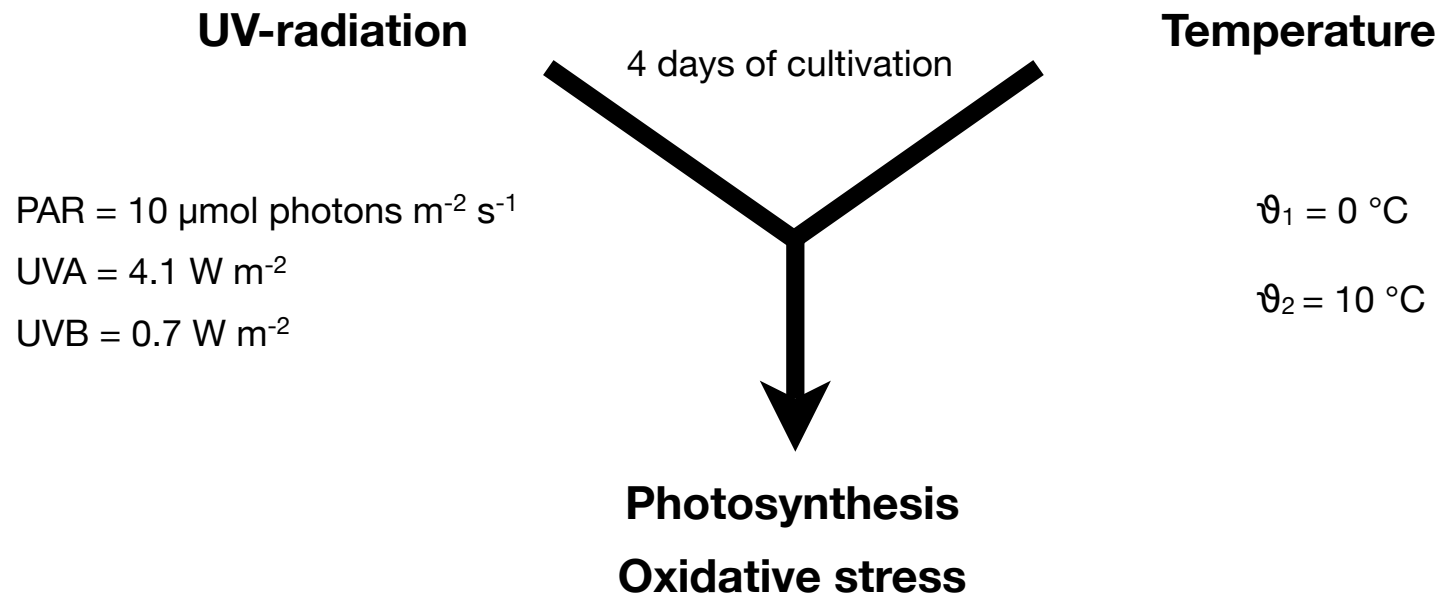
Ulva bulbosa

Antarctic/cold-temperate species: -2-2 °C
Tide pools: >> 2 °C



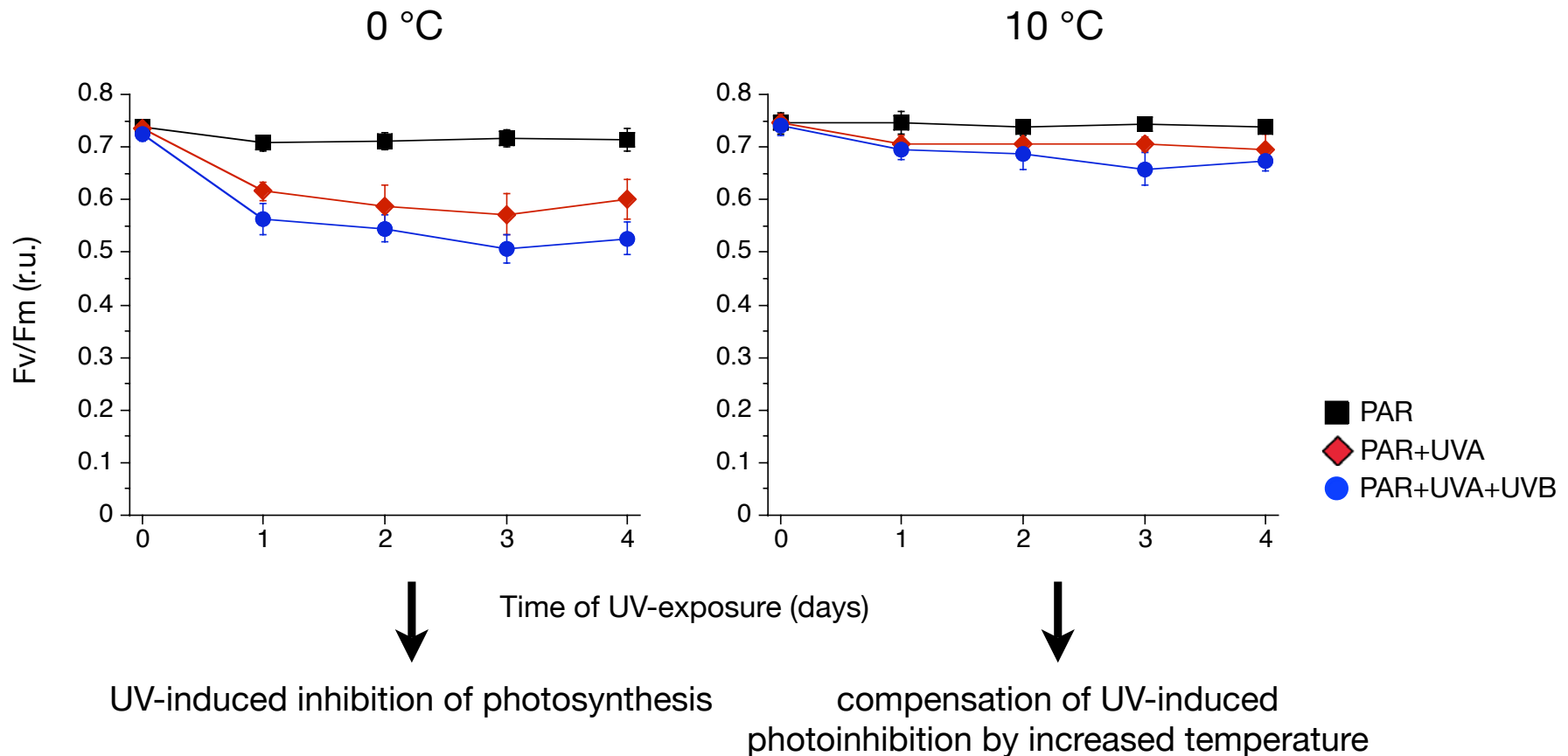
Ulva bulbosa

Objective of the study

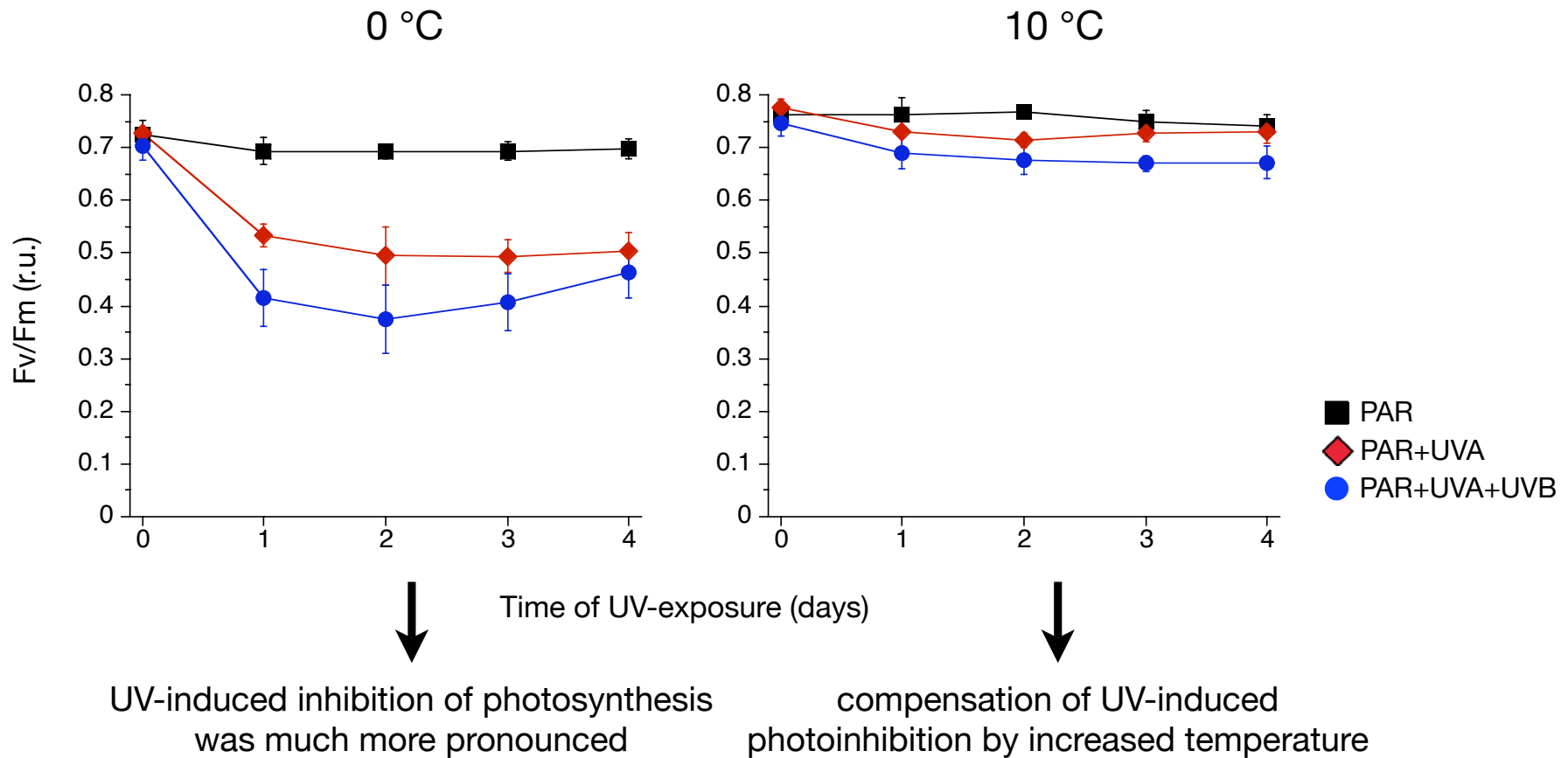


Interactive effects of UV-radiation and temperature
on the physiological and ecological level

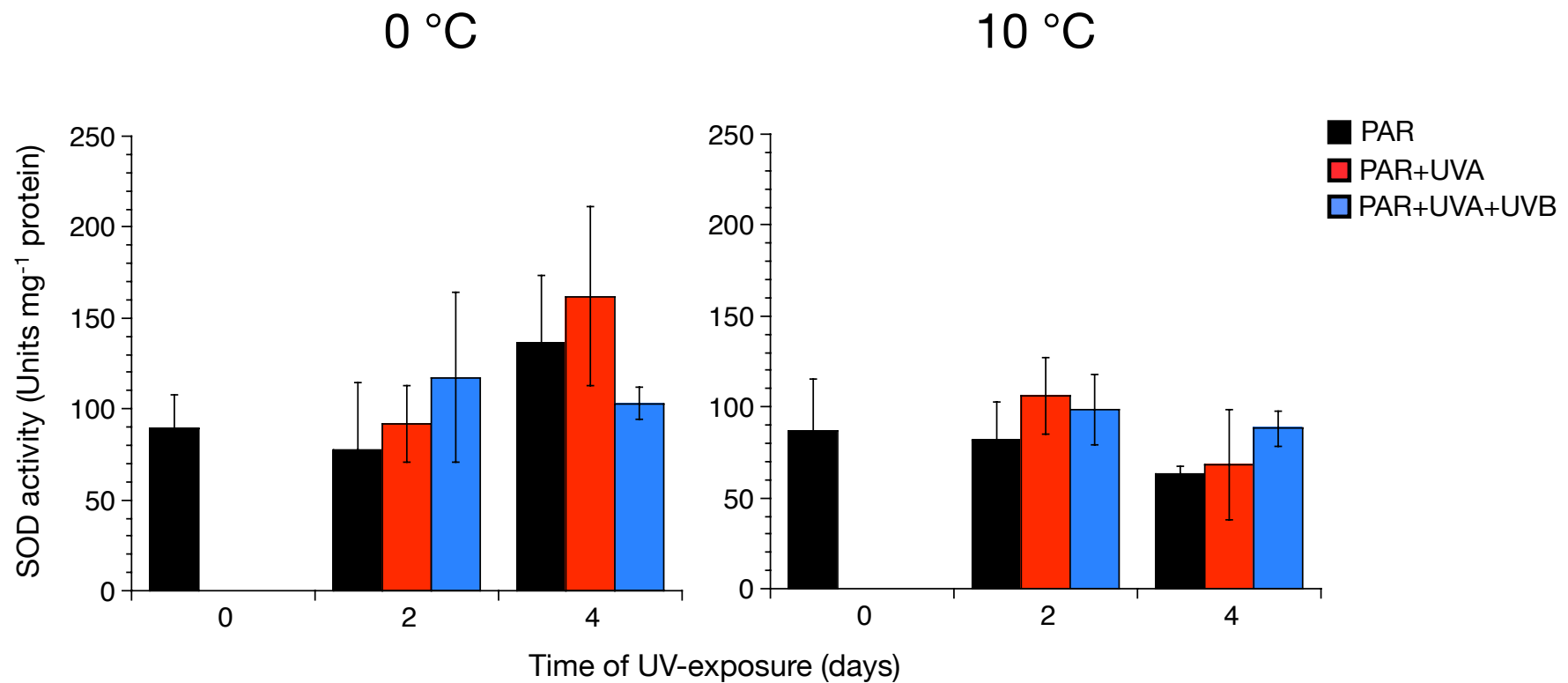
Photosynthesis of *U. bulbosa*



Photosynthesis of *U. clathrata*

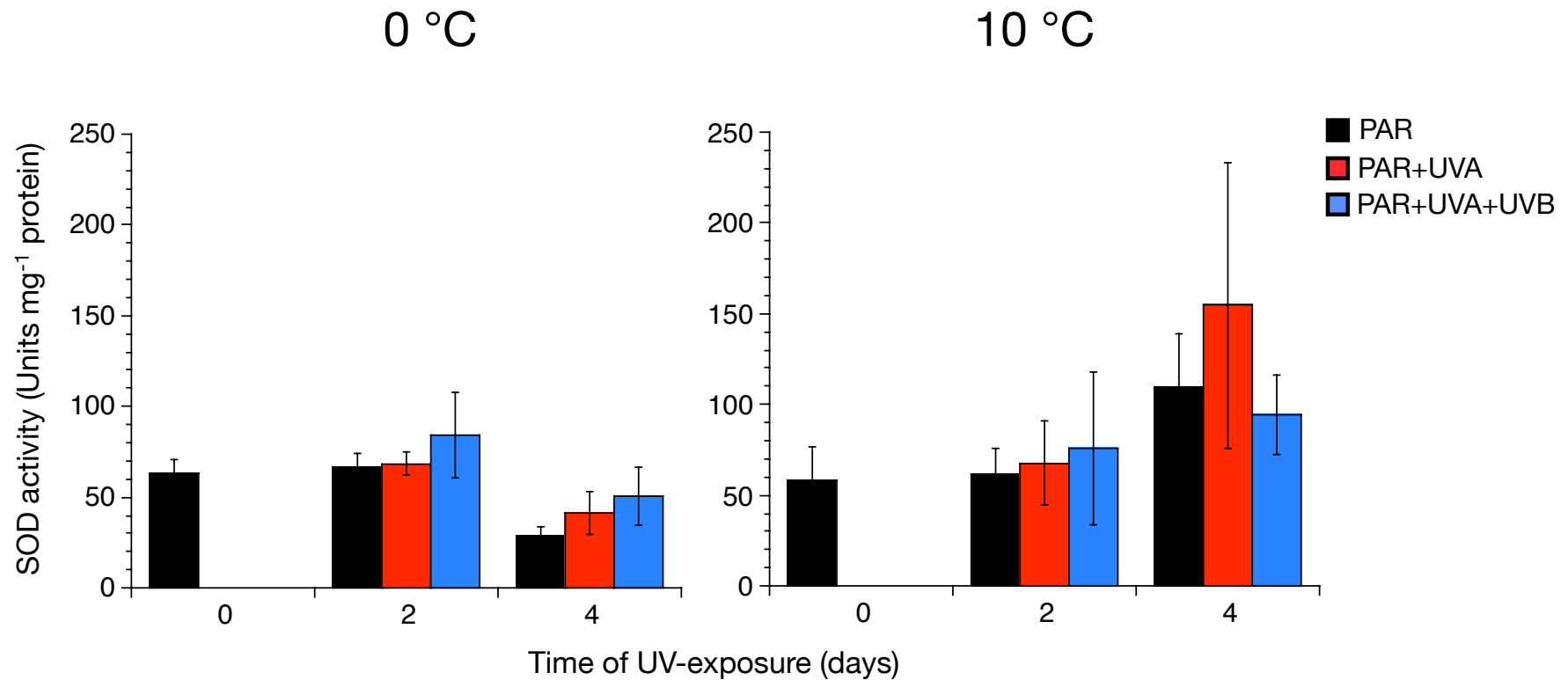


Activities of superoxide dismutase in *U. bulbosa*



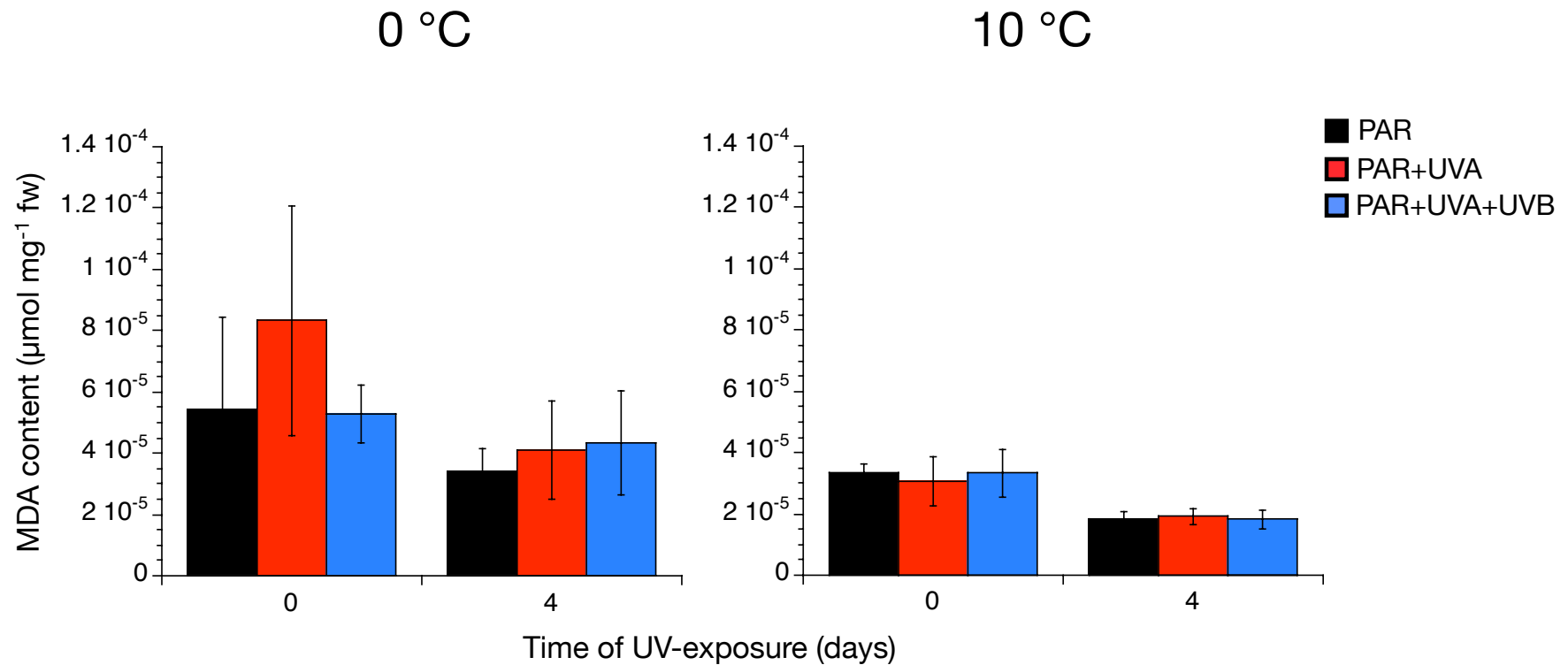
No significant differences between light and temperature treatments!

Activities of superoxide dismutase in *U. clathrata*



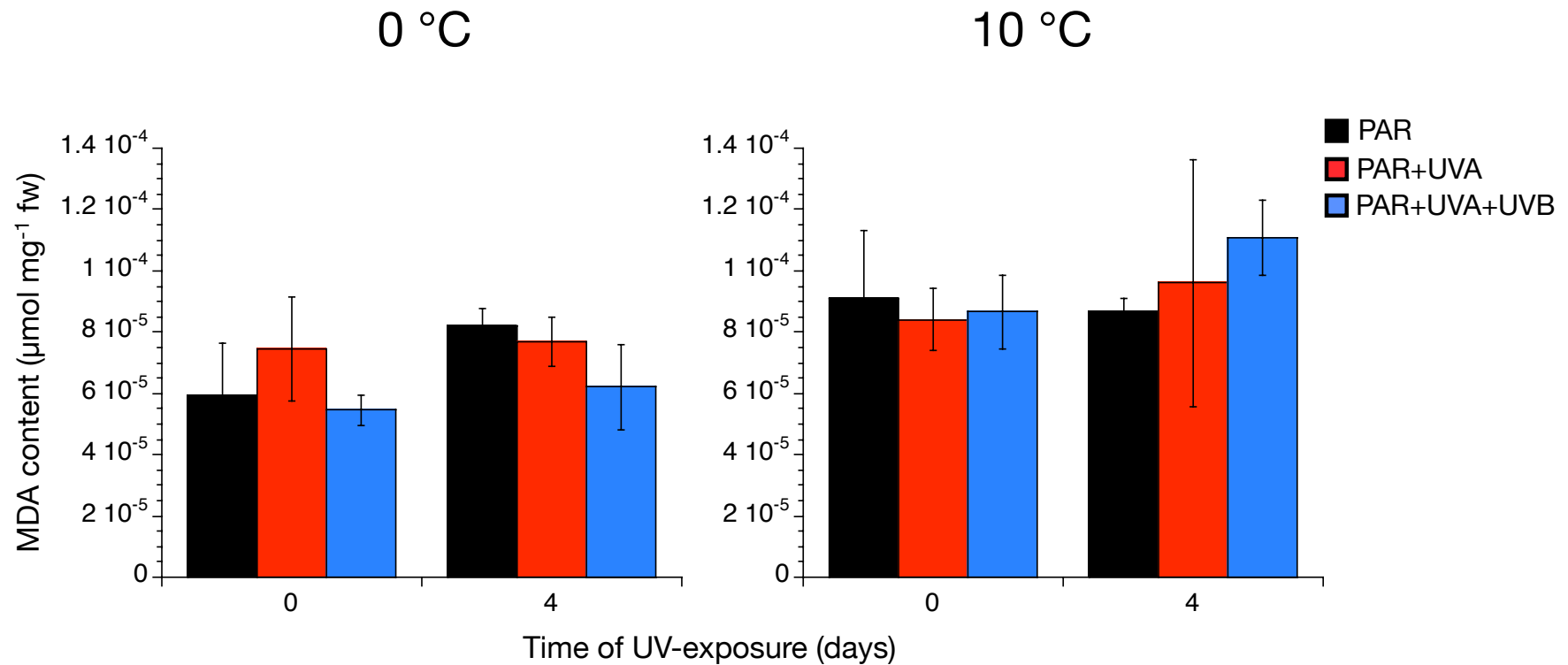
No significant differences between light treatments!

Content of malondialdehyde in *U. bulbosa*



No significant differences between light treatments!

Content of malondialdehyde in *U. clathrata*



No significant differences between light treatments!

Physiological interpretation

- UV-radiation induced inhibition of photosynthesis at 0 °C but did not cause any oxidative stress
- Compensation of UV-induced photoinhibition by increased temperature, probably due to increased activities of key enzymes involved in photoprotection
- Higher SOD activities in *U. bulbosa* than in *U. clathrata* suggest a more efficient management of oxidative stress at permanent low temperatures

Ecological Interpretation

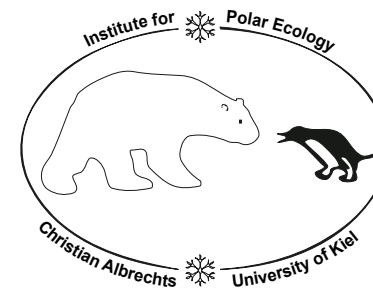
- *U. bulbosa* seems better adapted to cope with UV-radiation than *U. clathrata* at lower temperatures
- *U. bulbosa* in the eulittoral is affected by UV-radiation but photoinhibition is reversible
- In tide pools, increased temperatures may diminish UV-effects in *U. bulbosa*
- *U. clathrata* from South America does not experience similarly low temperatures
- There, higher water temperatures facilitate a higher activity of physiological protection mechanisms



Thank you for your attention.

Deutsche
Forschungsgemeinschaft

DFG



Rautenberger R and Bischof K (2006) Impact of temperature on UV-susceptibility of two *Ulva* (Chlorophyta) species from Antarctic and Subantarctic regions. **Polar Biology** (Online First)