

MODELING OF THE HORNSUND FJORD - GENERAL CIRCULATION, WATER MASSES AND HEAT EXCHANGE(S), SEASONAL VARIABILITY AND SHELF - FJORD INTERACTION.

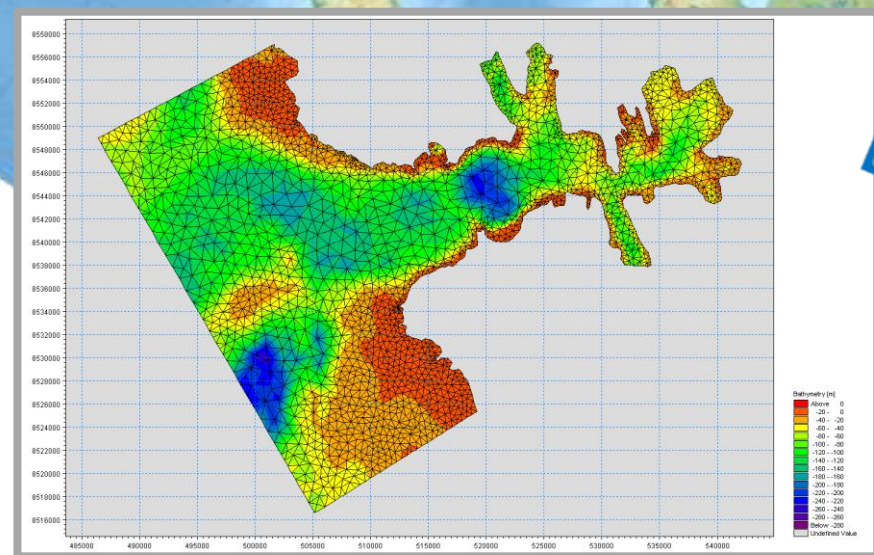
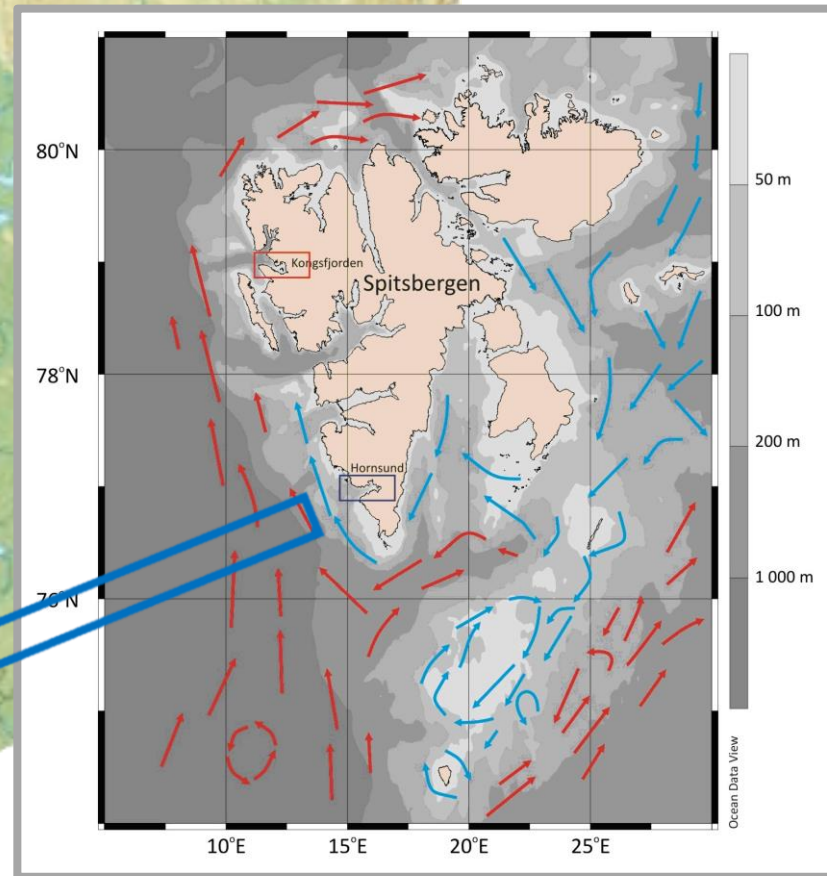
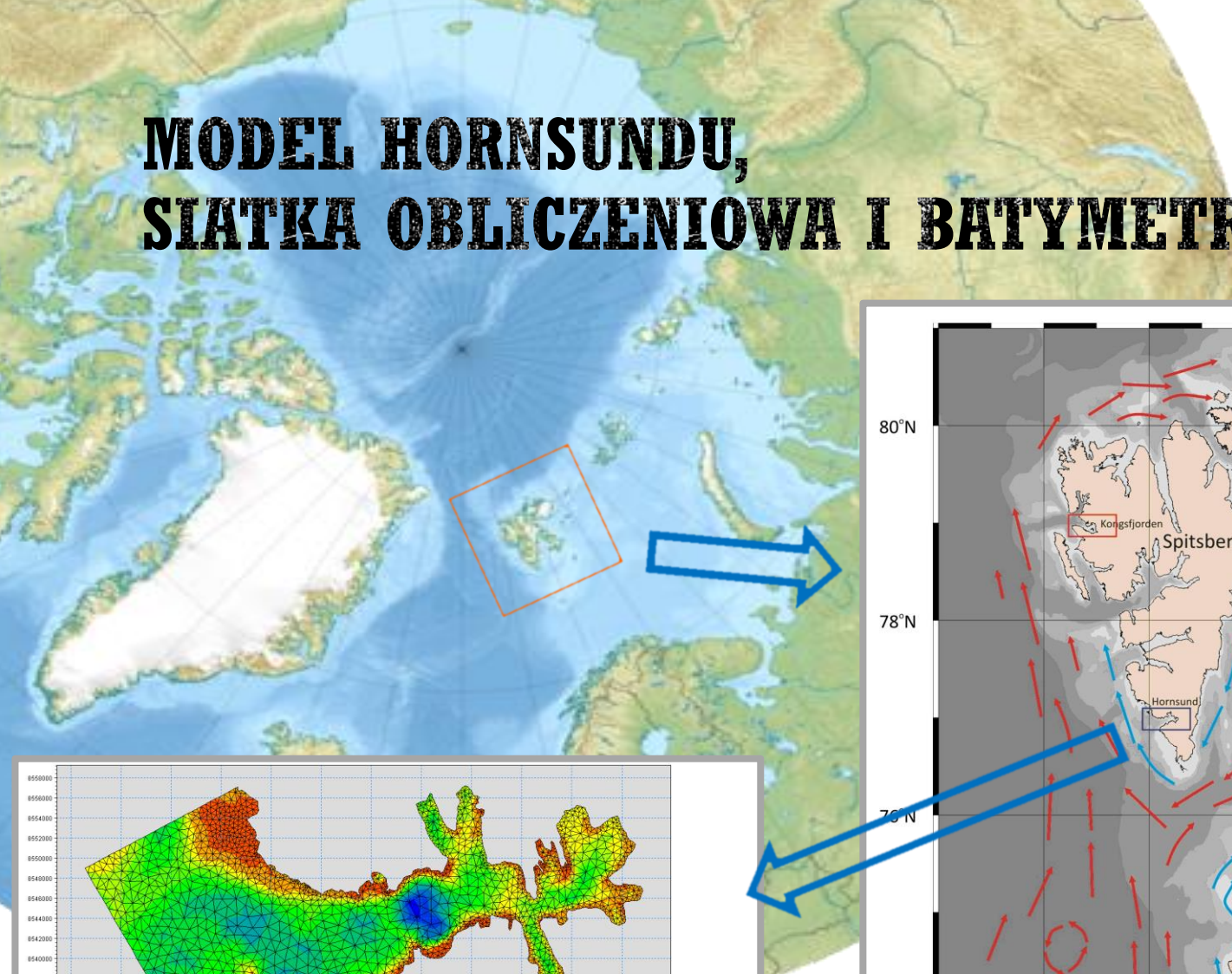
Jaromir Jakacki, Anna Przyborska, Szymon Kosecki



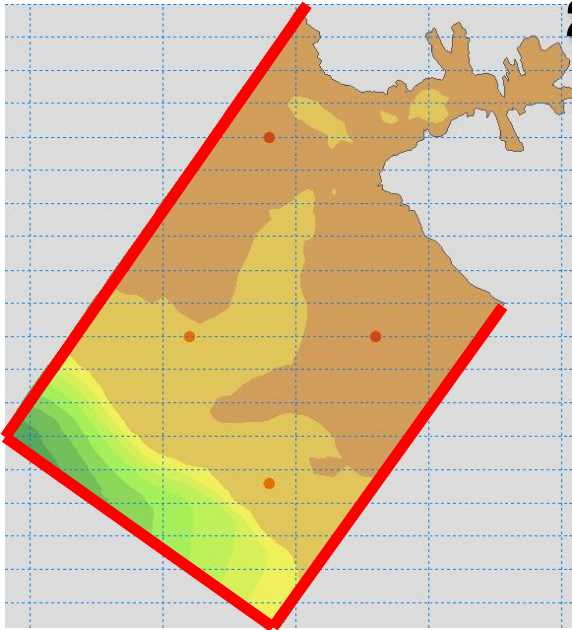
GAME
Growing of the Arctic Marine Ecosystem



MODEL HORNSUNDU, SIATKA OBLICZENIOWA I BATYMETRIA



KONFIGURACJA MODELU:



- 1) Model engine – MIKE by DHI (commercial product)
- 2) Open boundary conditions
 - Data (temperature, salinity, barotropic velocity) from Norway Arctic Model (ROMS) – 800 meters horizontal resolution
 - Tidal sea level data from global tidal model (0.25 degrees resolution)
 - At the lateral boundary implemented flather boundary (combined sea level with barotropic velocity)

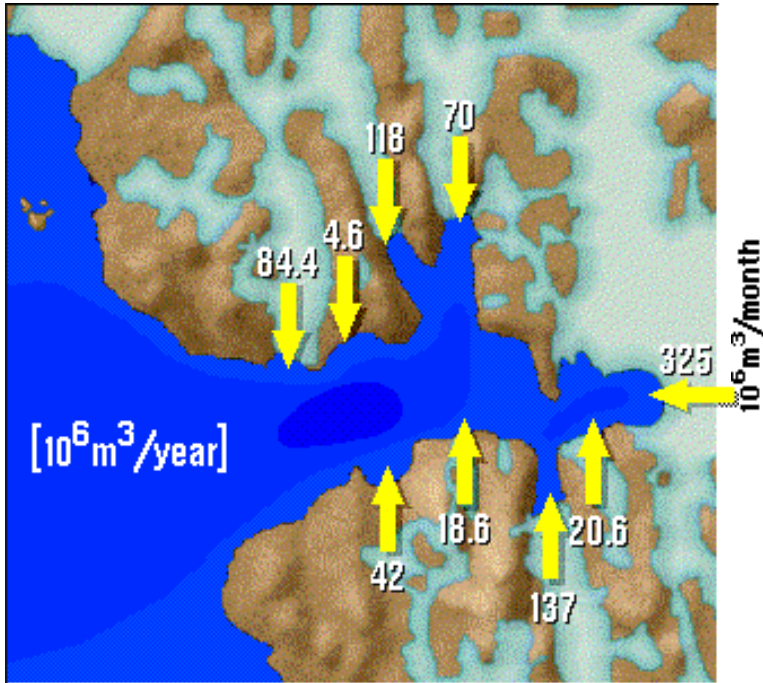


KONFIGURACJA MODELU:

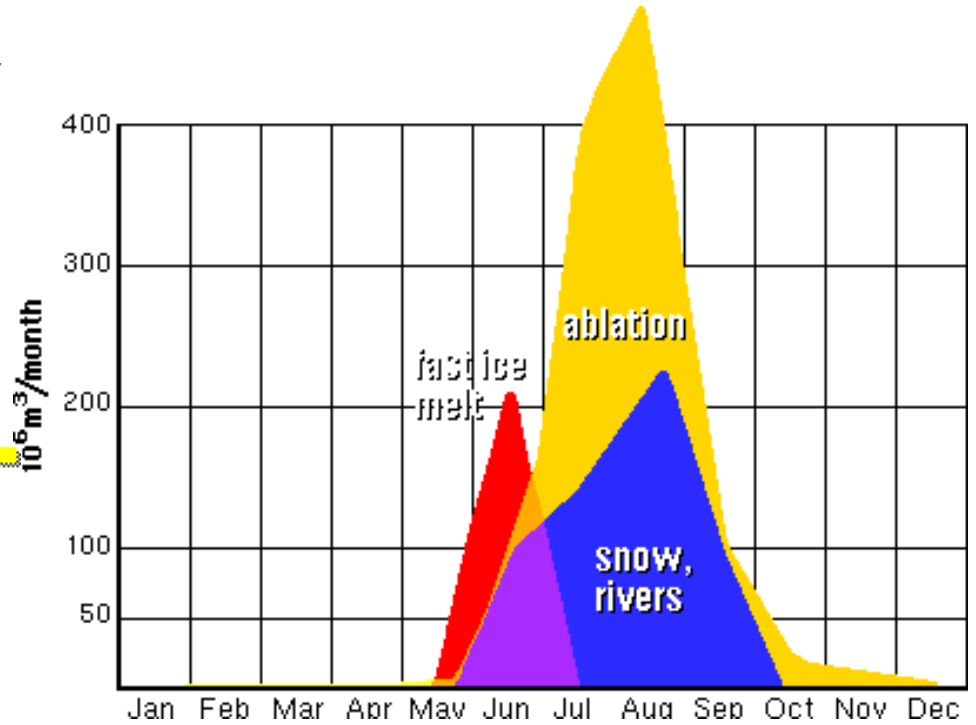
- 3) k-epsilon vertical mixing scheme $\nu_t = c_\mu \frac{k^2}{\varepsilon}$
- 4) Variable roughness for the whole domain
- 5) Atmospheric data from ECMWF (except ice concentration and thickness)
 - Precipitation
 - Winds
 - Visibility (cloud cover)
 - temperature
- 6) Ice cover also from Norway Model
- 7) Fresh water fluxes from two simple images (next slides)



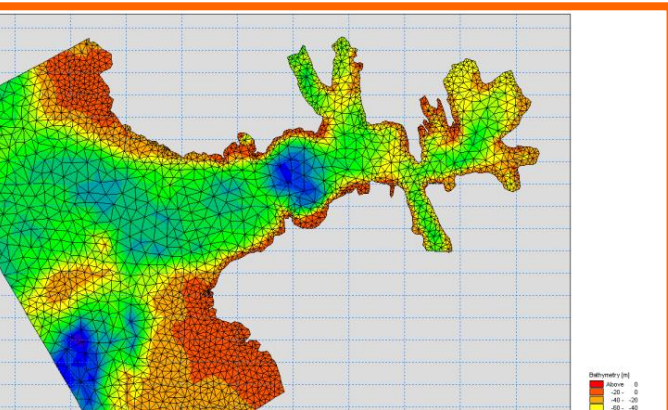
DOPLYW WODY SŁODKIEJ



PULINA & JANIA 1994

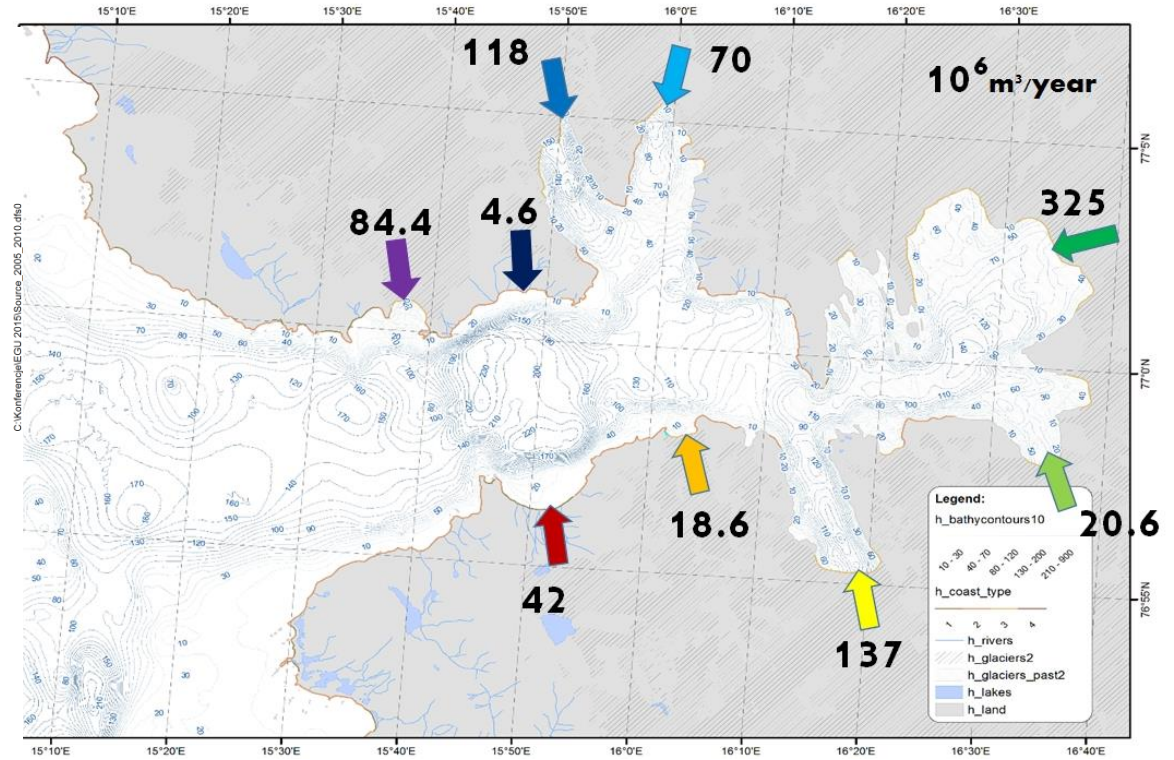
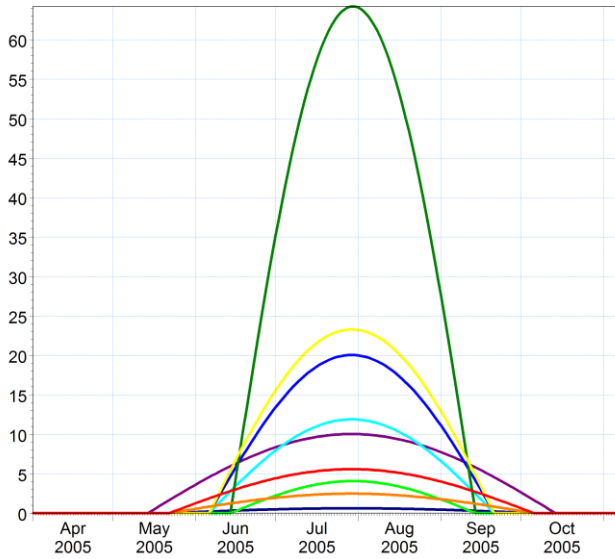


WESLAWSKI ET AL. 1995



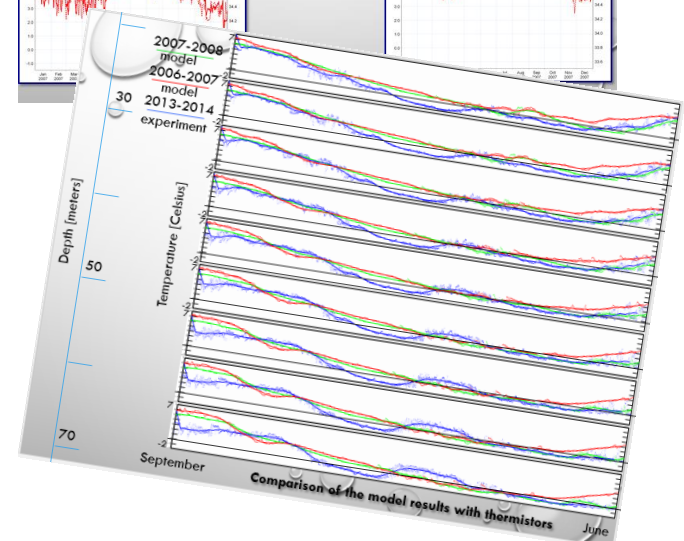
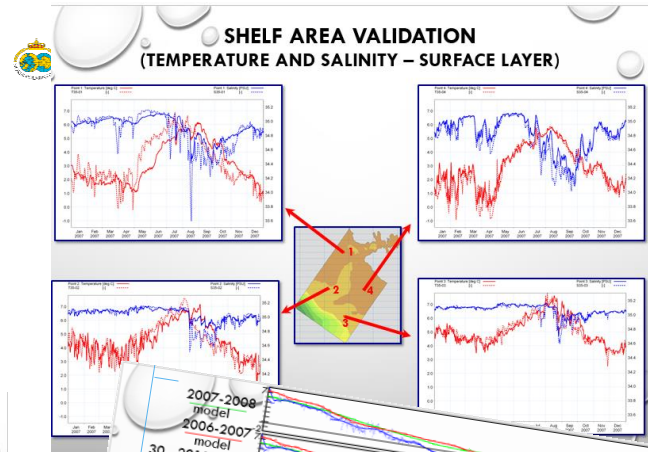
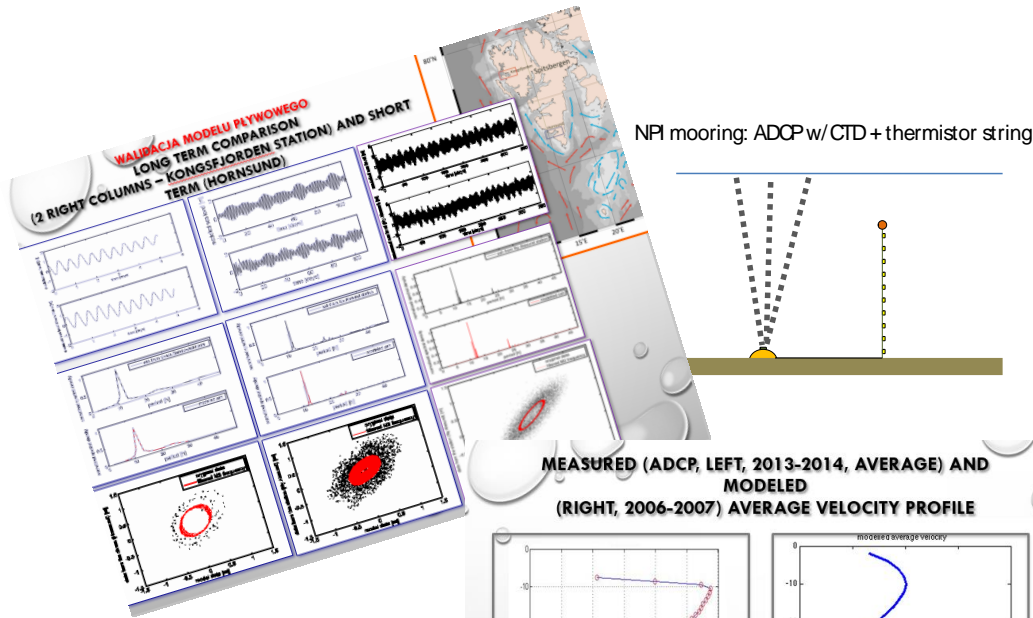
DOPIŁYW WODY SŁODKIEJ

- Source1 [m³/s] —
- Source2 [m³/s] —
- Source3 [m³/s] —
- Source4 [m³/s] —
- Source5 [m³/s] —
- Source6 [m³/s] —
- Source7 [m³/s] —
- Source8 [m³/s] —
- Source9 [m³/s] —



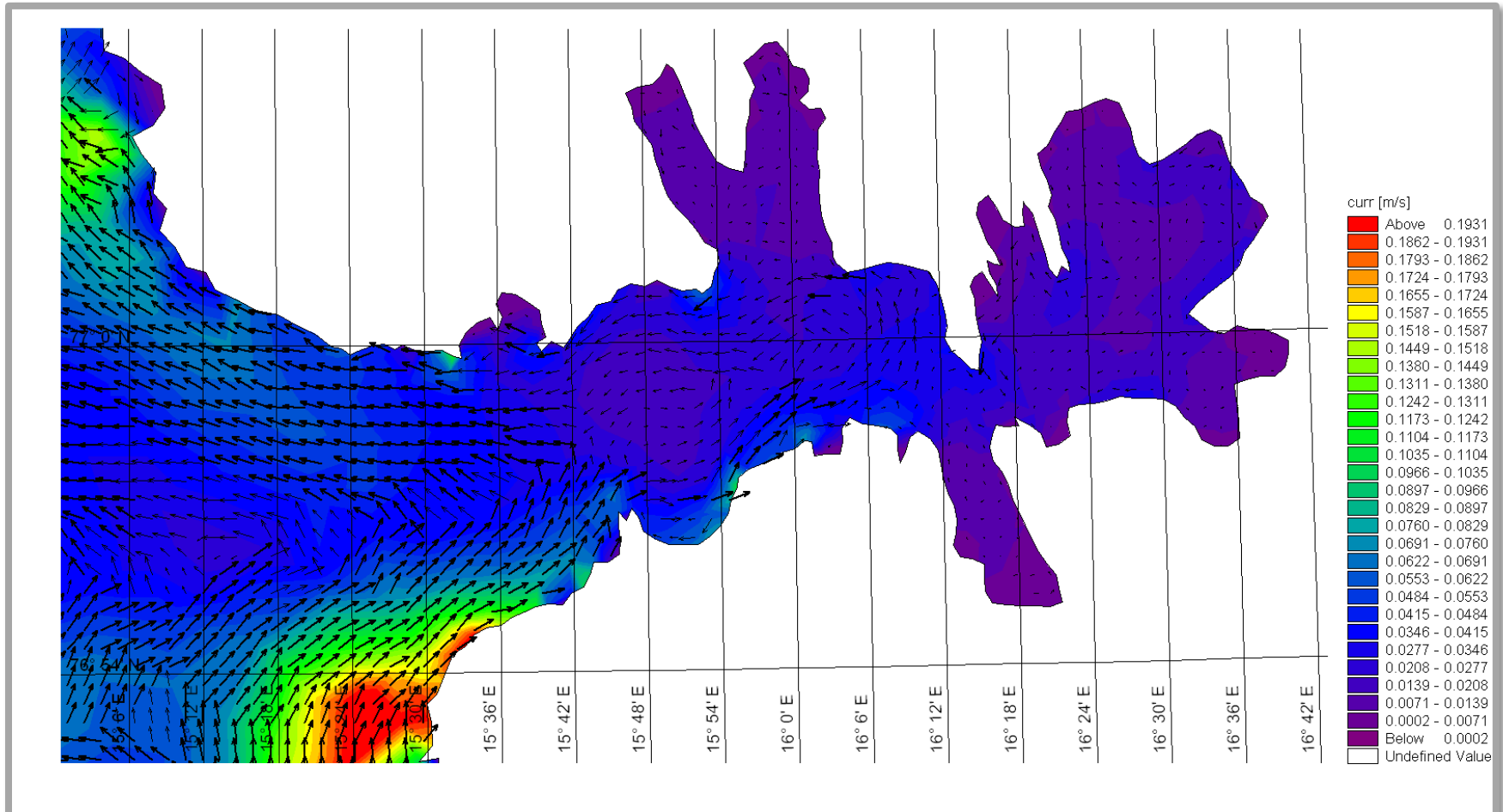
WALIDACJA MODELU:

- WALIDACJA MODELU PLYWOWEGO
- PORÓWNANO POZIOMĄ MORZA Z MODELU Z DANYMI Z MAREOGRAFÓW
- PORÓWNANO BAROTROPOWE SKŁADOWE PRĘDKOŚCI, TEMPERATURĘ I ZASOLENIE Z MODELU Z WYNIKAMI INNYCH MODELI
- WYNIKI DLA FIORDU PORÓWNANO Z DANYMI Z MOORINGU ADCP W/CTD

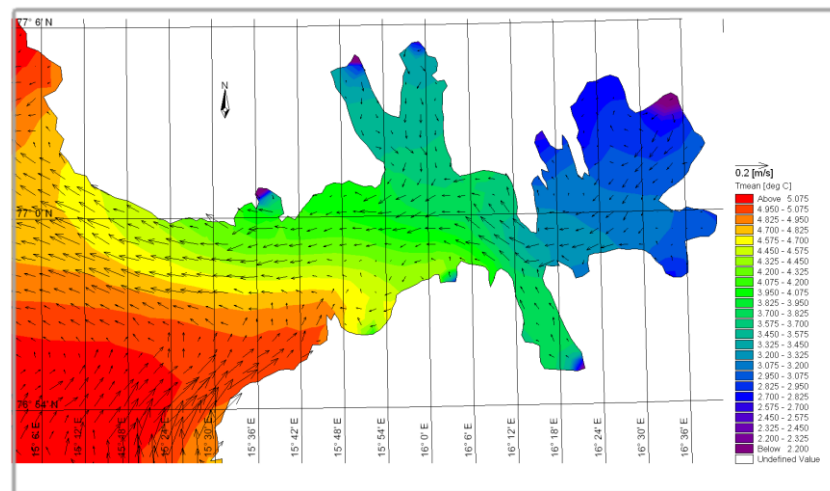
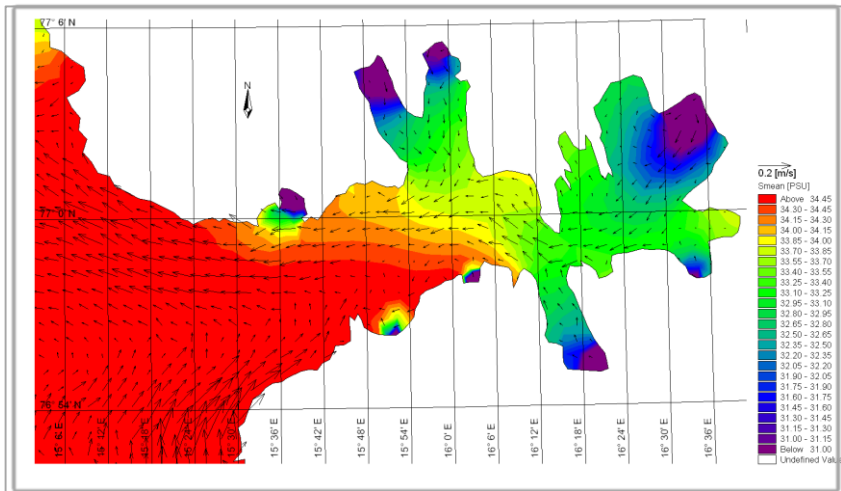


WYBRANE WYNIKI

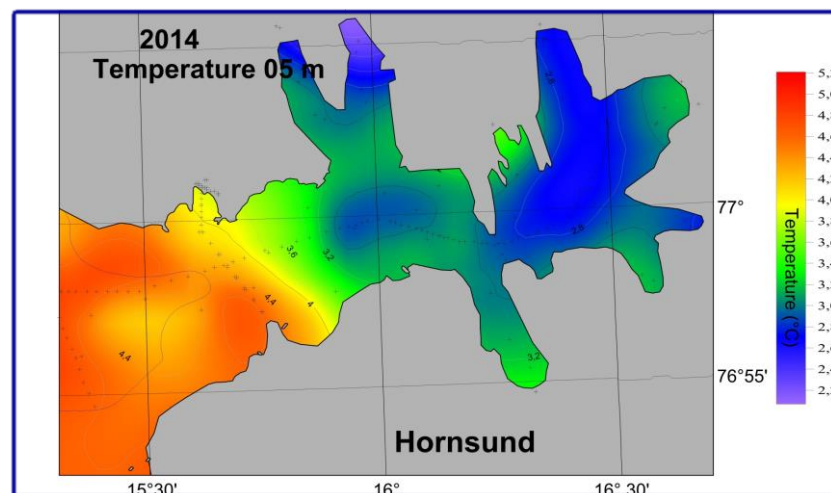
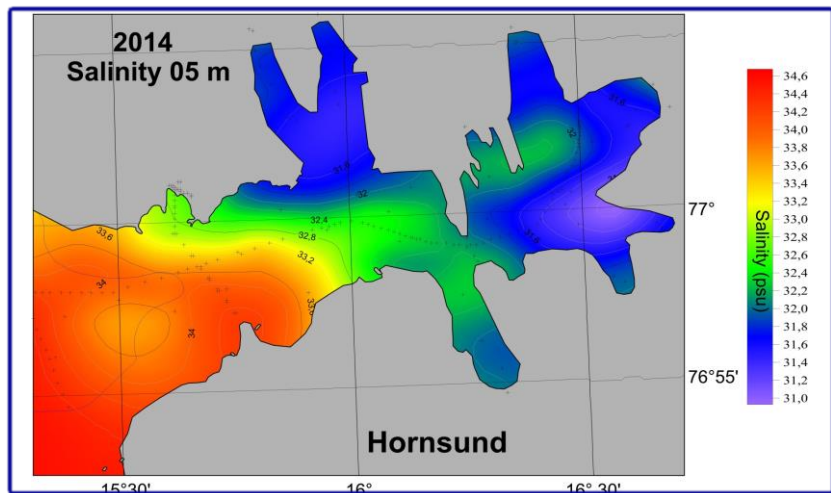
ŚREDNIA CYRKULACJA DLA CAŁEJ DOMENY (ROK 2007)



MODEL (LIPIEC 2006 ŚREDNIA)



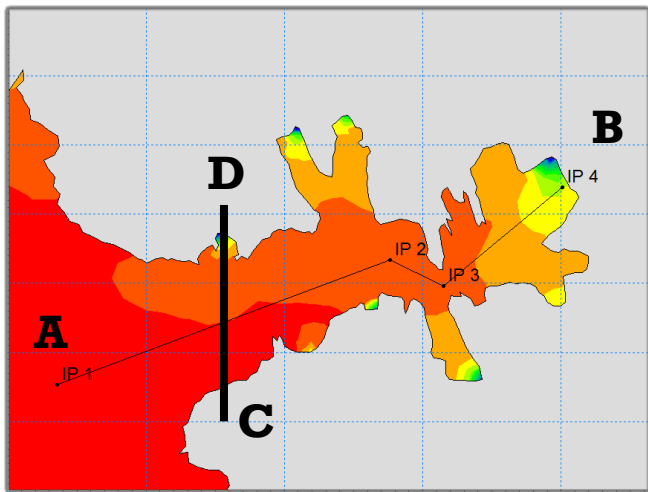
POMIARY (LIPIEC 2014)



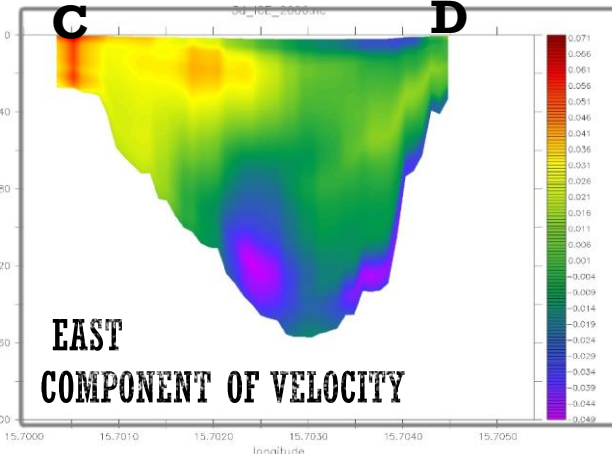
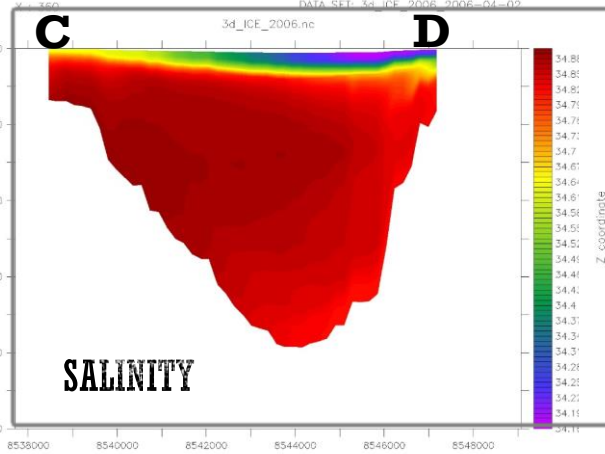
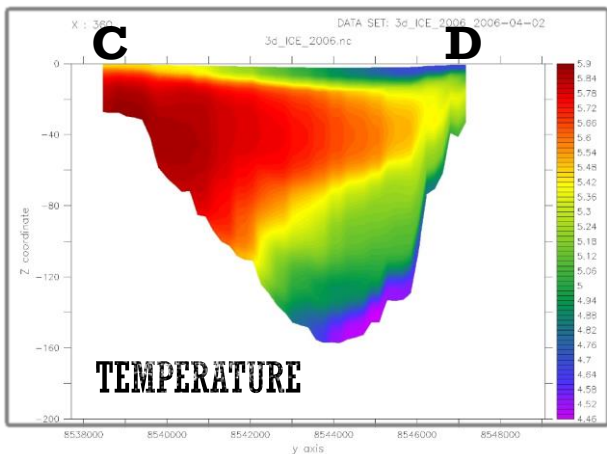
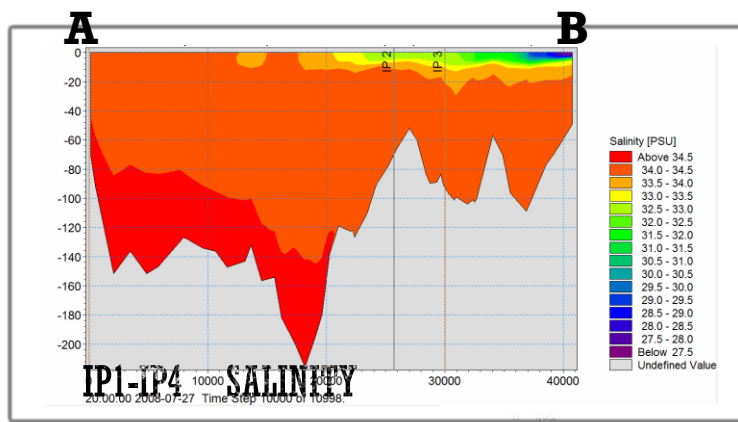
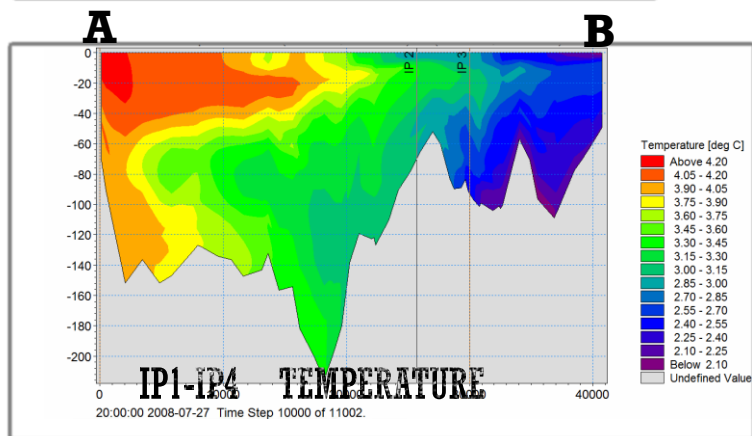
ZASOLENIE POWIERZCHNIOWE

TEMPERAURA POWIERZCHNIOWE



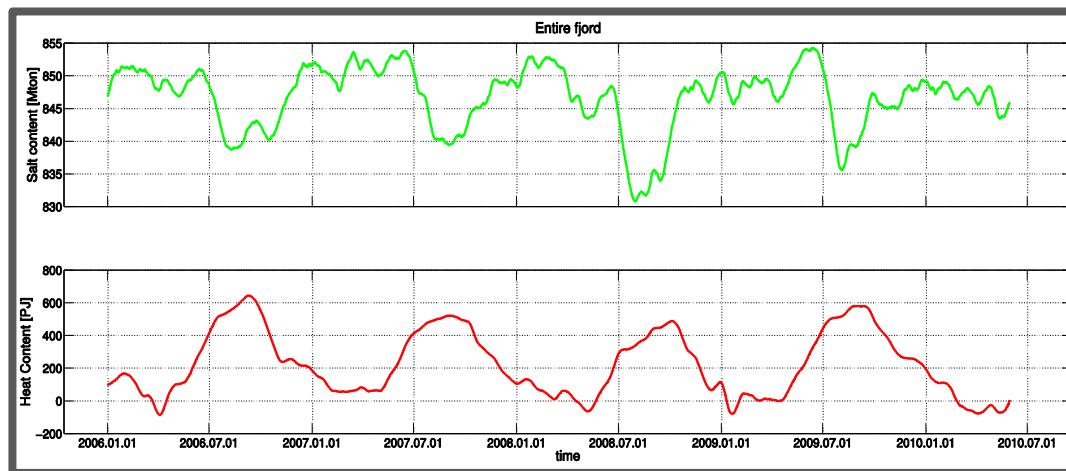
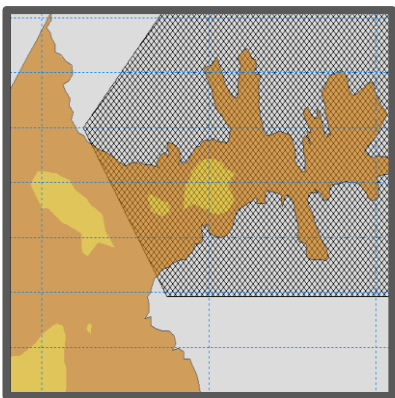


TRANSEKT I PIONOWE PROFILE TEMPERATURY, ZASOLENIA I PRĄDÓW (ŚREDNIA Z LIPCA 2006 ROKU)

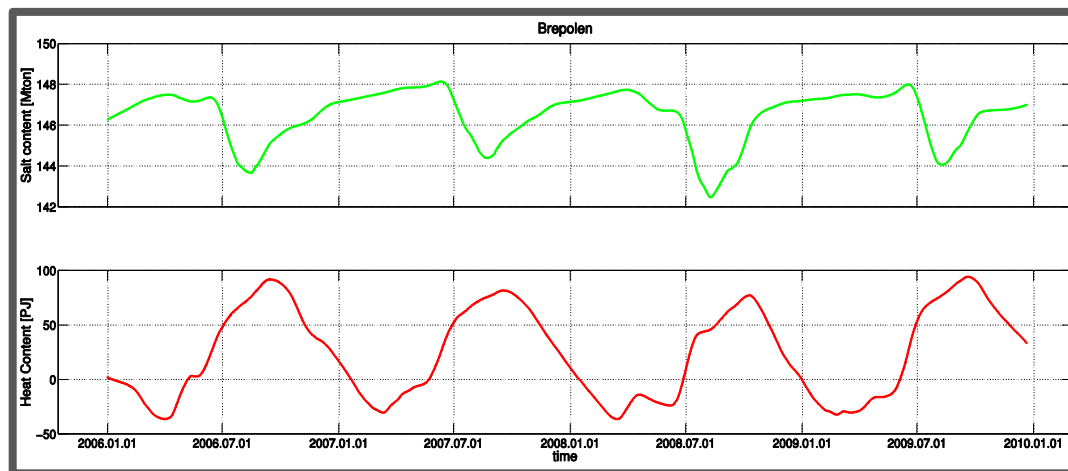
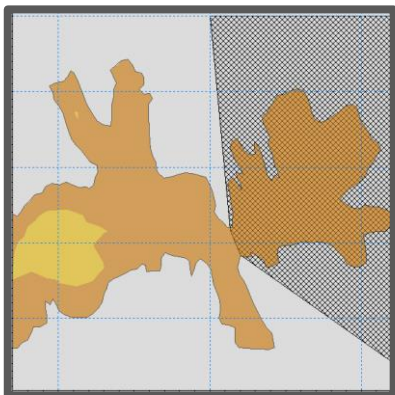


SEZONOWA ZMIENNOŚĆ ZAWARTOŚCI SOLI I CIEPŁA

FJORD HORNSUND

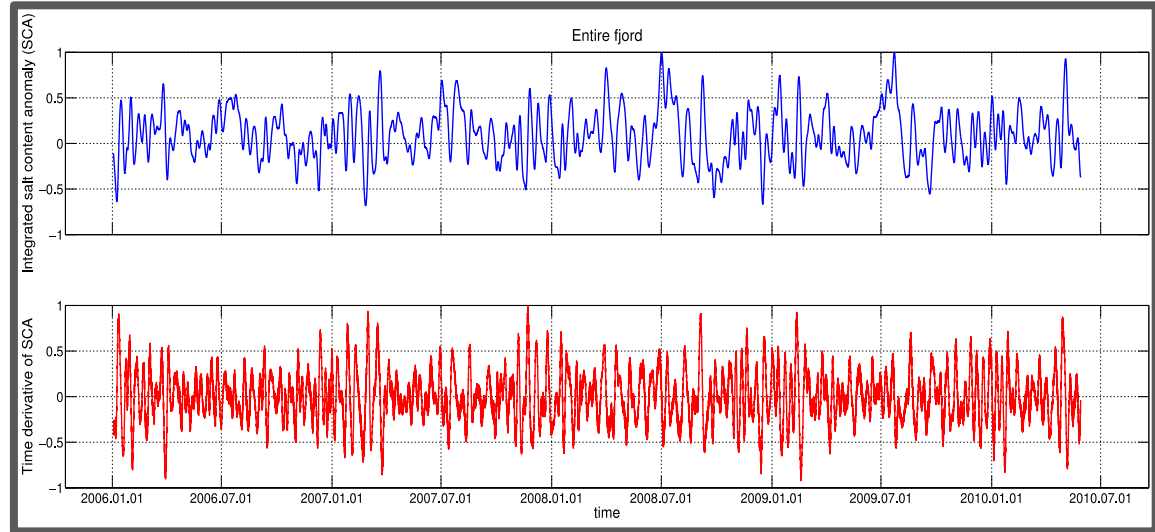
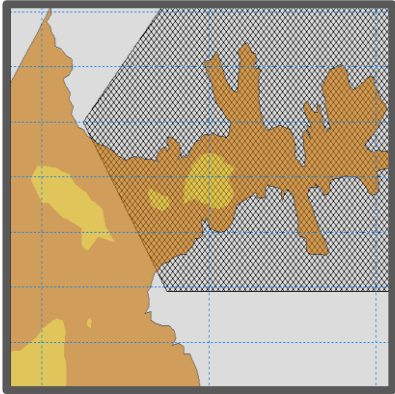


BREPOLEN

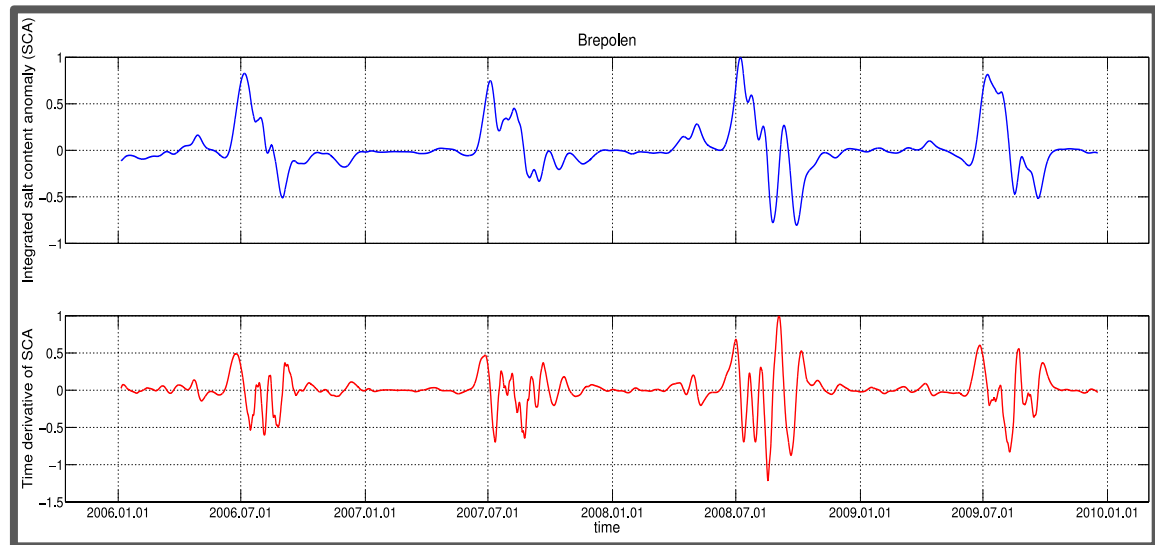
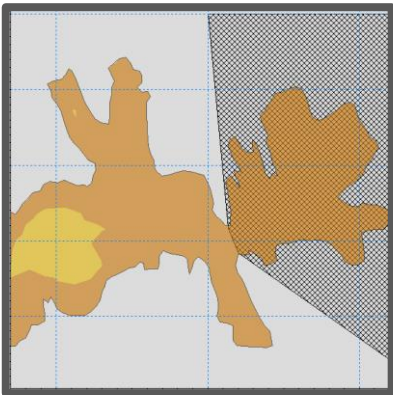


KRÓTKOOKRESOWA ZMIENNOŚĆ

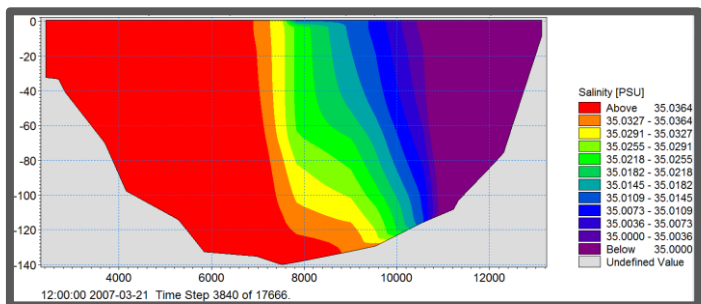
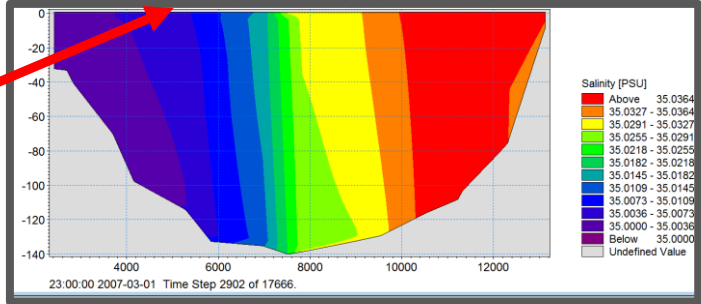
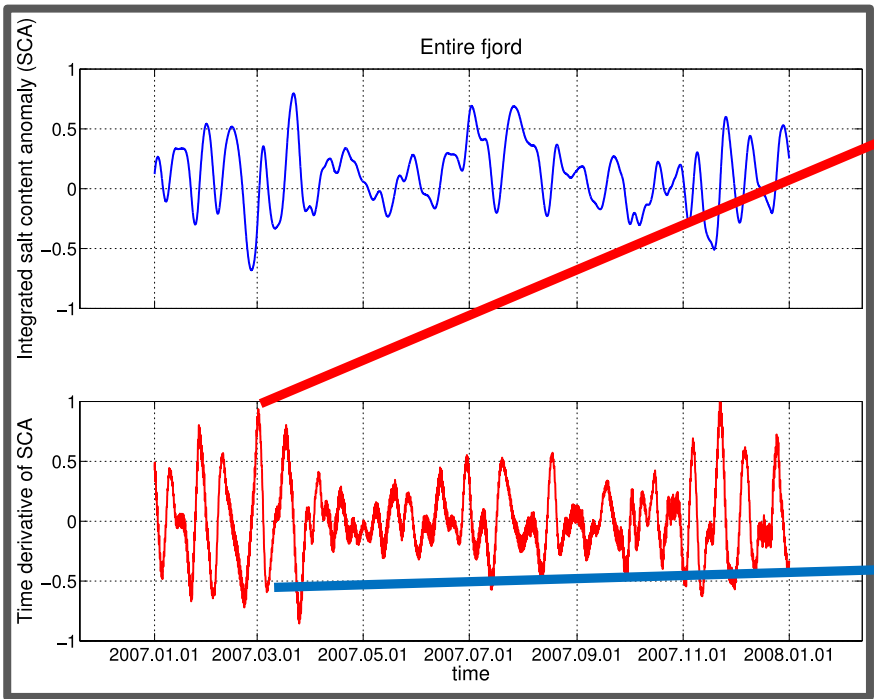
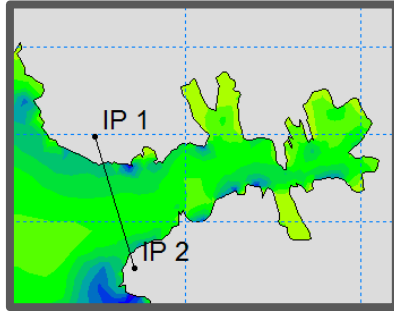
FJORD HORNSUND



BREPOLEN

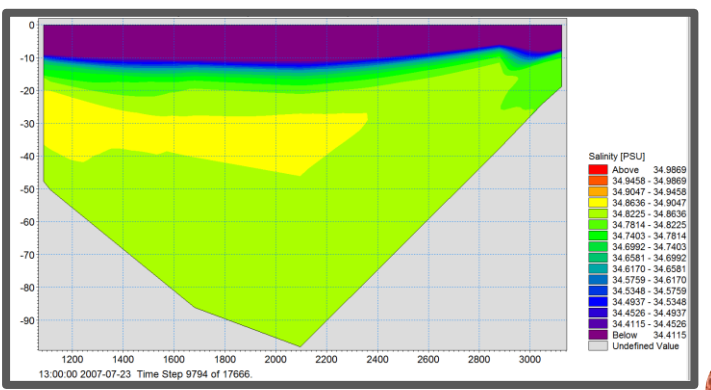
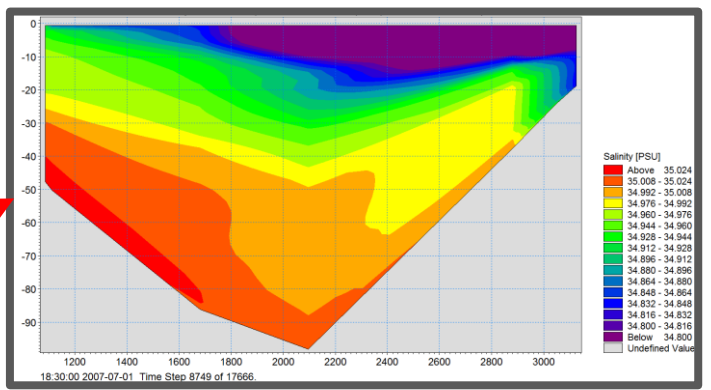
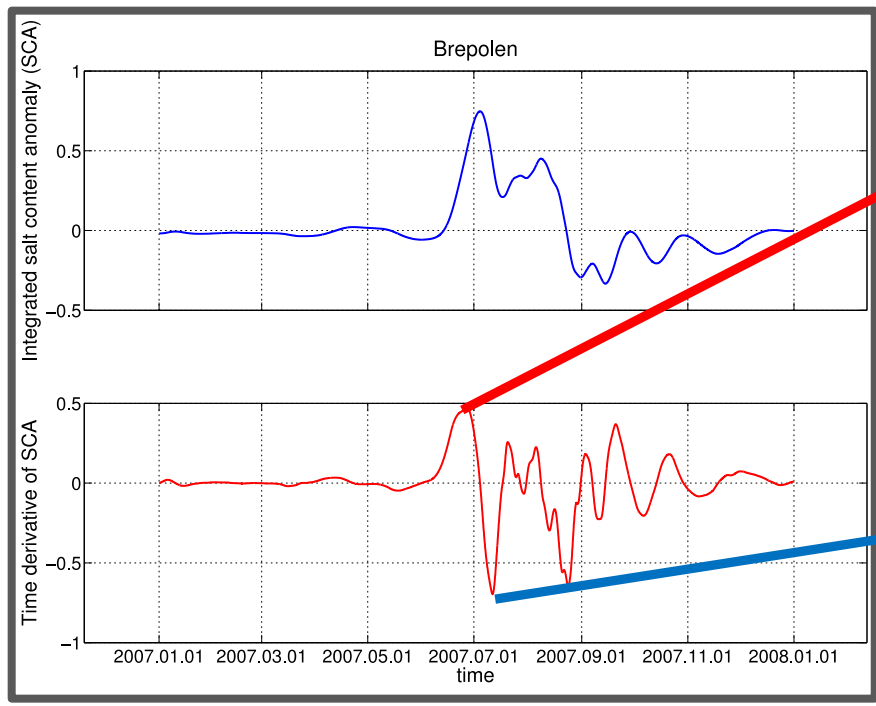
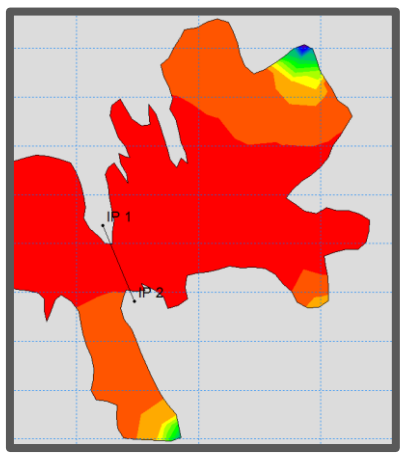


FJORD HORNSUND



KRÓTKOOKRESOWA ZMIENNOŚĆ

BREPOLEN



PODSUMOWANIE:

- model został zaimplementowany i zwalidowany (na podstawie niewielkiej ilości dostępnych pomiarów)
- zmienność sezonowa jest odzwierciedlona poprawnie
- wyniki pozwalają na ocenę w skali średniej stanu fizycznego fiordu
- poza zmianami sezonowymi fiord jest pod wpływem niewielkich oscylacji zmian zasolenia (wynikających prawdopodobnie z mieszania się wód WSC z SC)
- Cyrkulacja w Brepolen jest bardzo stabilna a dopływ wód słonych i ciepłych w skali krótkookresowej występuje wyłącznie latem pod wpływem tworzenia się cyrkulacji estuariowej

