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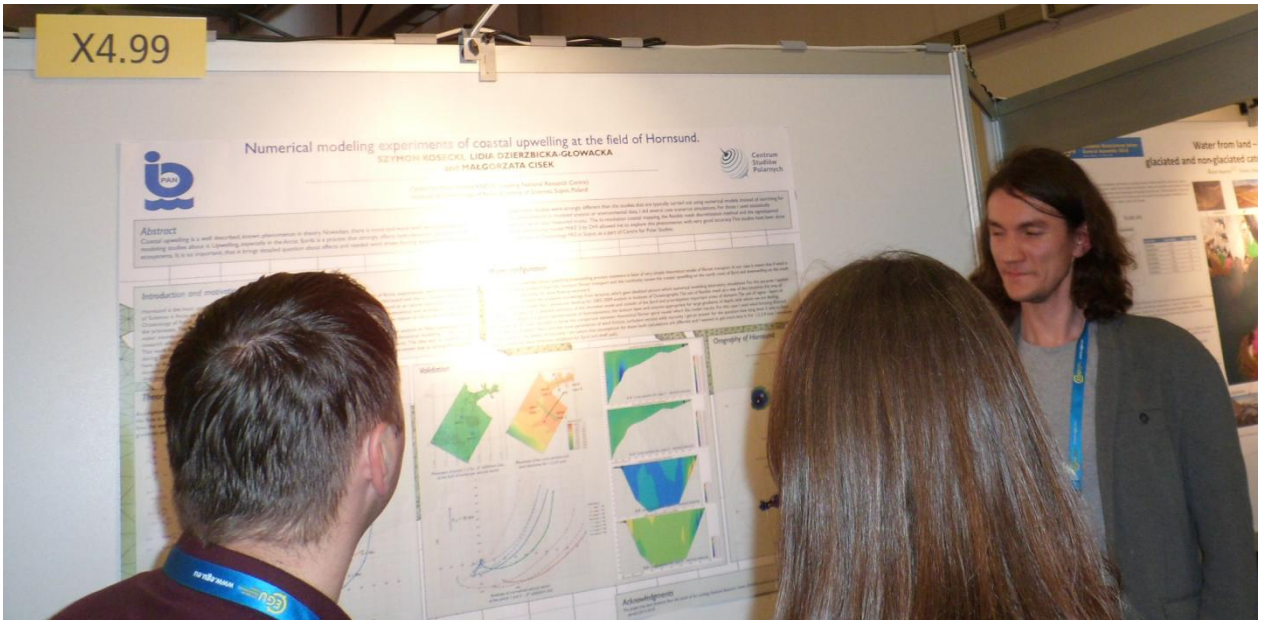
Report from EGU Vienna Conference

The EGU General Assembly 2016 took place in Vienna in 17–22 of April 2016. It was a great pleasure and valuable scientific experience to participate in such large conference. I have been an main author of *Numerical modelling experiments of coastal upwelling at the field of Hornsund* poster and also co-author of *Modeling of water masses exchange between Brepolen and the main fjord in the Western Svalbard fjord – Hornsund.* That conference gave me a great opportunity to establish collaborations with scientists involved in polar research.



The EGU General Assembly 2016 was again a great success with 4,863 oral, 10,320 poster, and 947 PICO presentations. 619 unique scientific sessions together with 321 side events created an interesting programme. At the conference 13,650 scientists from 109 countries participated.

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Numerical modeling experiments of coastal upwelling at the field of Hornsund.

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Abstract

Coastal upwelling is a well described, known phenomenon in theory. Nowadays, there is more and more both environmental and modeling studies about it. Upwelling, especially in the Arctic fjords is a process that strongly affects hydrodynamics and even more ecosystems. It is so important, that it brings detailed question about effects and needed wind driven forcing parameters. My modeling experiment studies were strongly different than the studies that are typically carried out using numerical models. Instead of searching for this phenomenon in modeled analysis or environmental data, I did several case scenarios simulations. For those I used statistically selected wind data measured in-situ. The hi-resolution coastal mapping, the flexible mesh discretization method and the sigma-layered three-dimensional model MIKE 3 by DHI allowed me to explore this phenomenon with very good accuracy. This studies have been done in Institute of Oceanology PAS in Sopot, as a part of Centre for Polar Studies.

Introduction

Hornsund is the most southern fjord of the Svalbard archipelago. Currently this fjord is the main object of Arctic explorations witch Polish Academy of Sciences is focused on. The vertical water masses movement in fjords take a great ... Because of the obvios - very important role of the credibility of data taken to modelling - I have to do and it still takes a lot of time to get for in the mean time I get an inspiration from the academic lectures to find out this academical theory to be true! time. This work has been done additionally beside my main aim of my PhD thesis. The idea was to confirm in the numerical modeling laboratory the thesis of the coastal upwelling appears and plays significant role in environment due to constant direction of wind driving forcing.

Model configuration

The use of flexible mesh as a way of discretization the area of integration allowed for a detailed summary of the shoreline inside and outside of the fjord and prioryzation important areas of domains.
The use of sigma - layers of stratification allows us a good representation of hydrodynamics the bottom layer and ensures appropriate for large gradients of depth, with whom we are dealing.

Theory - Ekman Spiral model

Assumptions (Massel 2010):
the flow is stable, fluid is barotropic, there is no geostrofic flow, the water is an ideal fluid, there are no pressure gradients on the surface, infinitely deep ocean.

Basic flow equation:

-Coriolis parameter: $f = 2\eta \sin\varphi = 0.0001421$ [rad/s]
Tangent wind pressure: $= 0.17$ [N/m²]

Calculations:

φ	=77.00	°
$V10$	=10.00	m/s
A_z	=0.05	m²/s
α	=1.20	kg/m³
ρ_w	=1028.00	kg/m³
Ω	=7.2950E-05	rad/s
C_D	=0.00140	-

Validation – upwelling?

Placement of the cross-sections and [illegible]

Orography of Hornsund

Acknowledgements

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