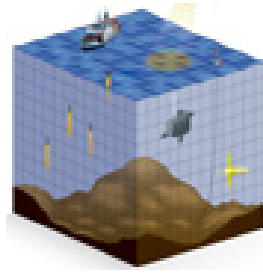


Joint ECMWF/OceanPredict workshop on Advances in Ocean Data Assimilation



Contribution ID: 29

Type: **Poster presentation**

Developing the NEMOVAR ocean data assimilation system towards Graphical Processing Unit based High Performance Computing systems

Graphical Processing Units (GPUs) are increasingly being used in compute intensive non-graphical applications due to their large performance potential in tasks that can be made highly parallel and are bound by memory bandwidth; and potentially improved power efficiency for appropriate workloads.

During a series of hackathons we are porting key sections of the ocean data assimilation code NEMOVAR to run on GPUs, focussing first on the diffusion operator that is used to model background error covariances. Key challenges are identifying the highly parallel sections of the code and inserting directives to run them on a GPU; and managing the transfer of data between the physically and logically separate GPU and main memory systems.

We present an overview of our approaches, which have included the use of explicit vs compiler managed data transfers, and the potential for the PSyclone code-generation and translation system to automatically insert the required directives. The most compute intensive sections of the diffusion operator have been run on GPU but good performance will only be achieved by getting a larger region of the diffusion operator 'resident' on the GPU to reduce the repeated transfers of data between the two memory systems. We'll show some initial findings about the performance potential of the system on GPU based on the work so far, and give an overview of the potential and challenges for a full port of NEMOVAR to GPU equipped systems.

Which theme does your abstract refer to?

Recent assimilation infrastructure developments (e.g. OOPS, JEDI, future HPCs, etc)

Primary author: PRICE, Martin (Met Office)

Co-authors: PIACENTINI, Andrea (CERFACS); PORTER, Andrew (Science and Technology Facilities Council Hartree Centre); WEAVER, Anthony (CERFACS); CARNEIRO, Davi (Met Office); Dr CASE, David (National Centre for Atmospheric Science); NORTON, David (The Portland Group / Nvidia); CHRUST, Marcin (ECMWF); MARTIN, Matthew (Met Office); Mr GAUDIN, Wayne (Nvidia)

Presenter: PRICE, Martin (Met Office)

Session Classification: Poster session 1

Track Classification: Recent assimilation infrastructure developments