HIGH RESOLUTION HYDRODINAMIC FORECAST SYSTEM – IMPLEMENTATION AND PRELIMINARY VALIDATION

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INTRODUCTION

The design, implementation and preliminary validation of a Brazilian southeast coast hydrodynamic forecast system based on Delft-FLOW model is presented.

This system has been developed in order to reproduce hydrodynamic of coastal and estuarine systems from Guanabara bay to São Sebastião channel including the complex circulation around the islands. The main goal is to provide current and tide forecast for operations on Oil Terminal regions: TEBAR (Almirante Barroso), TEBIG (Ilha Grande) and TABG (Guanabara Bay). These terminals are located along southeast Brazilian coast, from Ilha Bela (São Paulo) to Cabo Frio (Rio de Janeiro).
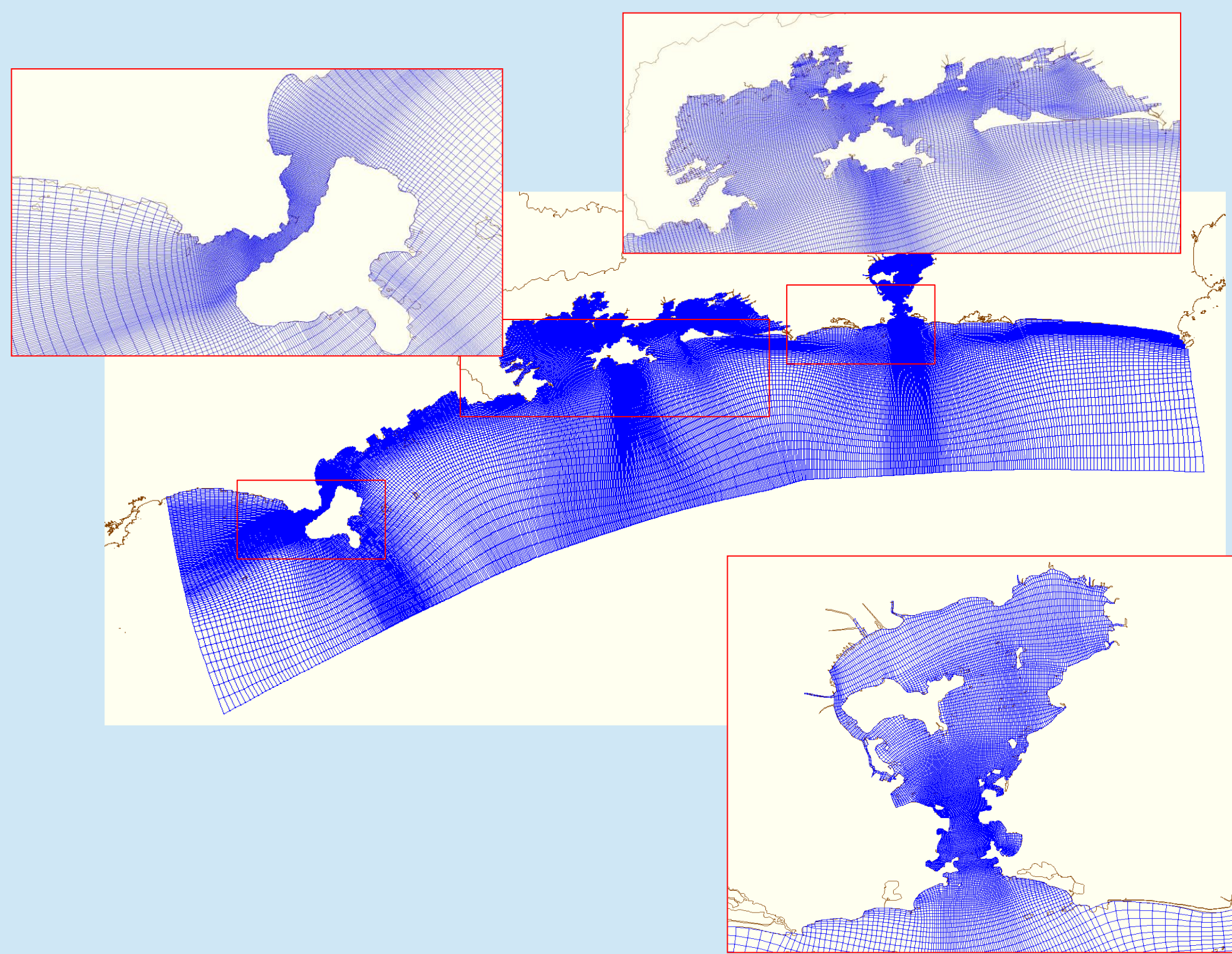
GRID AND BATHYMETRY

The horizontal resolution grid has 671x260 elements ranging from 80 meters inside bays to 2000 meters offshore, near the shelf break. The vertical column is divided in 10 sigma layers.

Bathymetry has been built from a mixed of ETOPO1 and Nautical Charts digitalized.
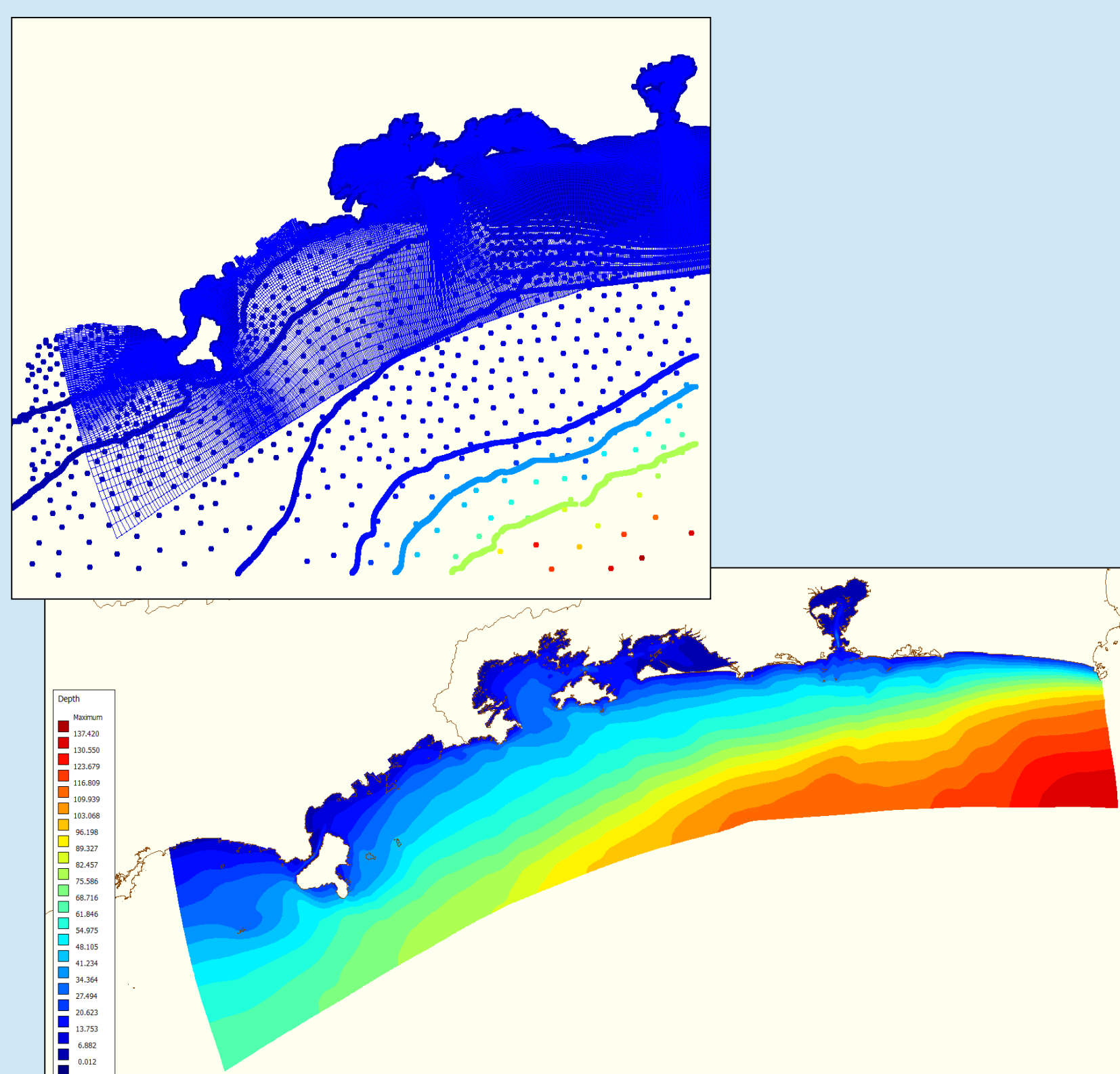
Atmospheric forcings on free surface, wind and sea level pressure, was setup through operational runs with COSMO from INMET, available with 7 Km of horizontal resolution. Currents and level boundary conditions were assembled with HYCOM/REMO and TPX8 harmonic tides by Riemann techniques.

SURFACE CURRENT COMPARISONS

For the validation, a hindcast for the period between August and November 2016 was run and the harmonic constants and tide reconstruction at different points along the coast were used to compare tide amplitudes and phases. The model current circulation was analyzed based on a horizontal current profiler, obtained from PETROBRAS near TEBAR, and four buoy current series on Rio de Janeiro area, one from PNBOIA project (buoy BG), and three from SimCosta project (buoy RJ1, RJ2 and RJ3).
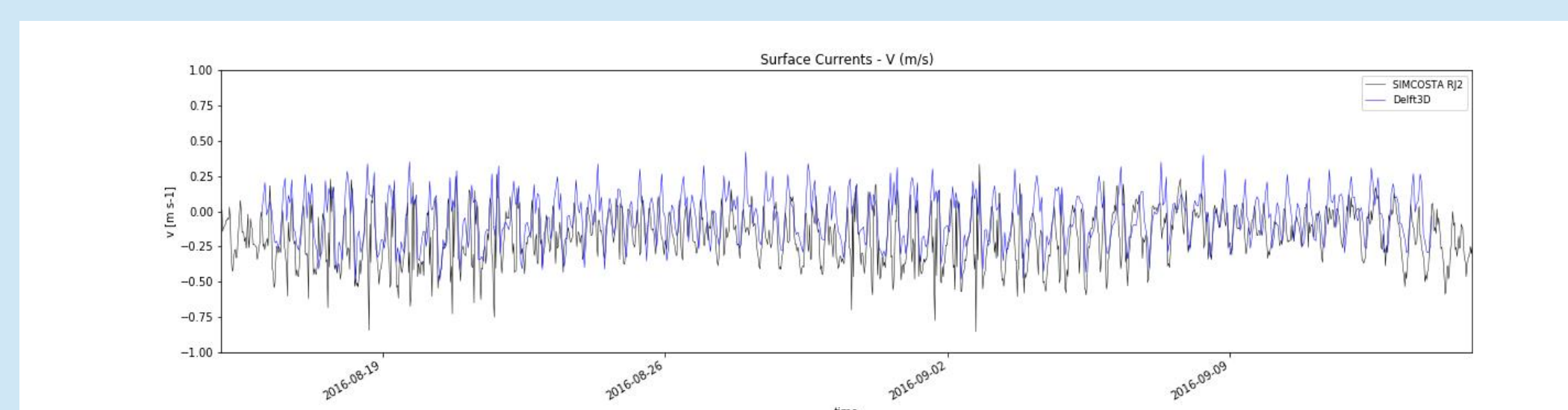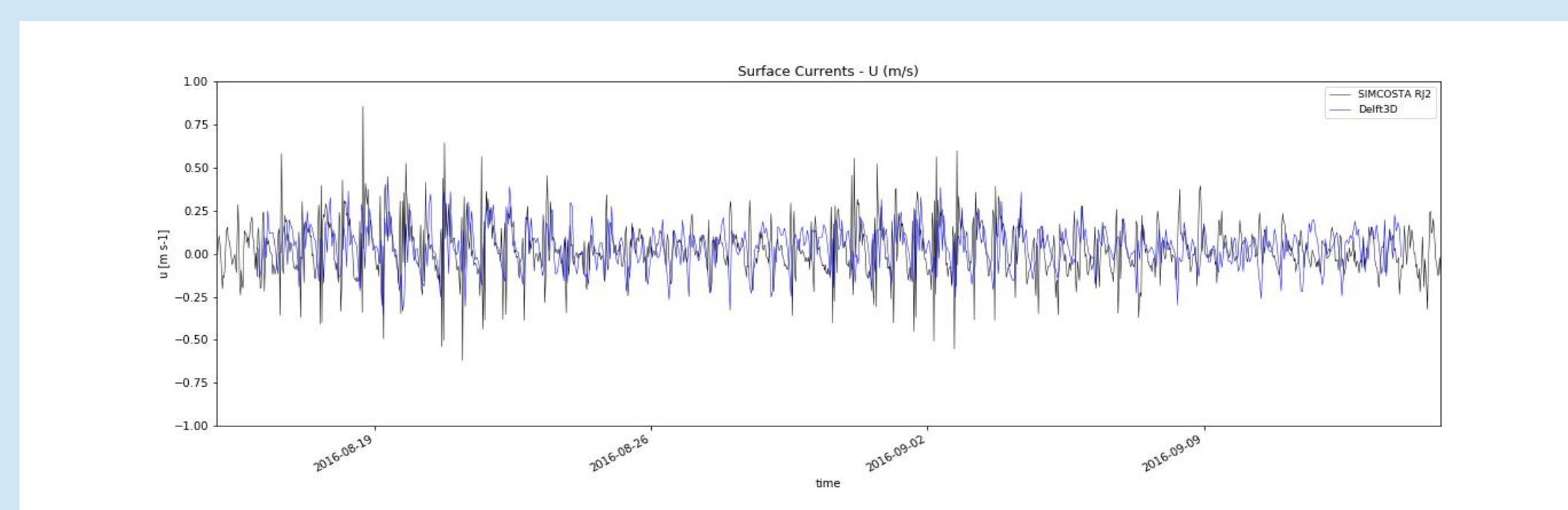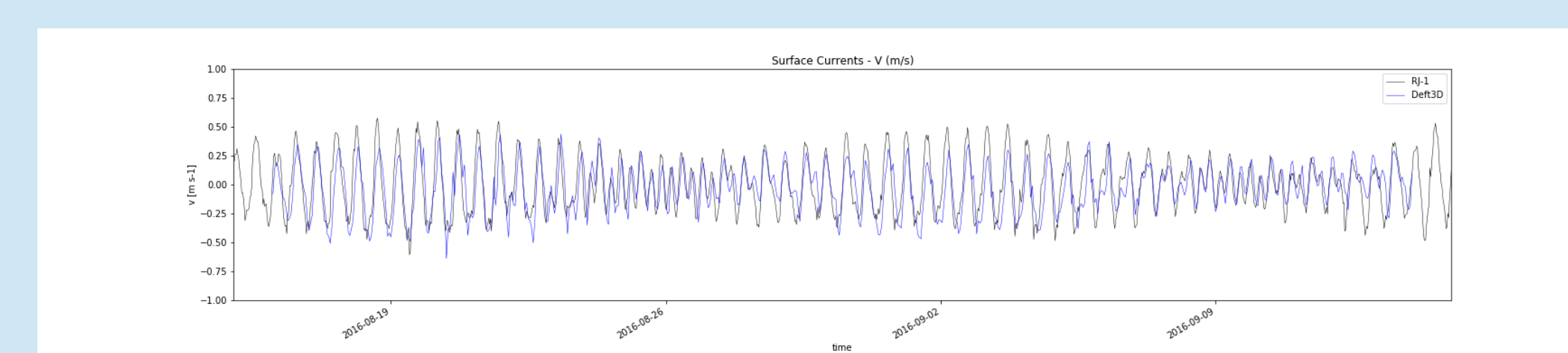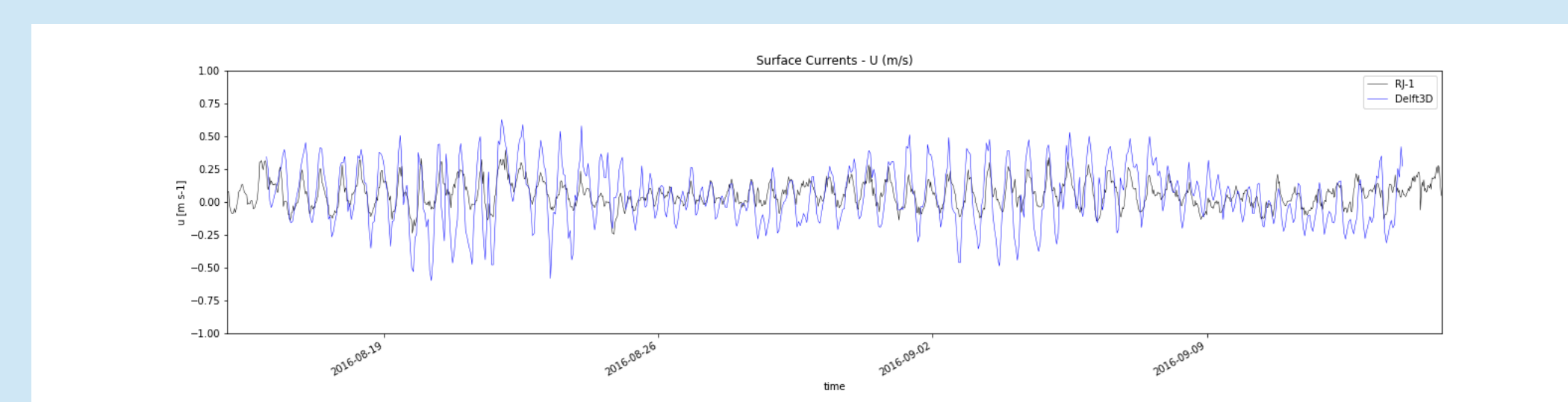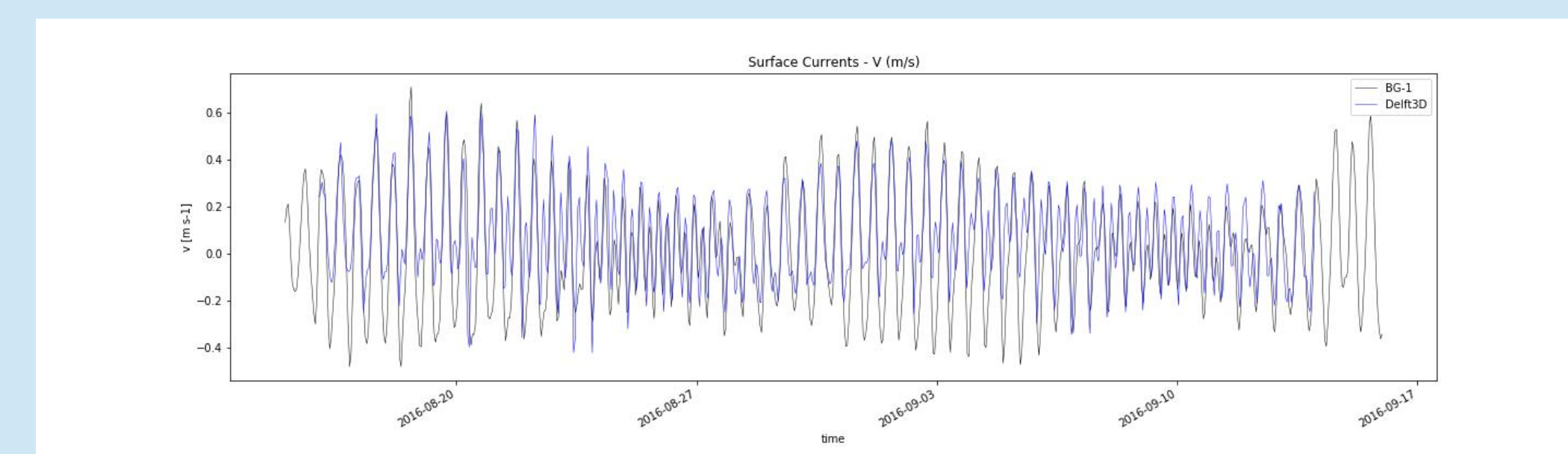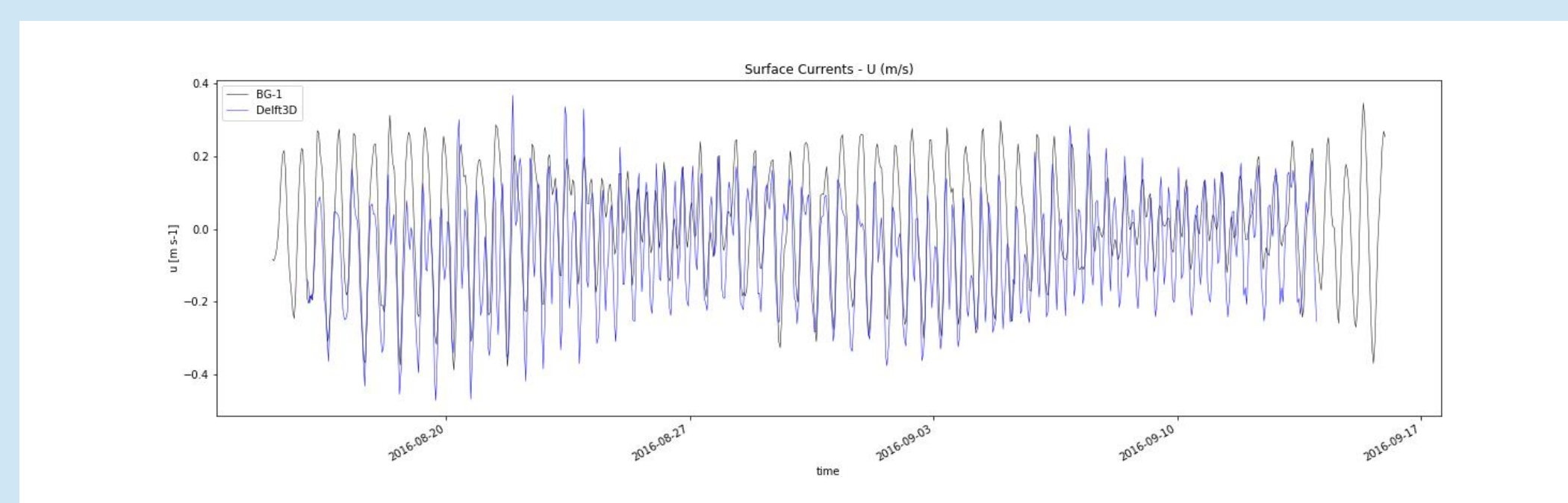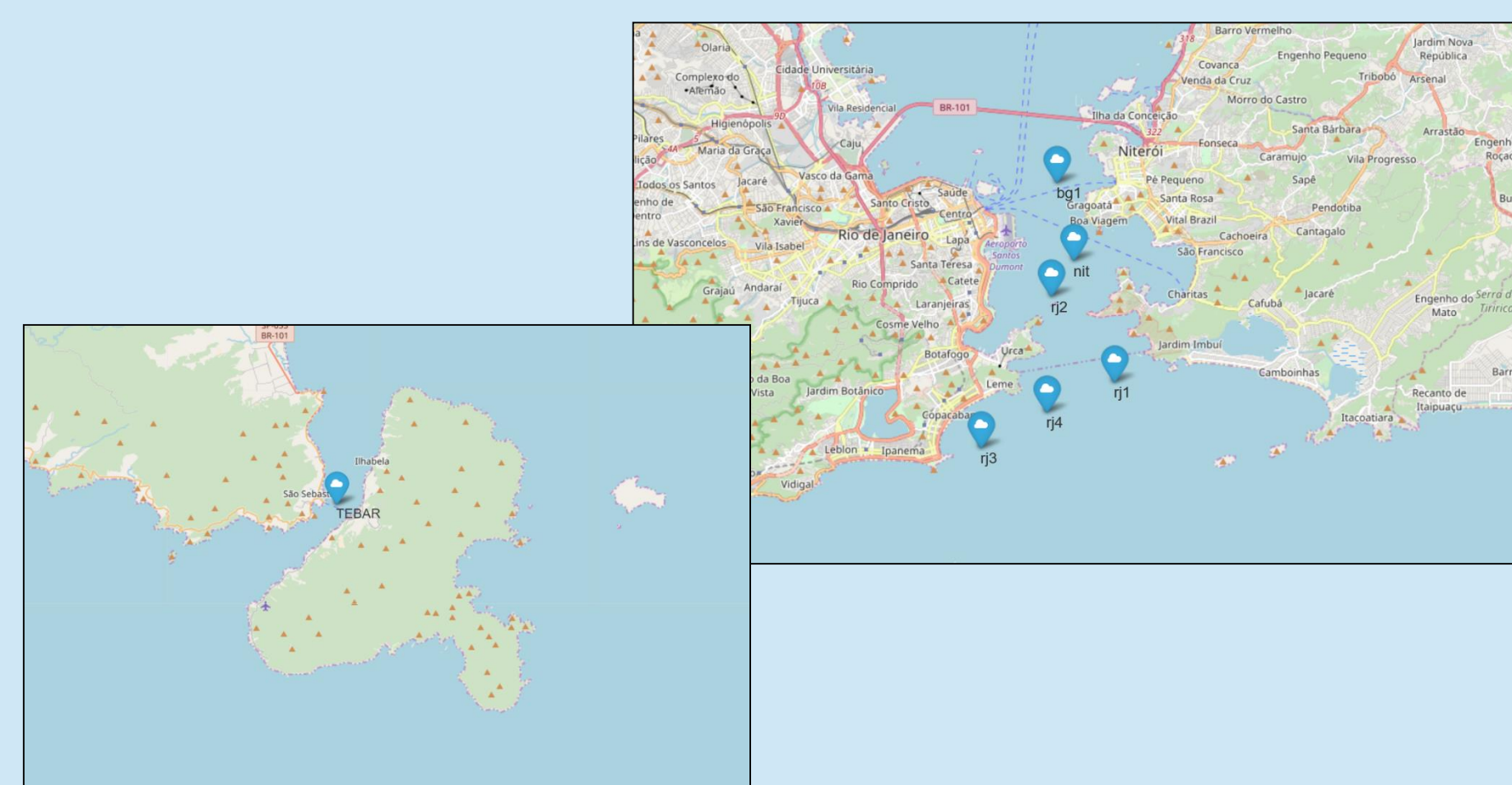
TIDE COMPARISONS

Tide amplitude an phases has very well accuracy levels at many different points along coast and currents velocities time series showed satisfactory skills in comparison with data buoy measures.
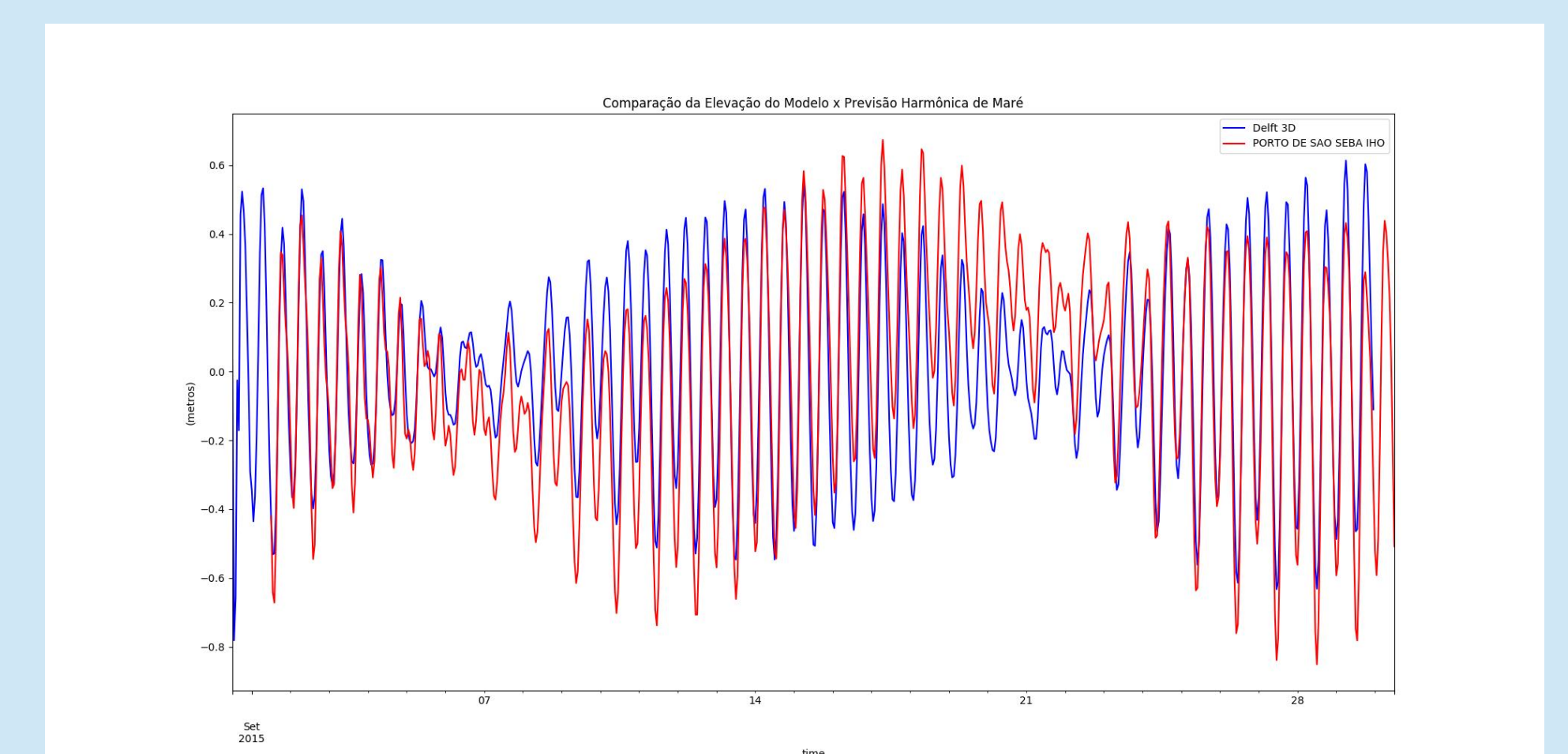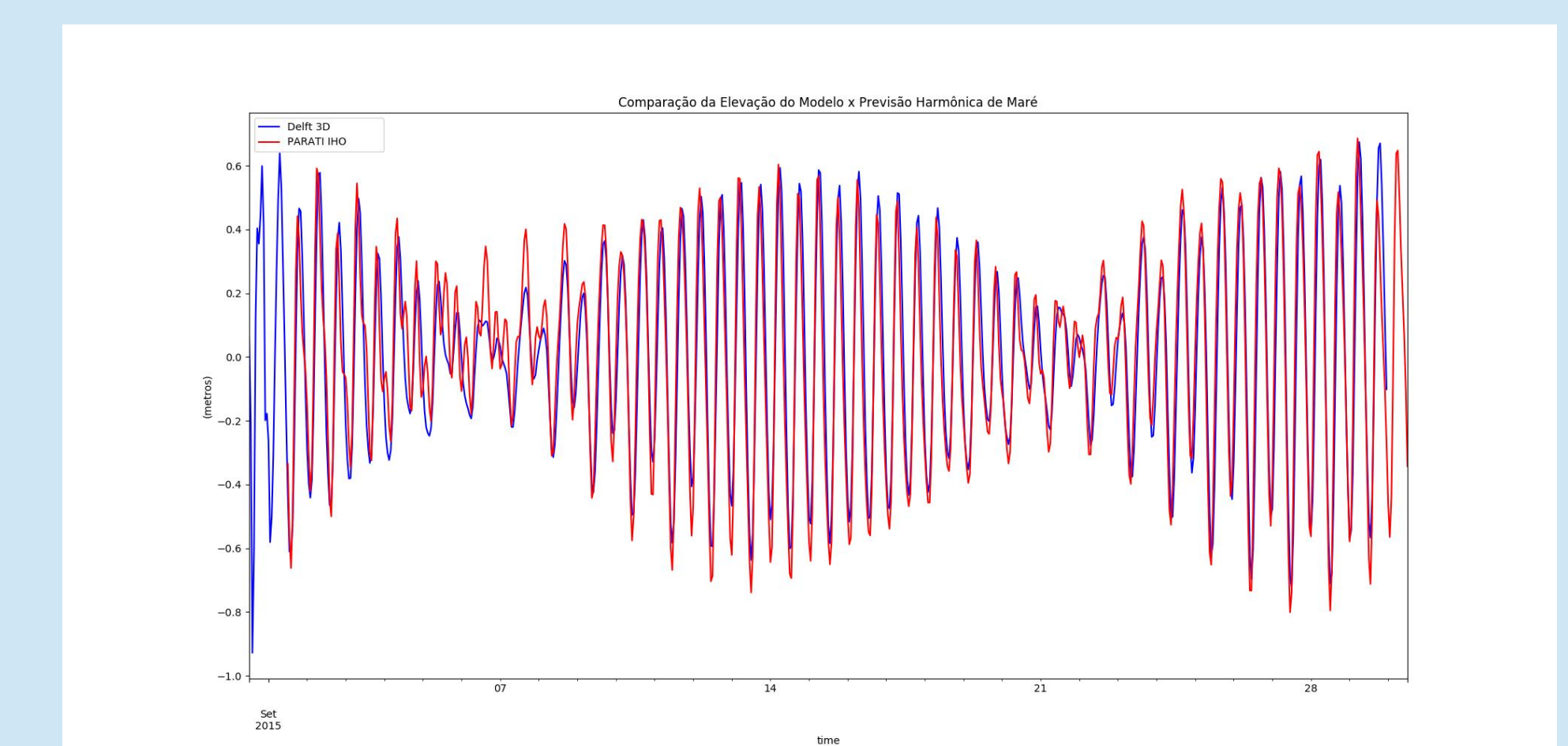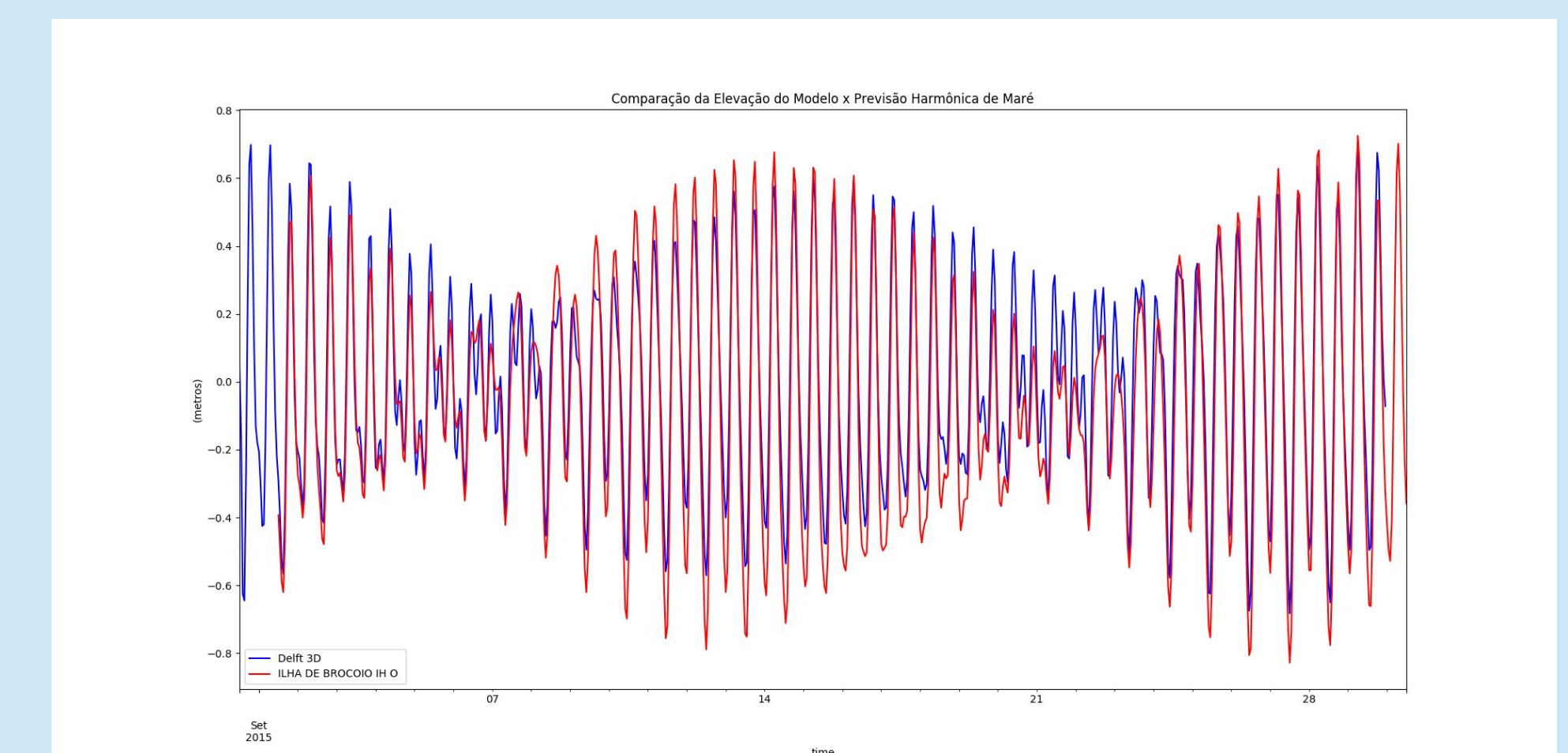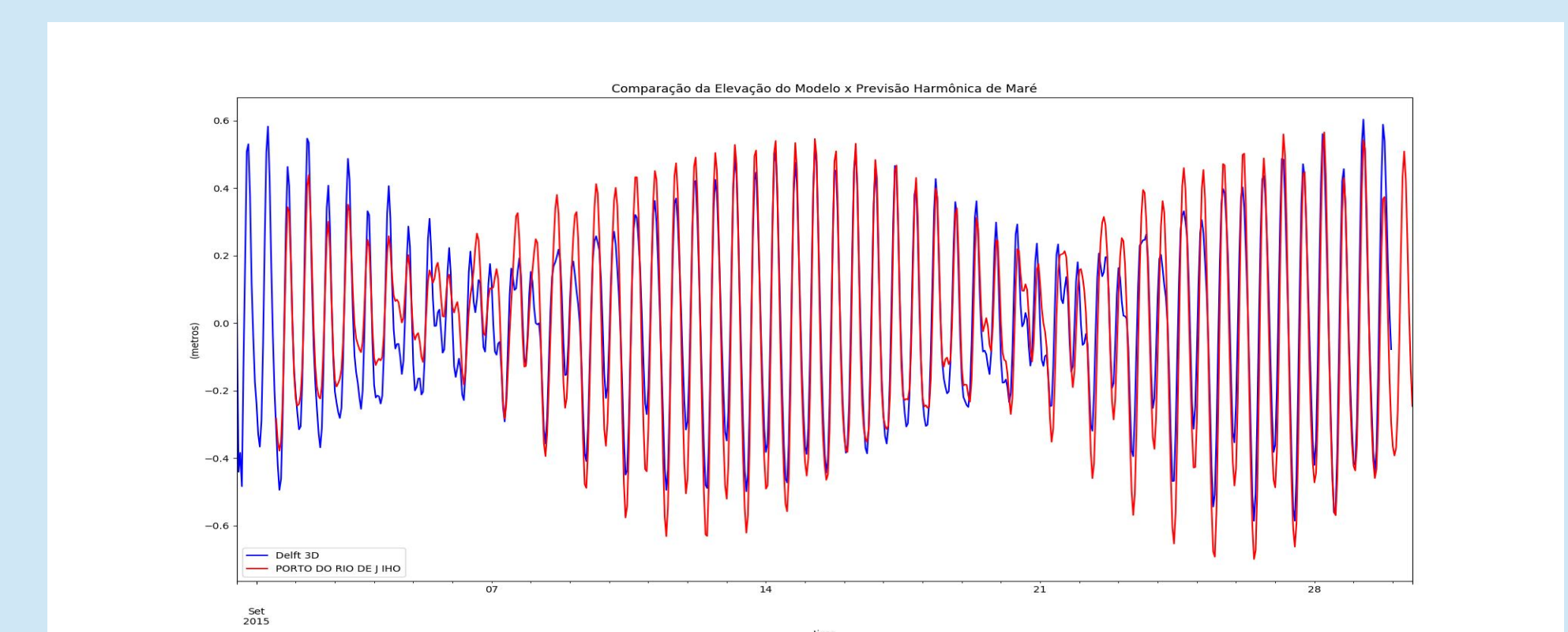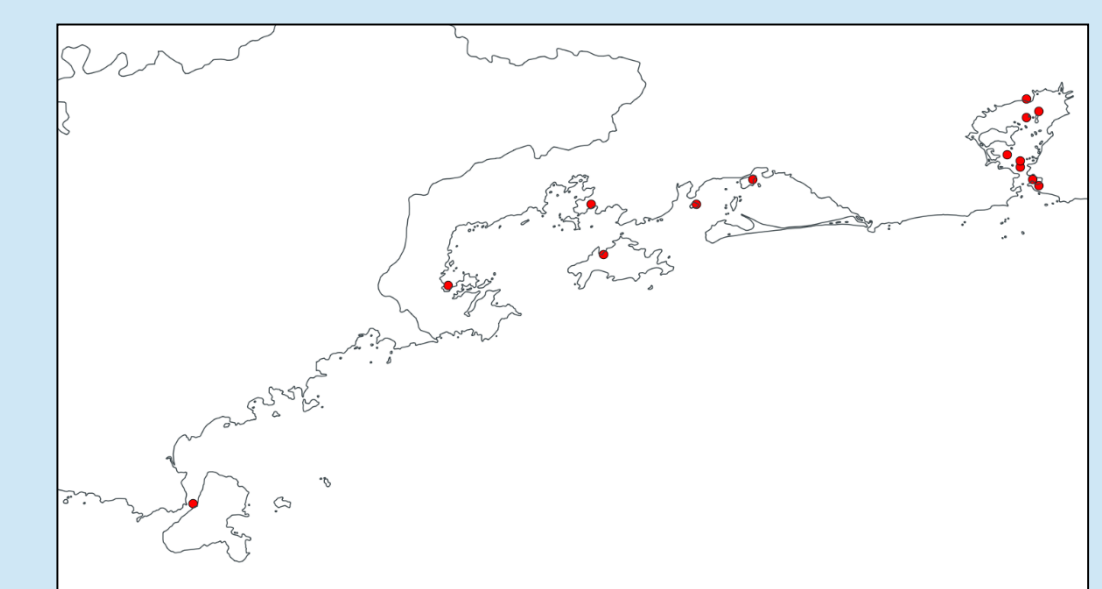
COMMENTS

The results presented for the hindcast validation period demonstrated that the physical processes were represented effectively in different scales. Eventually, this system is enabled for operational planning and coastal emergency contingencies.

Referências Bibliográficas:

DELTARES. (2014a). Delft3D. Functional Specifications. *User Manual*, Deltares, Delft, The Netherlands, 48p.
DELTARES. (2014b). Delft3D-FLOW. Simulation of multi-dimensional hydrodynamics flows and transport phenomena, including sediments. *User Manual*, Deltares, Delft, The Netherlands, 652p.