



## 1. Research activity (max 1.000 words)

The aim of my research activity is the development of numerical models which simulate subduction zones dynamics and its relation with mantle circulation, using 2D and 3D, plane and spherical models.

Although several authors investigated subduction zones dynamics and mantle circulation through numerical modelling tools (e.g., Gerya et al., 2008; Tackley, 2000; Steinberger et al., 2012; Becker, 2017, etc.). The starting point for my research was the lack of literature including three of the main kinematic and geophysical constraints for subduction dynamics:

- 1) a global westward drift of the lithosphere, which generates an eastward motion of the mantle below.
- 2) the subduction hinge motion, that allows estimation of the effective velocity with which the lithosphere enters within the mantle.
- 3) a Low Velocity Zone

During my PhD I firstly worked on 2D numerical models on a plane geometry, with the objective of studying the interaction between a horizontal mantle circulation and the dip of a subducting slab, having the same or opposite direction with respect to it. In the last part of my PhD I made a global kinematic analysis and an estimation of the lithospheric volumes currently subducting worldwide. Data obtained from these analysis were used as input for a 2D numerical model (both in plane and spherical geometries) to investigate the global mantle circulation pattern under the influence of plate tectonics.

## 2. Research products

- a) Published paper:

Ficini, E., Dal Zilio, L., Doglioni, C. and Gerya, T.V. Horizontal Mantle Flow Controls Subduction Dynamics. *Sci. Rep.* **7** (2017).

b) Manuscripts (submitted, in press):

Ficini, E., Cuffaro, M., Doglioni, C. Asymmetric mantle convection: clues from lithosphere sinking at subduction zones.

c) Abstracts:

- European Geoscientist Union General Assembly - Wien 2016, "Numerical Modelling of Subduction Zones: a New Beginning" Eleonora Ficini, Luca Dal Zilio, Carlo Doglioni, and Taras V. Gerya, *poster presentation*.
- 35th International Geological Congress, Cape Town 2016, "Numerical Modelling of Subduction Zones: a New Beginning" Eleonora Ficini, Luca Dal Zilio, Carlo Doglioni, and Taras V. Gerya, *poster presentation*.
- 35th International Geological Congress, Cape Town 2016, "Astronomically Tuned Mantle Convection" Eleonora Ficini, Carlo Doglioni, Ferran Garcia Gonzales, *poster presentation*.
- 88° Congresso della Società Geologica Italiana, Naples 2016, "Subduction Cycle and Mantle Convection: Clues from Lithosphere Sinking at Subduction Zones", *winner of the best poster of session S9 award - Input and output in subduction settings: chemical and geodynamics implications, poster presentation*.
- JpGU-AGU Joint Meeting - 2 *oral presentations*, Chiba, Japan.
- Workshop "Crust to Core" - *oral presentation*, Omishima Island, Japan.
- Workshop "Numerical modelling of the Lithosphere and Mantle Dynamics", *poster presentation*, Putten, The Netherlands.