

## Final project report

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| <i>Project ID</i>             | 2004/6.03   |
| <i>Title</i>                  | CLIVA (CLImatic trends of stratospheric Vortex in Antarctica) |
| <i>Principal investigator</i> | Di Donfrancesco Guido   |
| <i>Institution</i>            | ENEA-CLIMOSS  |
| <i>Email</i>                  | guido.didonfrancesco@enea.it                                  |
| <i>Duration</i>               | 3 years   |
| <i>Assigned funding</i>       | 60.000,00 Euro  |

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### Activities and results

CLIVA proposal aims to perform a climatological analysis of Antarctic Polar Vortex (APV) dynamics and structure on the last decade, and of its relation to the ozone hole phenomenon, to quantify the contributions of natural forcing as QBO, Solar cycle, ENSO and volcanic eruptions, and to evaluate the feedback between polar ozone depletion and global change.

The main activities of the project could be summarized in:

- 1) A critical review of all the available data from ground-based, balloon-borne and satellite-borne instruments suitable for a characterization of the APV.
- 2) Decadal characterization of the APV structure and its mixing properties by means of the PDFs (Probability Density Functions) of a passive tracer (N<sub>2</sub>O) as function of the potential temperature
- 3) A study of the interactions between polar and mid-latitude O<sub>3</sub> and between polar stratosphere and troposphere.
- 4) A comparisons between the climatological data base obtained with models and a purely observational climatology of polar stratospheric clouds and aerosols for a cross-evaluation of both the data bases.

The main results obtained are:

- 1) A characterization of dynamical barriers in the polar stratosphere by means of statistical diagnostics based of PDFs of N<sub>2</sub>O tracer;
  - 2) A statistical comparison between CCM model outputs of polar stratospheric clouds and a database of PSCs measurements taken above McMurdo station.
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### Products

#### A – papers in scientific magazines

1. Palazzi, E., F. Fieri , S. Bekki , F. Cairo , G. Di Donfrancesco: Statistical diagnostics for the characterization of dynamical barriers in the stratosphere, submitted to Journal of Geophysical Research - Atmosphere, 2009.
2. Palazzi, E. , F. Fierli, F. Cairo, C. Cagnazzo, G. Di Donfrancesco, E. Manzini, F. Ravegnani, C. Schiller, F. D'Amato, C. M. Volk: Diagnostics of the Tropical Tropopause Layer from in-situ observations and CCM data, Atmos. Chem. Phys. Discuss., 9, 11659-11698, 2009.

## Programma Nazionale di Ricerche in Antartide (PNRA)

### B – book chapters

### C - proceedings of international conferences

1. Palazzi, E., F. Fierli, S. Bekki, G. Stiller, J. Urban, F. Cairo, and G. Di Donfrancesco: Diagnosing the permeabilità of dynamical barriers in the stratosphere from satellite observations of long-lived tracers, ESA Atmos. Sci. Conf., BCN, 7-11 Settembre 2009.
2. Palazzi, E., L. Di Liberto, G. Di Donfrancesco, F. Cairo, F. Fieri: Variabilità e cambiamenti climatici della dinamica in stratosfera: il progetto CLIVA; Convegno Environment, Including Global Ch'ange - CINFAI, Palermo, 5-9 Ottobre 2009
3. Palazzi, E., L. Di Liberto, G. Di Donfrancesco, F. Cairo, F. Fieri: Ozone and Polar Stratospheric Clouds long-term diagnostics; European Geosciences Union General Assembly 2010, Vienna, Austria, 2 - 7 Maggio 2010.

### D – proceedings of national meetings and conferences

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### E – thematic maps

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### F – patents, prototypes and data bases

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### G – exhibits, organization of conferences, editing and similar

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### H - formation (PhD thesis, research fellowships, etc.)

1. Research fellowships, Dr. E. Palazzi

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## Research units

- ENEA G. Di Donfrancesco  
C. Scarchilli  
P. Ruti  
A. Dell'Aquila
- CNR F. Fierli  
F. Cairo  
L. Di Liberto  
M. Snels  
E. Palazzi
- INGV E. Manzini  
C. Cagnazzo

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**Date: 01/02/2010**

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### Notes