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FIRST ALPINE EVIDENCE OF *IN SITU* COARSE CRYOGENIC CAVE CARBONATES (CCC_{COARSE})

ABSTRACT: COLUCCI R.R., LUETSCHER M, FORTE E., GUGLIELMIN M., LENAZ D., PRINCIVALLE F. & VITA F., *First alpine evidence of in situ coarse cryogenic cave carbonates (CCC_{coarse}). (IT ISSN 0391-9839, 2017).*

A layer of coarse cryogenic cave carbonate (CCC_{coarse}) is documented within a subsurface ice outcrop (*in-situ*) in a cave of the Julian Alps (southeastern Alps). This original finding, representing the first alpine evidence of *in-situ* CCC_{coarse} and the first occurrence from the southern side of the Alps, provides a unique opportunity to better understand the processes associated with the formation of CCC_{coarse} with respect to the cave ice mass balance.

Here, we discuss first considerations on the shape and characteristics of CCC_{coarse} samples and their potential for palaeoclimate reconstructions in the southern Alps. In the light of accelerated climate change, we emphasize the need for scientific actions to exploit the available physical, chemical, isotopic and biological records from still untapped and fragile cryospheric archives such as ice caves.

KEY WORDS: cryogenic cave carbonates, paleoclimate, climate change, ice caves, Alps

RIASSUNTO: COLUCCI R.R., LUETSCHER M, FORTE E., GUGLIELMIN M., LENAZ D., PRINCIVALLE F. & VITA F., *Prima evidenza alpina di calcite criogenica grossolana in situ (CCC_{coarse}). (IT ISSN 0391-9839, 2017).*

In questo lavoro si documenta il ritrovamento di un deposito di calcite criogenica grossolana (CCC_{coarse}) trovato all'interno di una sezione di ghiaccio permanente (*in situ*) in una cavità delle Alpi Giulie (Alpi sudorientali).

Questo ritrovamento, che rappresenta la prima evidenza a livello alpino di CCC_{coarse} *in situ* oltre il primo ritrovamento per il versante meridionale delle Alpi, fornisce una importante opportunità per una migliore comprensione dei processi associati alla formazione della CCC_{coarse} in relazione al bilancio di massa di una grotta di ghiaccio. In questo lavoro si riportano alcune prime considerazioni sulla forma e le caratteristiche dei campioni di CCC_{coarse} ed il loro potenziale per una ricostruzione paleoclimatica nelle Alpi meridionali. In presenza di un cambio climatico accelerato, si vuole enfatizzare la necessità di azioni scientifiche atte a studiare i record fisici, chimici, isotopici e biologici di questi fragili ed ancora intatti archivi criosferici rappresentati dalle grotte di ghiaccio.

TERMINI CHIAVE: carbonato criogenico di grotta, paleoclima, cambiamento climatico, grotte di ghiaccio, Alpi.

INTRODUCTION

Ice caves are natural cavities in bedrock which contain perennial accumulations of ice (Perşoiu & Onac, 2012). Because cave ice is typically older than two years, ice

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RRC found the CCC_{coarse} deposits in the Leupa ice cave and wrote the manuscript together with ML. DL and FP performed X-ray diffractometer analyses. FV performed the electron microscope analysis. EF collected and analyzed the geophysical data and with MG participated in the discussion and revised the final version of the manuscript.