DRY ANDES RESEARCH

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FROM CRYOSPHERE TO ANTHROPOGENIC IMPACTS

primary data and environmental applications:
- summary of the Hungarian high altitude research activity in Chile
- research proposal for a permafrost and ELA monitoring network

WHY the Dry Andes (Puna de Atacama)?

WHY now?

WHY with us?

Past Research

Active layer monitoring: Antarctica, King George Island
Cave ice monitoring: European Alps, Carpathians, Dinaric mountains
Periglacial monitoring: Carpathians
Glacial geomorphological research: Greenland
Paleoenvironmental research: Alps, Carpathians, Dinaric mountains

Goals

Base research:

- the effects of climate change on the evolution of mountain environment
- exploring the dynamism of environment changes
- processes and importance of cryosphere changes
- network development
- database building
- exploration and explanation of regional differences

Applied research:

- exploration of mountain water base changes
- analysis of natural hazards
- exploration of changes in tourism potential

CHILE ATACAMA CRYOSPHERE PERMAFROST ACTIVE LAYER MONITORING EXTREME LIFE H2O

FIELD RESEARCH

LABORATORY ANALYSES

CRYOSPHERE RESEARCH

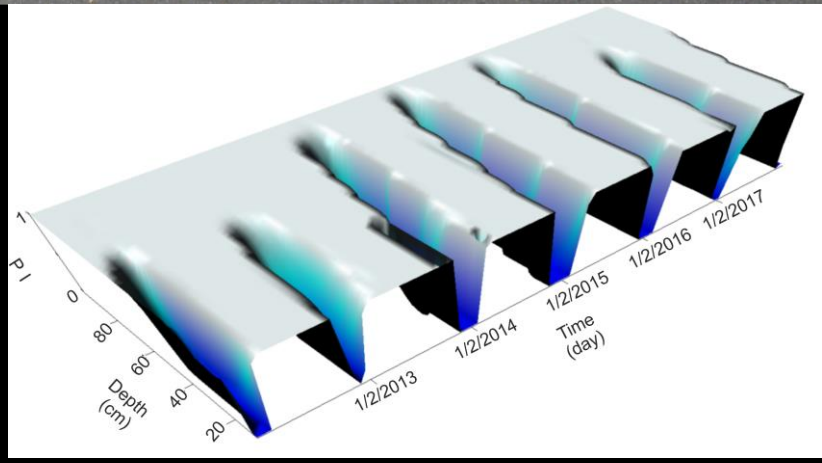
GEOMORPHOLOGY

MICROBIOLOGY + HYDROBIOLOGY

PLANETARY RESEARCH

HYDROGEOLOGY + SOIL RESEARCH

CRYOSPHERE RESEARCH

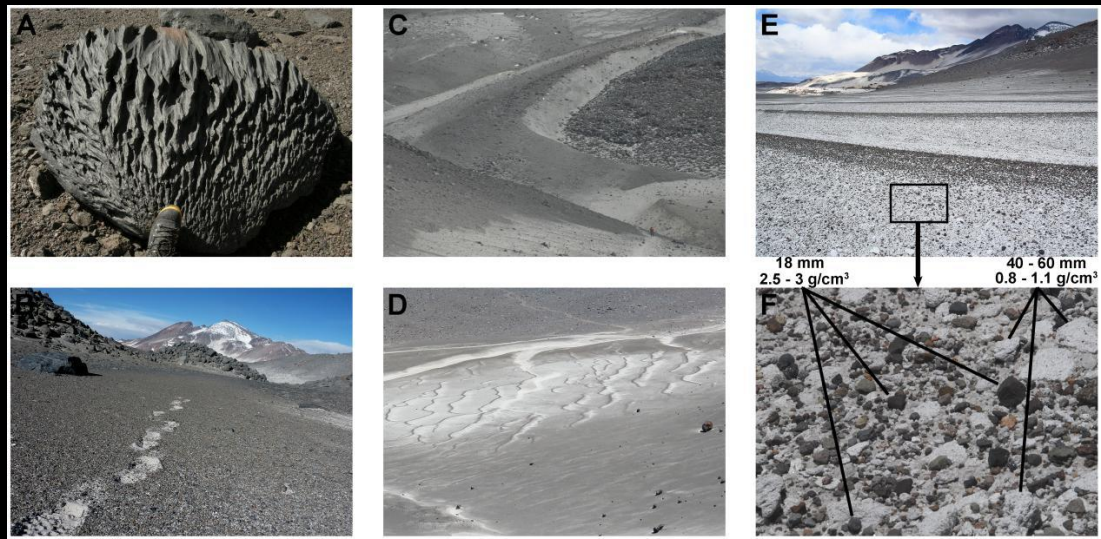


- the presence of ground ice
- processes of the active layer
- thermal regime of the active layer
- dynamism of permafrost degradation
- local meteorological conditions
- ice and water in the high mountain region – the origin of meltwater

GEOMORPHOLOGY

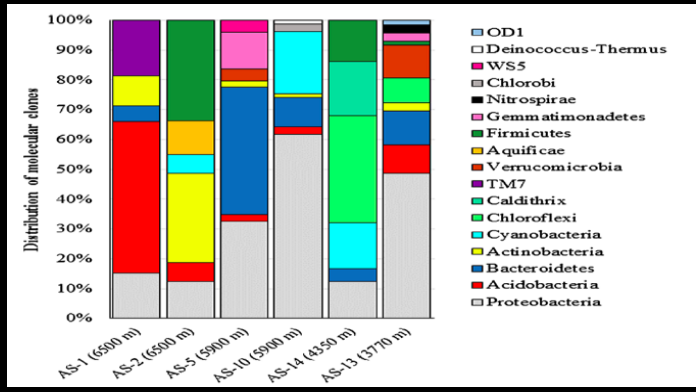
Surface evolution of the mountain desert:

- dating of past glaciations
- processes of periglacial environment
- aeolian activity



MICROBIOLOGY
+
HYDROBIOLOGY

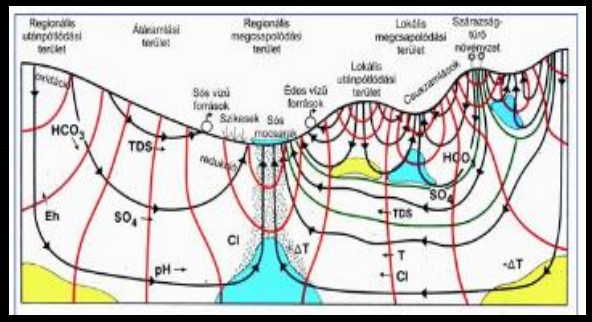
- permafrost degradation and phylogenetic, metabolic diversity of prokaryotes
- boundaries of adaptation
- risk management:
  biological background
- hydrobiological diversity



PLANETARY RESEARCH

- identifying Mars-analogue locations
- field analysis of Mars related surface processes
- development of autonomous instruments
- in-situ instrument tests

HYDROGEOLOGY
+
SOIL RESEARCH



- meltwater-changes and the elements of water-cycle
- groundwater and connected surface water resources
- sensitivity to changing climatic conditions and contamination
- prospective areas for water-well execution
- causes and background of flash floods

FIELD MONITORING NETWORK

active layer monitoring

permafrost monitoring

ELA (Equilibrium Line Altitude) monitoring

PermaChile+

- from the hyperarid Andes
  to the Patagonian oceanic wet Andes
- regional differences: different importance of processes
- representative locations
- highest altitude section for measurement

hyperarid: Llullaillaco area
arid: Ojos del Salado area
arid/semiarid transition: Huasco valley
semiarid: ?
…
…

FIELD MONITORING NETWORK *PermaChile+*

Field methods

active layer changes

location: stony tundra

- shallow ground temperature monitoring

permafrost changes

location: rock glaciers, stony tundra, slope processes

- SfM (Structure from Motion) – DEM – morphological changes
- geophysical methods
- ground temperature and water discharge monitoring

equlibrium line altitude changes

- DEM – photo-monitoring (actual snowline) – ELA changes

FIELD MONITORING NETWORK *PermaChile+*

Expected results

active layer changes

- active layer thickness changes
- phase changes dynamism
- water content changes
- degradation of permafrost table
- regional phase change model

permafrost changes

- dynamism of permafrost degradation
- water reserves changes

equlibrium line altitude changes

- dynamism of ELA-uplift
- glacier mass balance changes
- water reserves changes