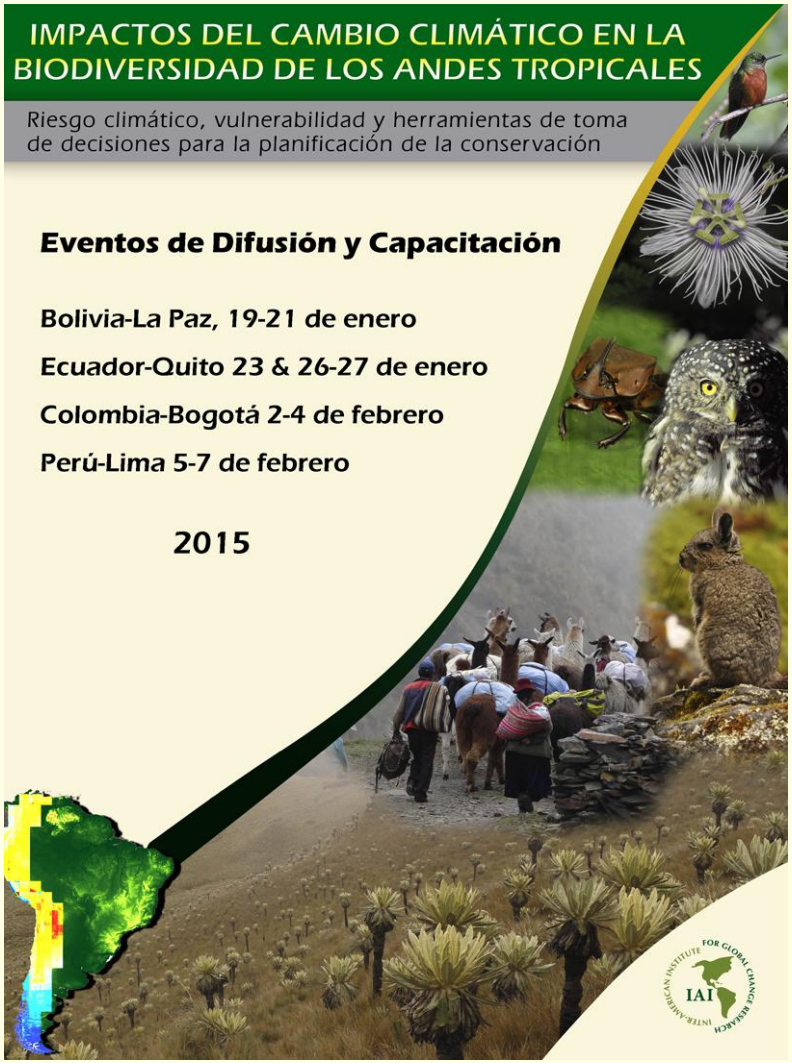
IMPACTOS DEL CAMBIO CLIMÁTICO EN LA BIODIVERSIDAD DE LOS ANDES TROPICALES
Riesgo climático, vulnerabilidad y herramientas de toma de decisiones para la planificación de la conservación
Eventos de Difusión y Capacitación
Bolivia-La Paz, 19-21 de enero
Ecuador-Quito 23 & 26-27 de enero
Colombia-Bogotá 2-4 de febrero
Perú-Lima 5-7 de febrero
2015

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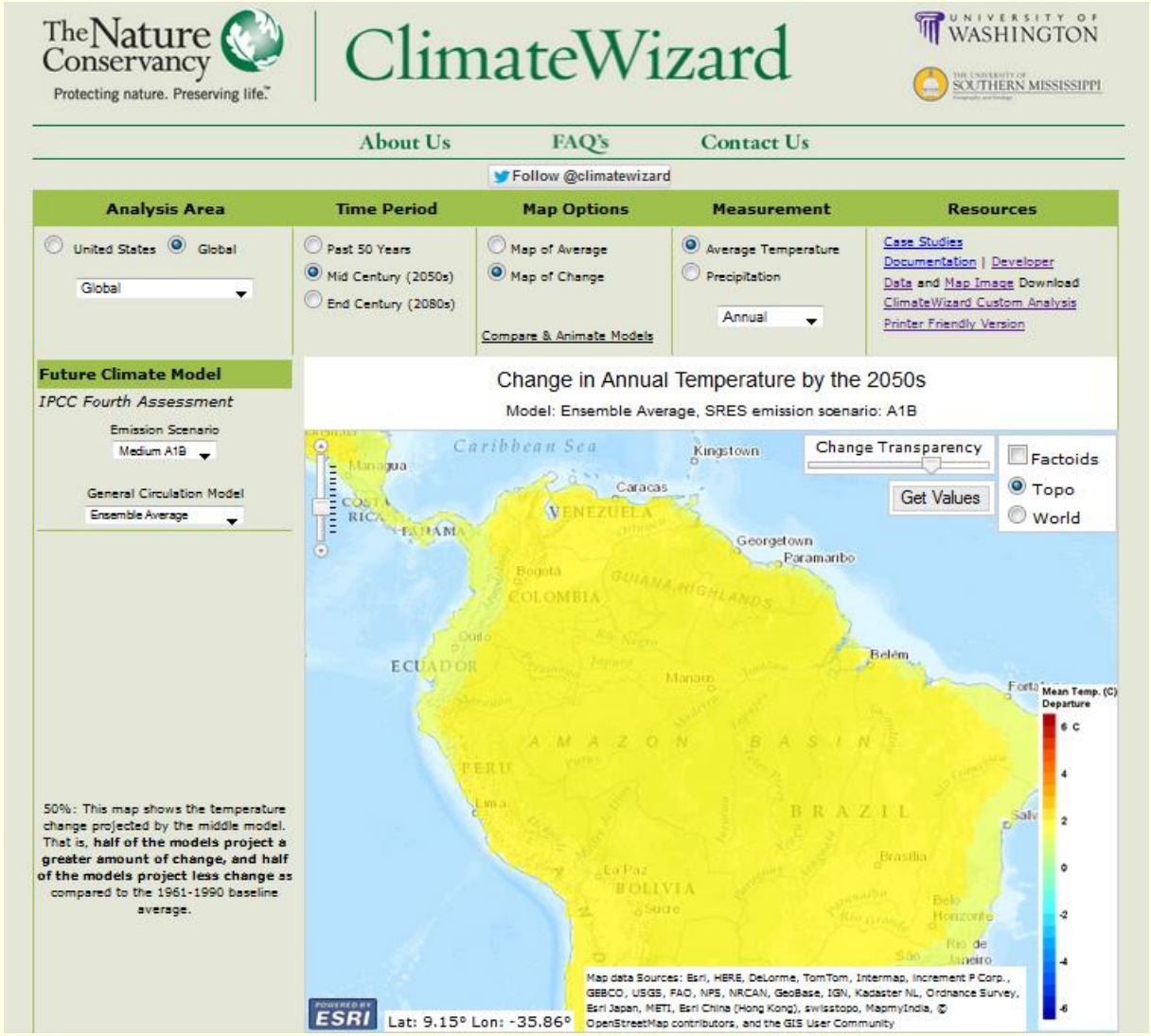
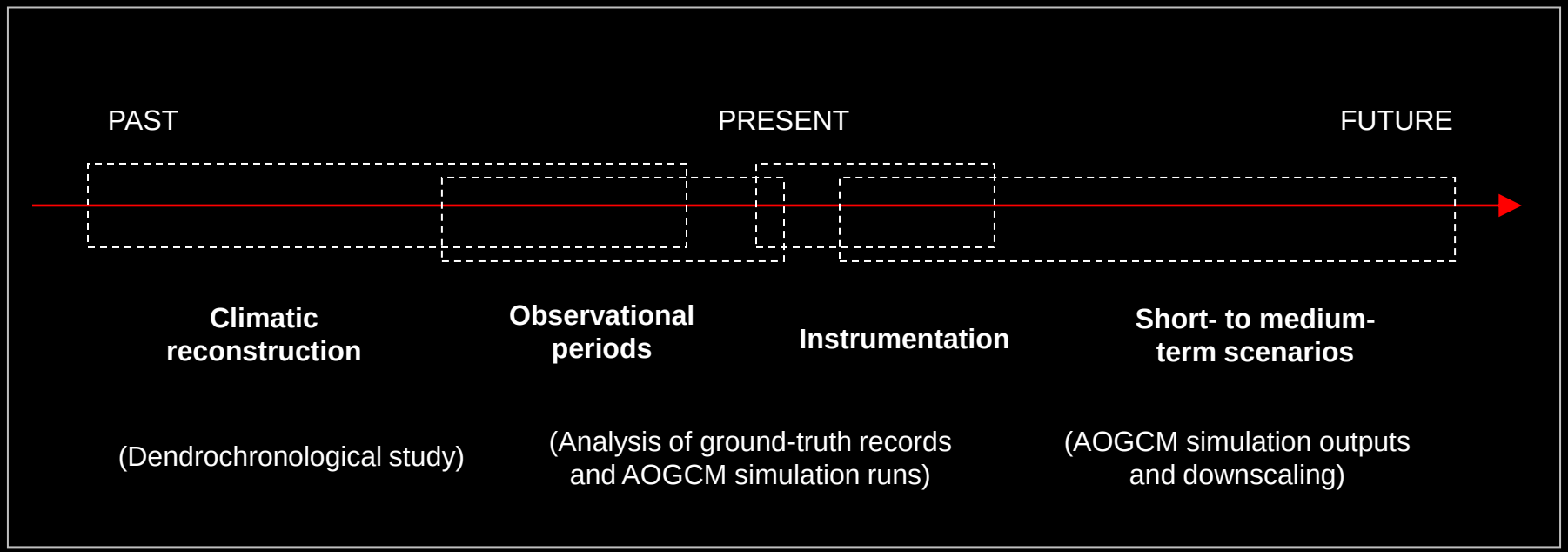
International Research Institute for Climate and Society
Lamont-Doherty Earth Observatory, USA

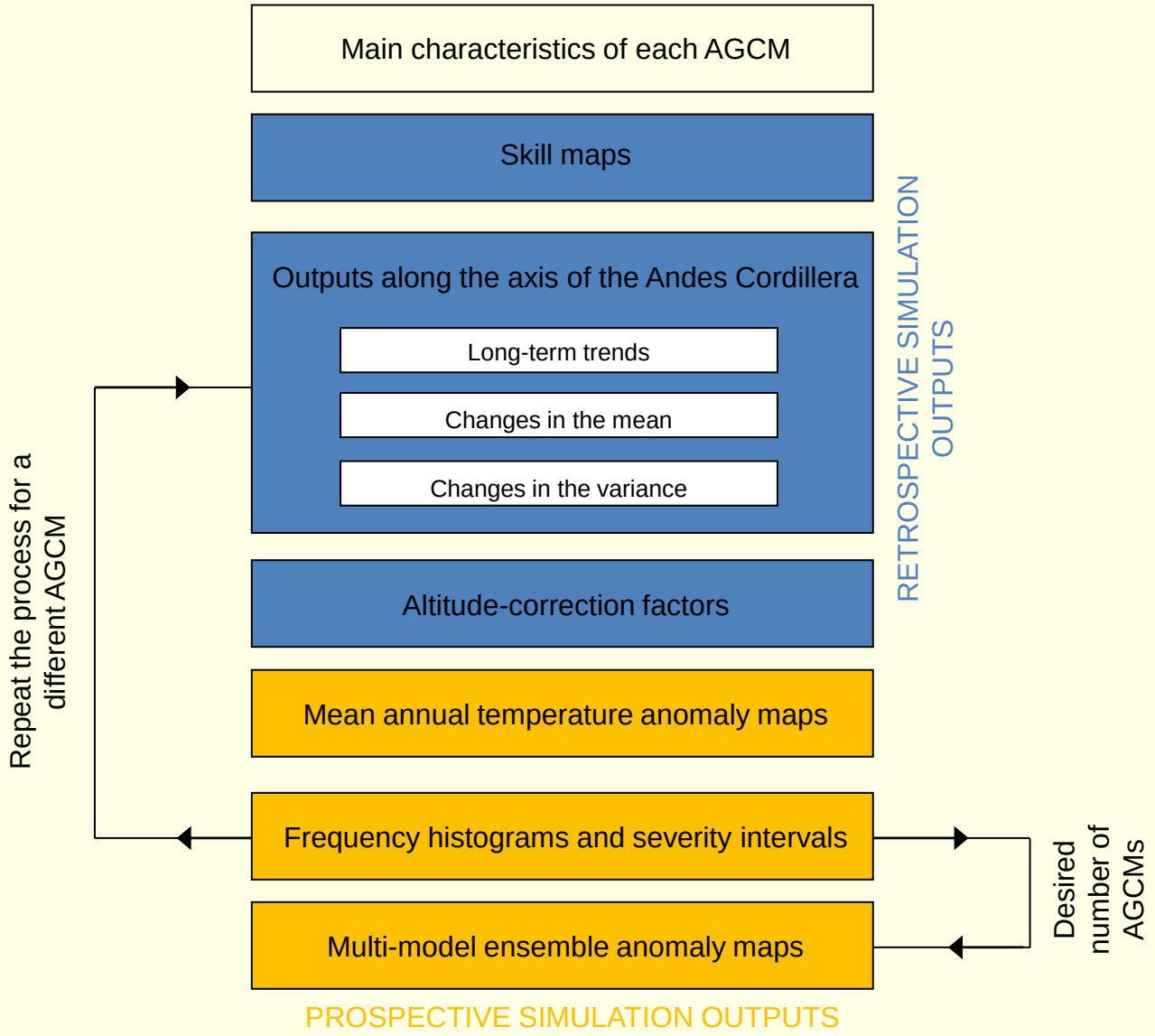


http://www.climatewizard.org/

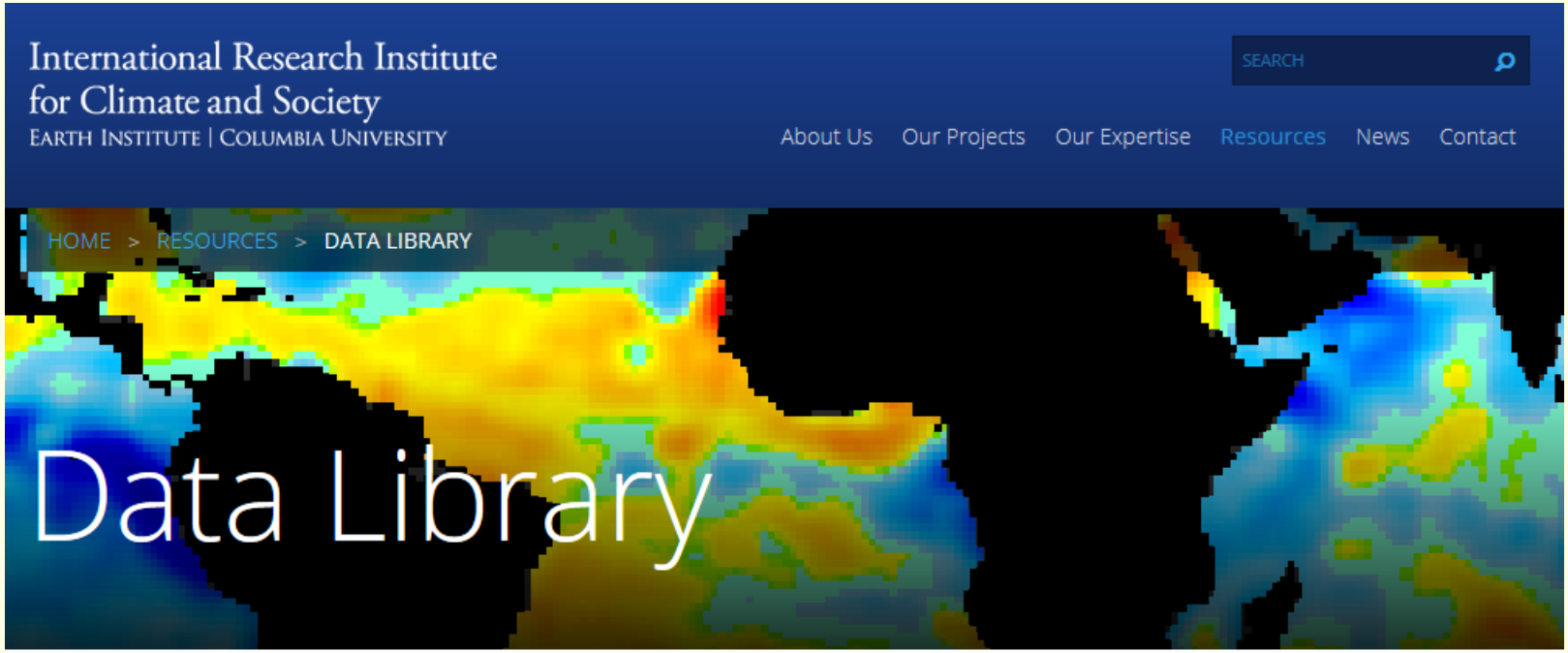
http://www.ccafs-climate.org/

CLIMATE COMPONENT




Main characteristics of each AGCM
Skill maps
Outputs along the axis of the Andes Cordillera
Long-term trends
Changes in the mean
Changes in the variance
Altitude-correction factors
Mean annual temperature anomaly maps
Frequency histograms and severity intervals
Multi-model ensemble anomaly maps
RETROSPECTIVE SIMULATION OUTPUTS
Repeat the process for a different AGCM
Desired number of AGCMs
PROSPECTIVE SIMULATION OUTPUTS

EASY ACCESS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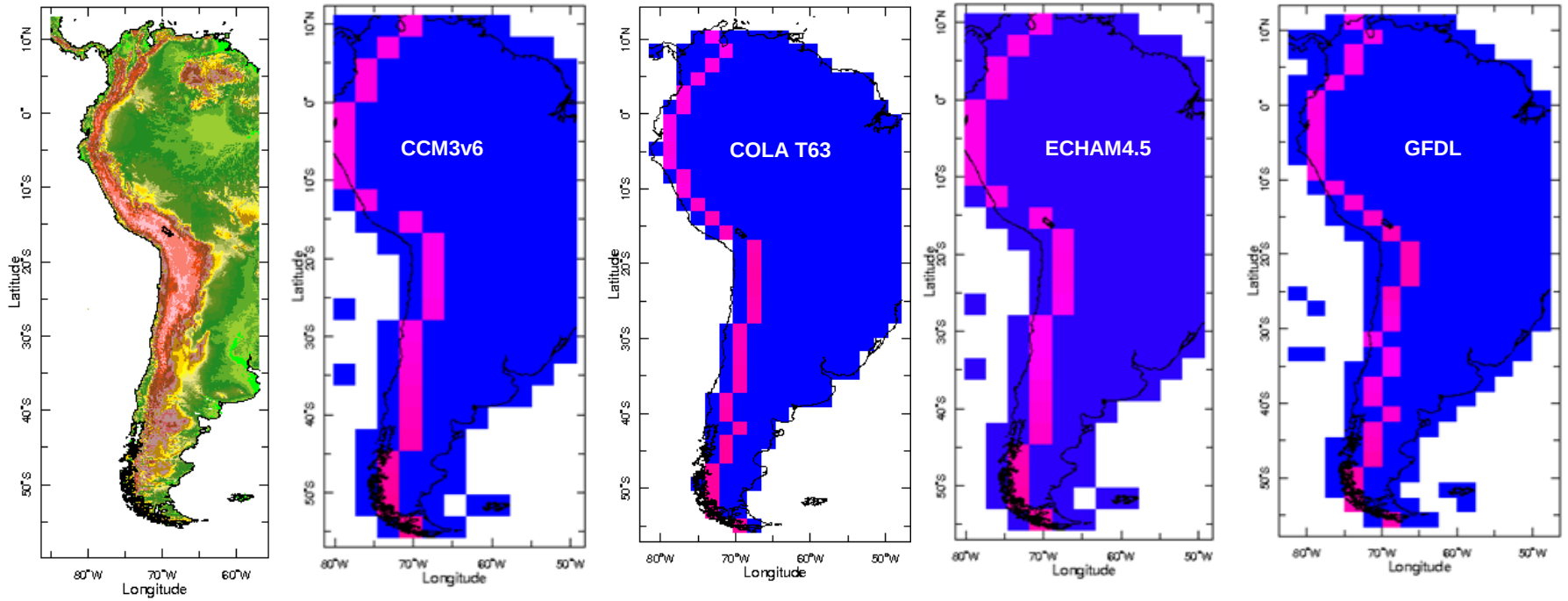
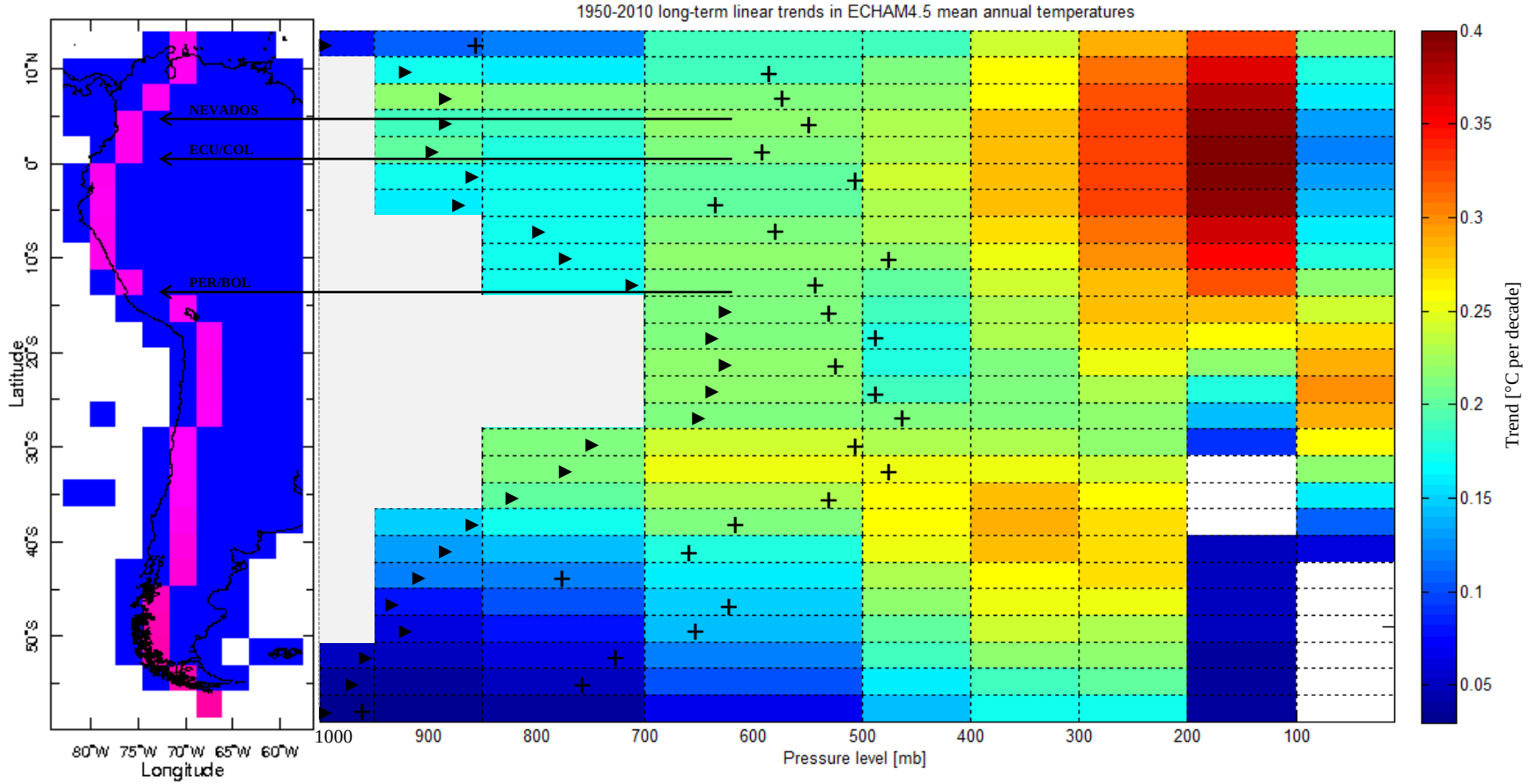
AXIS OF THE ANDES CORDILLERA



Source: González, Gutiérrez and Ruiz. (2014)

(Left panel) NOAA NGDC GLOBE gridded 1-km, quality-controlled digital elevation model

(Right panels) Grid points for the analysis of CCM3v6, COLA T63, ECHAM4.5, and GFDL ensemble simulation outputs



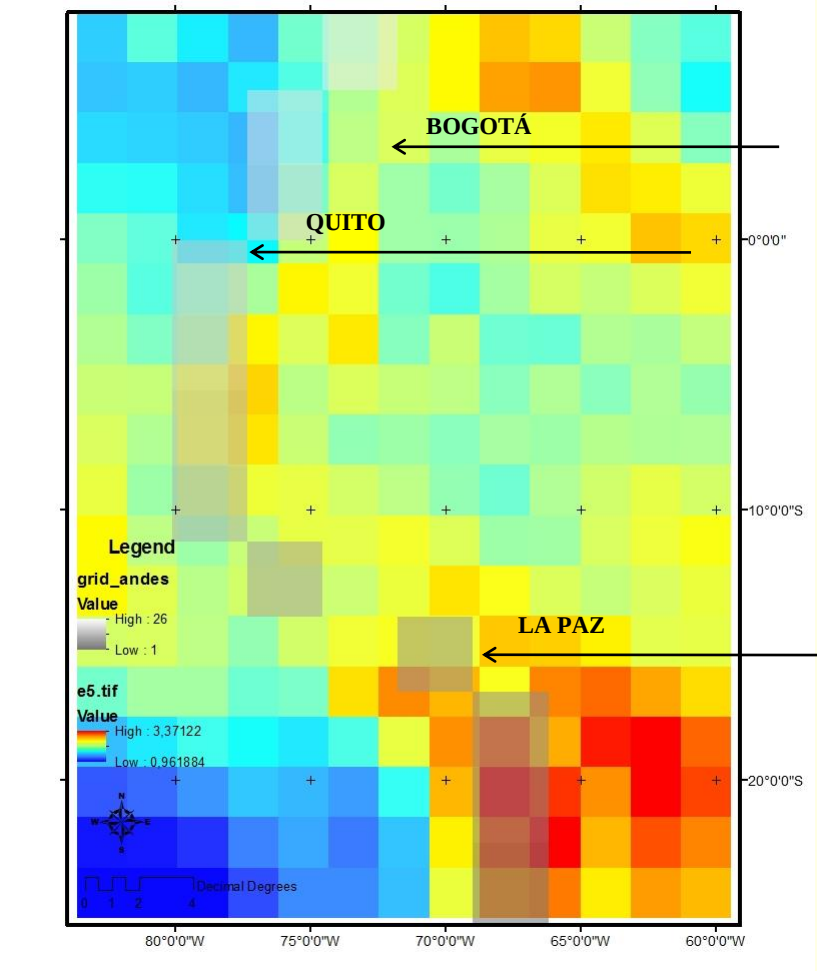
LOS NEVADOS ALTITUDINAL GRADIENT [04°50'N-05°00'N] ECUADOR-COLOMBIA TRANSBOUNDARY REGION ECOTRANSECT [00°30'N-01°30'N] PERU-BOLIVIA TRANSBOUNDARY REGION ECOTRANSECT [14°00'S-15°00'S]

Source: Ruiz et al. (2012)

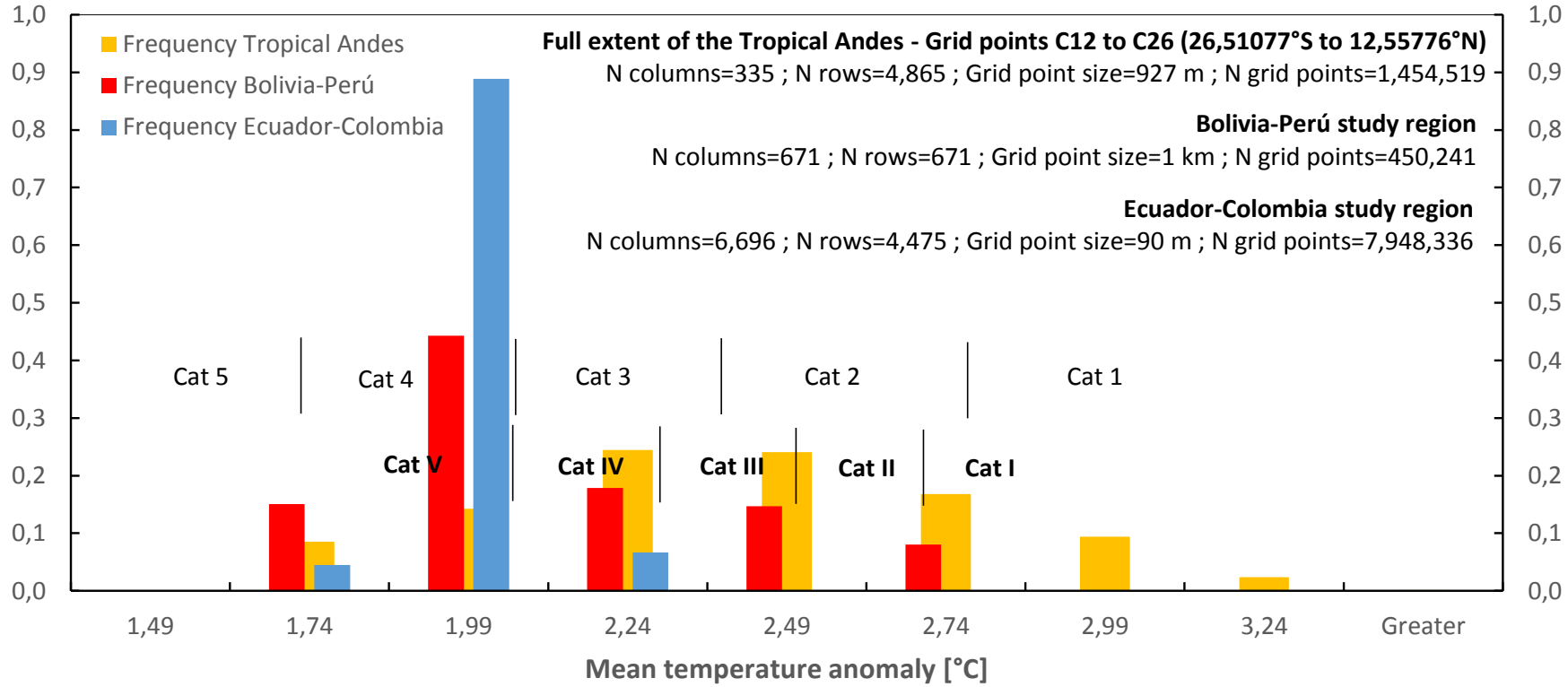
Black solid triangles and crosses depict, respectively, the average and maximum altitudes of the NOAA NGDC GLOBE gridded 1-km, quality controlled global DEM in the ECHAM4.5 model grid points

CLIMATE CHANGE PROJECTIONS

Mean annual near-surface temperature anomalies, with respect to the historical period 1961-1991, according to ECHAM5 multi-member ensemble simulation outputs, for the prospective period 2046-2065 and for the A1B representative pathway



MEAN TEMPERATURE ANOMALY PROJECTIONS FOR THE TROPICAL ANDES



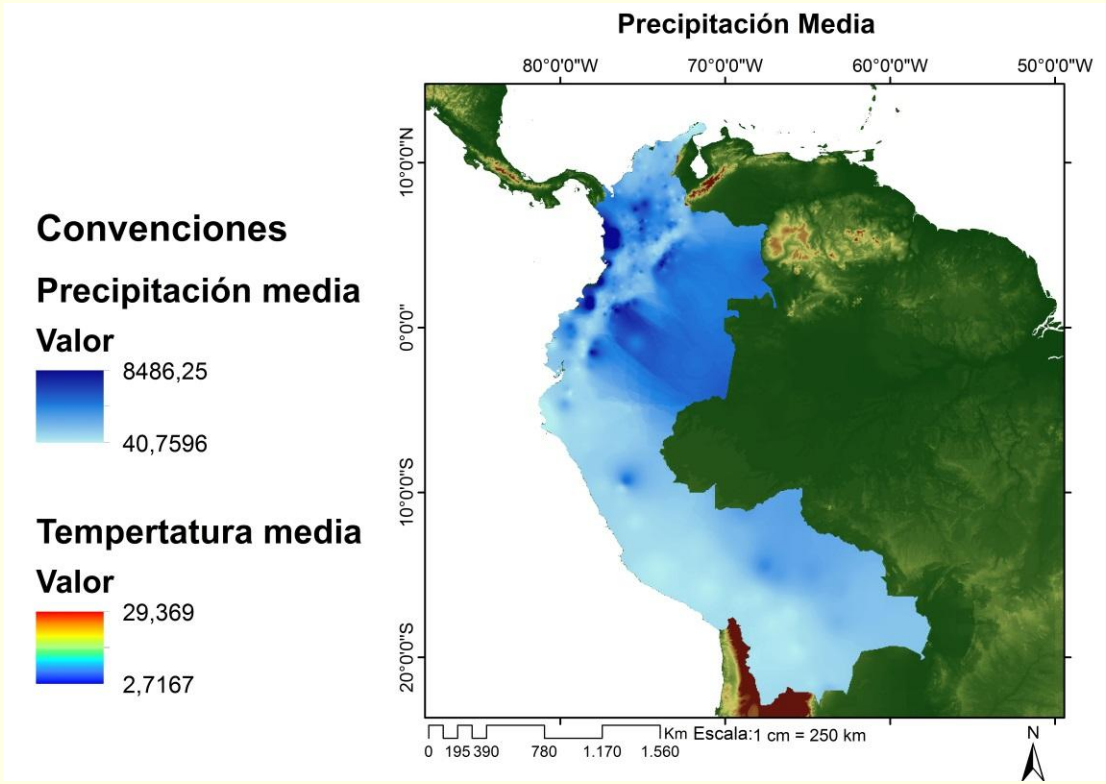
Altitude corrected ECHAM5 2046-2065 prospective period, scenario A1B

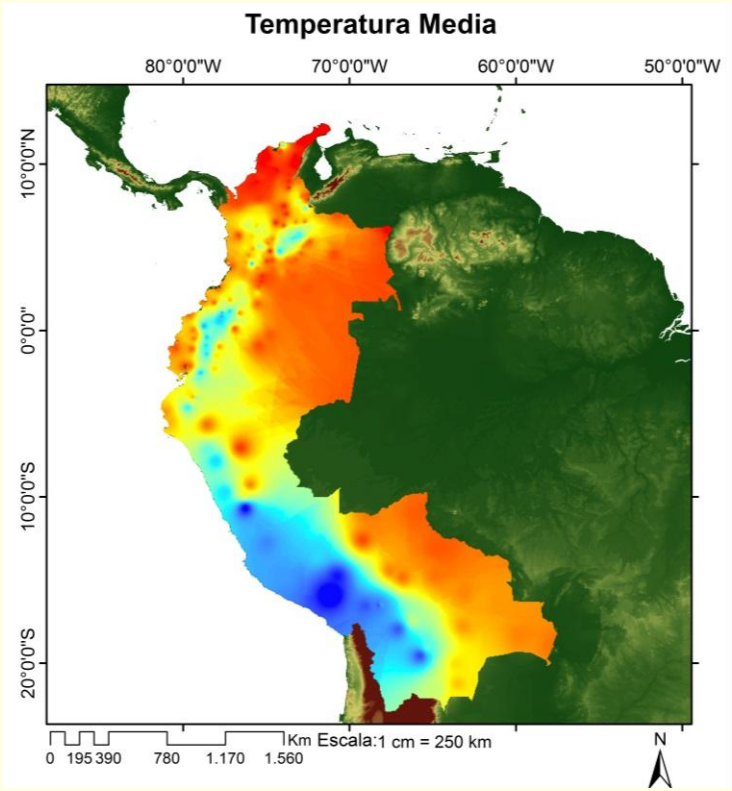
HUMIDITY

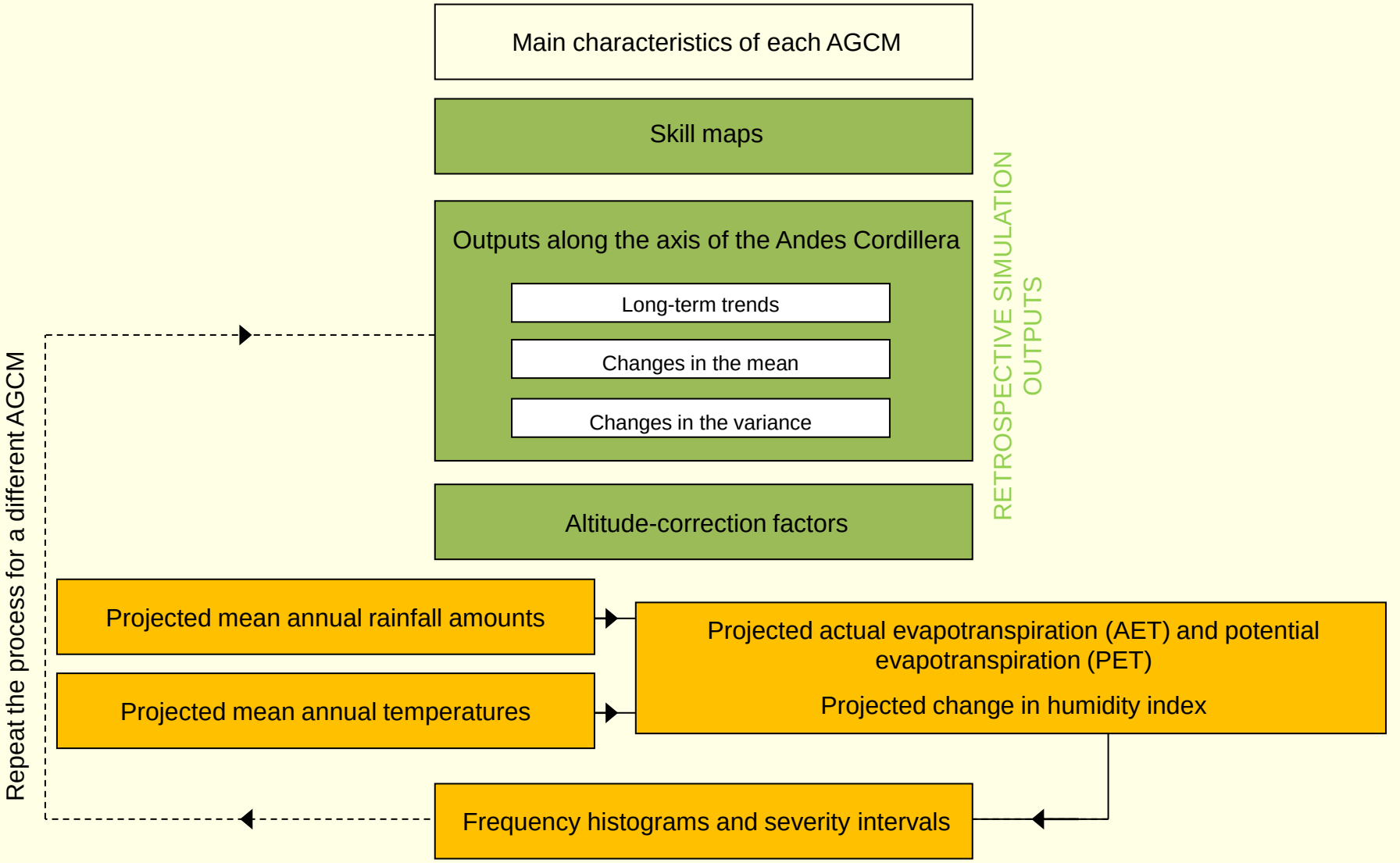
$$AET = \frac{P}{\sqrt{0{,}9 + \left(\frac{P^2}{L^2}\right)}} \text{ if } \frac{P}{L} > 0{,}316$$

$$AET = P \text{ if } \frac{P}{L} < 0{,}316$$

$$PET = 16\left(10\frac{T}{I}\right)^{a}\Bigg)$$



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Altitude-correction factors
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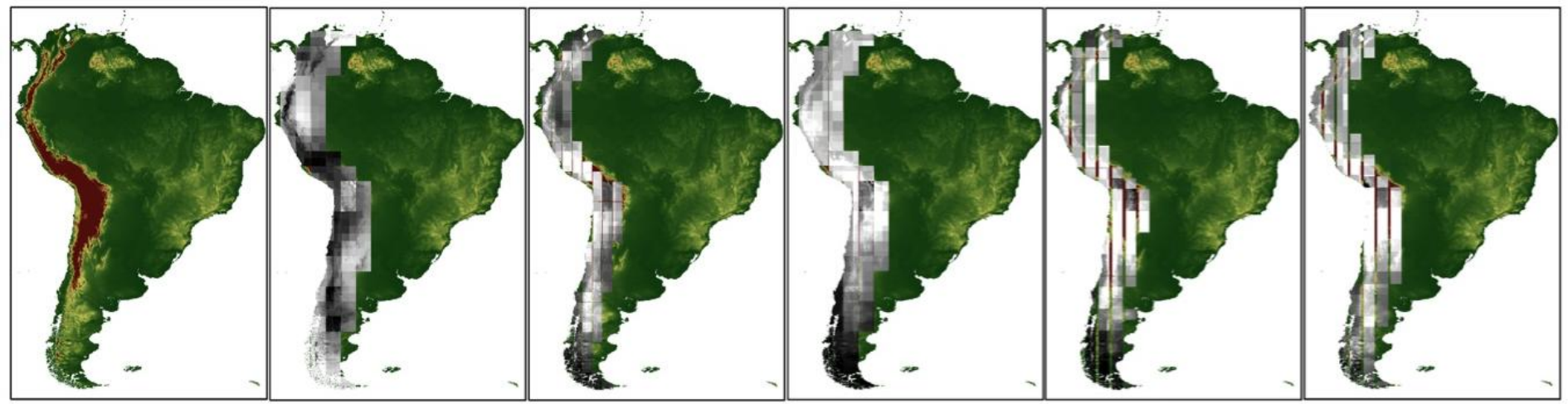
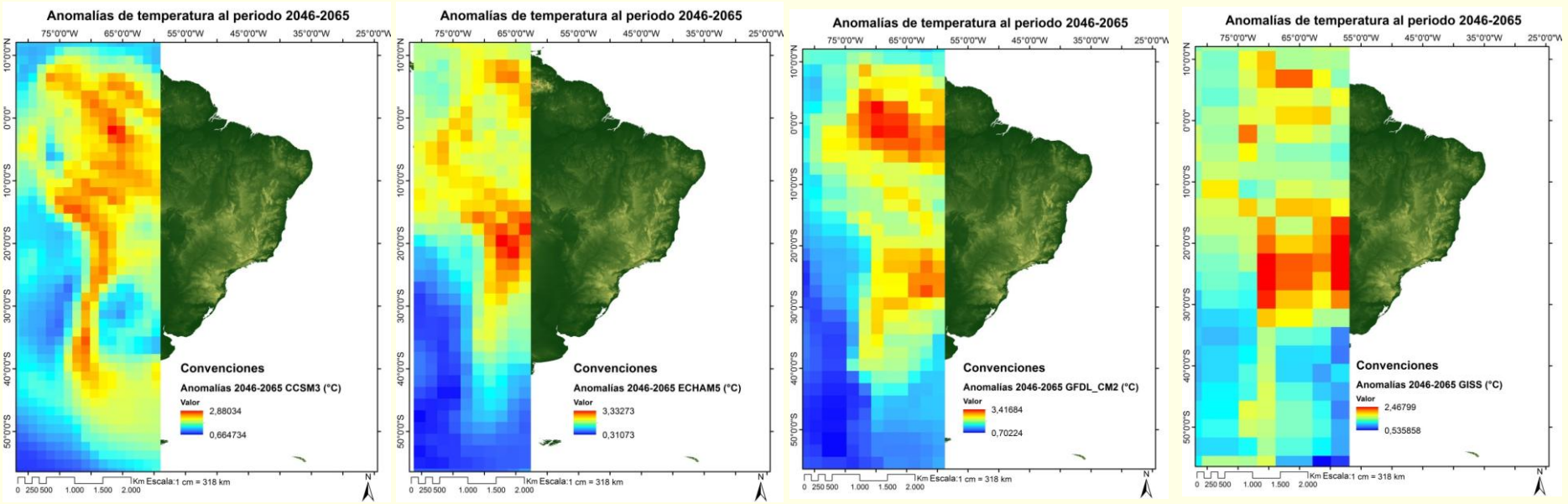
Repeat the process for a different AGCM
Projected mean annual rainfall amounts
Projected mean annual temperatures
Projected actual evapotranspiration (AET) and potential evapotranspiration (PET)
Projected change in humidity index
Frequency histograms and severity intervals

SYSTEMIC REPRESENTATION OF THE ANDES CORDILLERA
(considering both flanks)

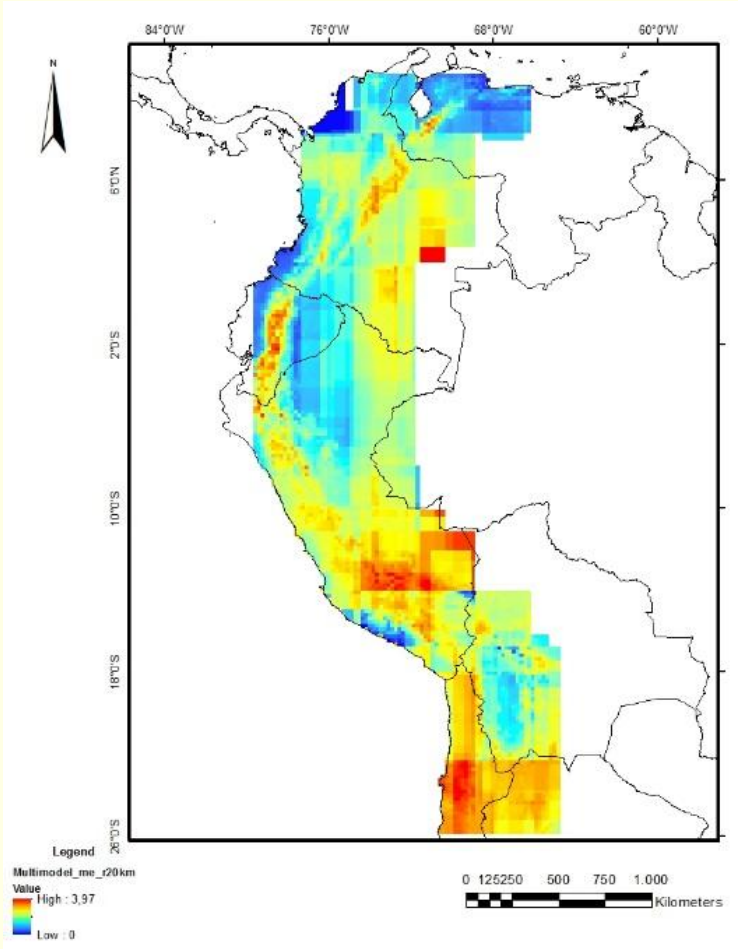


1-km DEM | CCM3v6 | COLA T63 | ECHAM4.5 | GFDL | NSIPP

MULTI-MODEL CLIMATE CHANGE PROJECTIONS

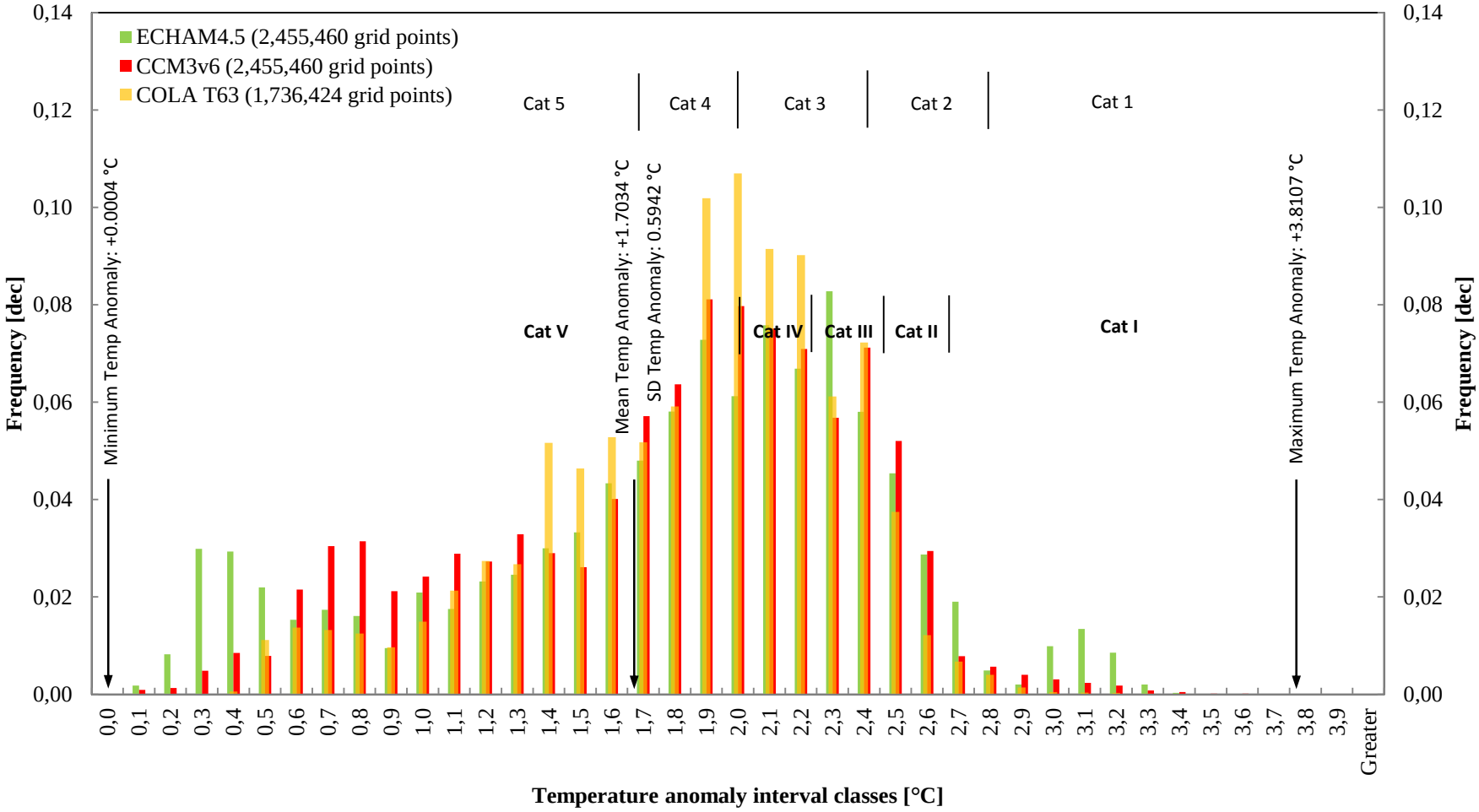


Mean annual near-surface temperature anomalies, with respect to the historical period 1961-1991, according to CCSM3 (left), ECHAM5 (middle left), GFDL_CM2 (middle right), and GISS (right) multi-member ensemble simulation outputs, for the prospective period 2046-2065 and for the A1B representative pathway

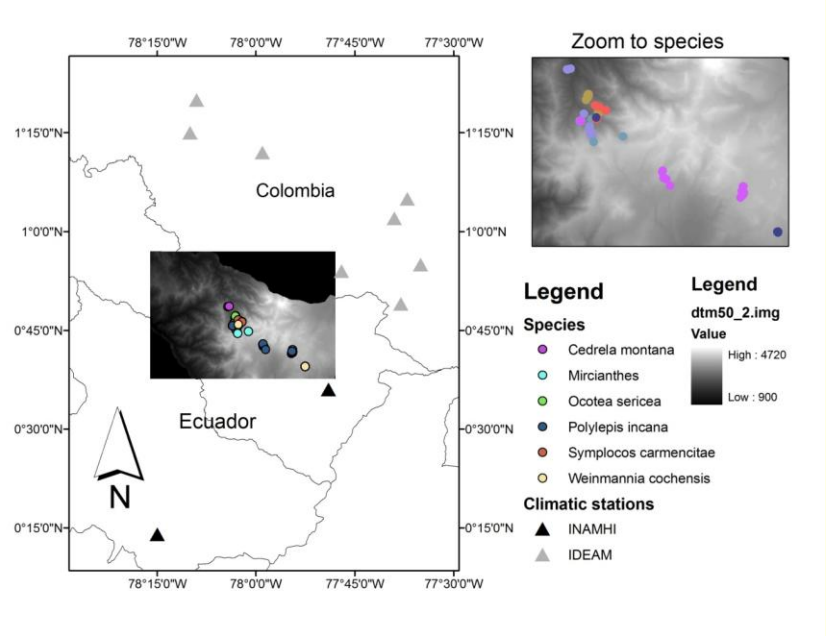


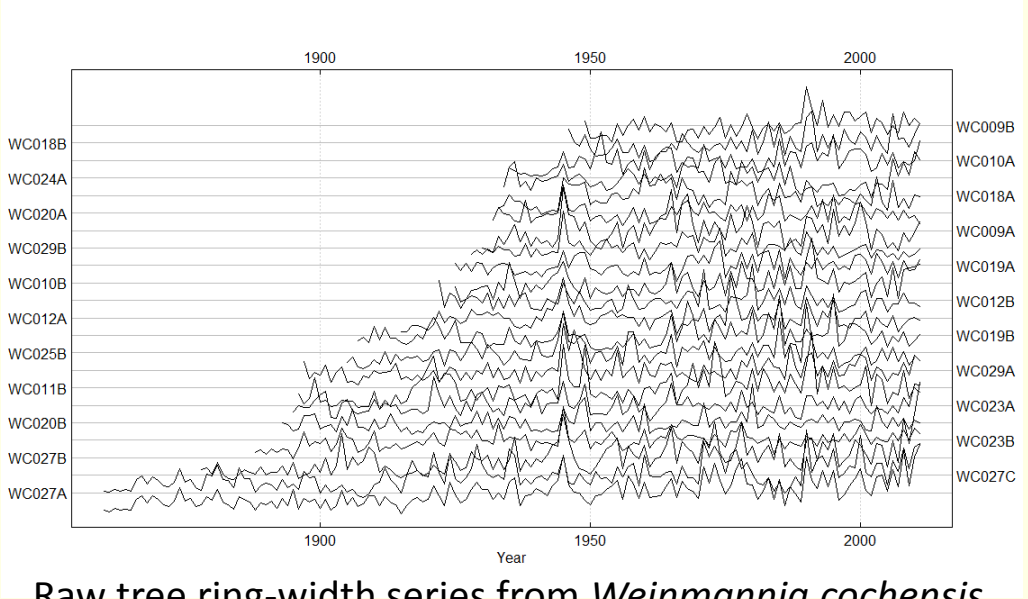
Mean annual near-surface temperature anomalies suggested by a 20-km altitude-corrected, equally-weighted, multi-model ensemble – MME, with respect to the historical period 1961-1991, for the prospective period 2046-2065 and for the A1B representative pathway

UNCERTAINTY IN CLIMATE CHANGE PROJECTIONS



DENDROCHRONOLOGICAL STUDY



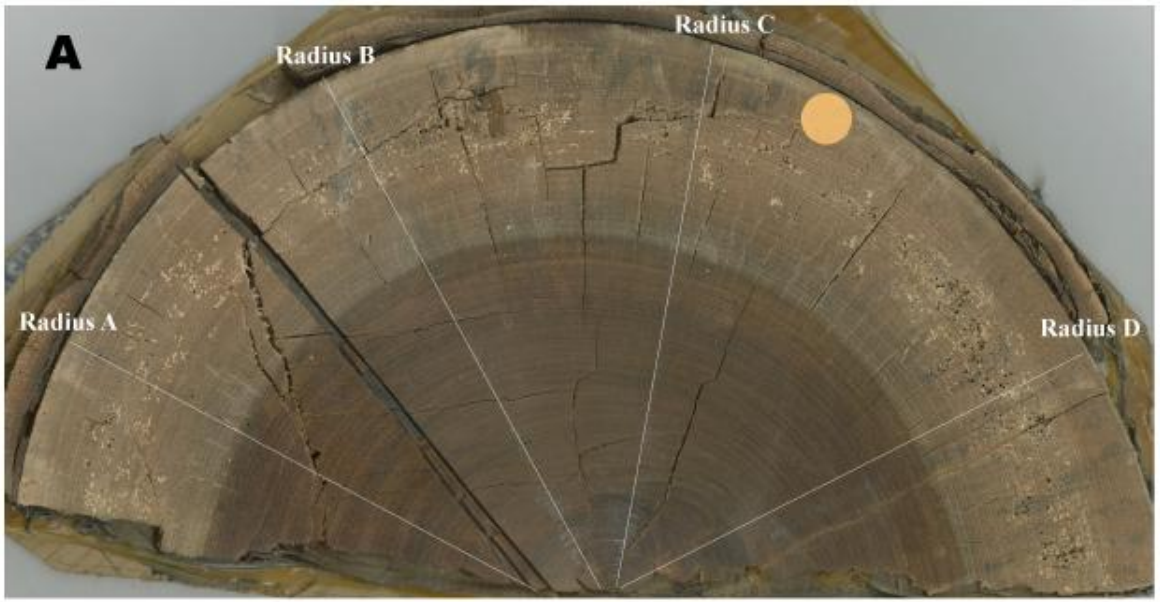


Raw tree ring-width series from *Weinmannia cochensis*

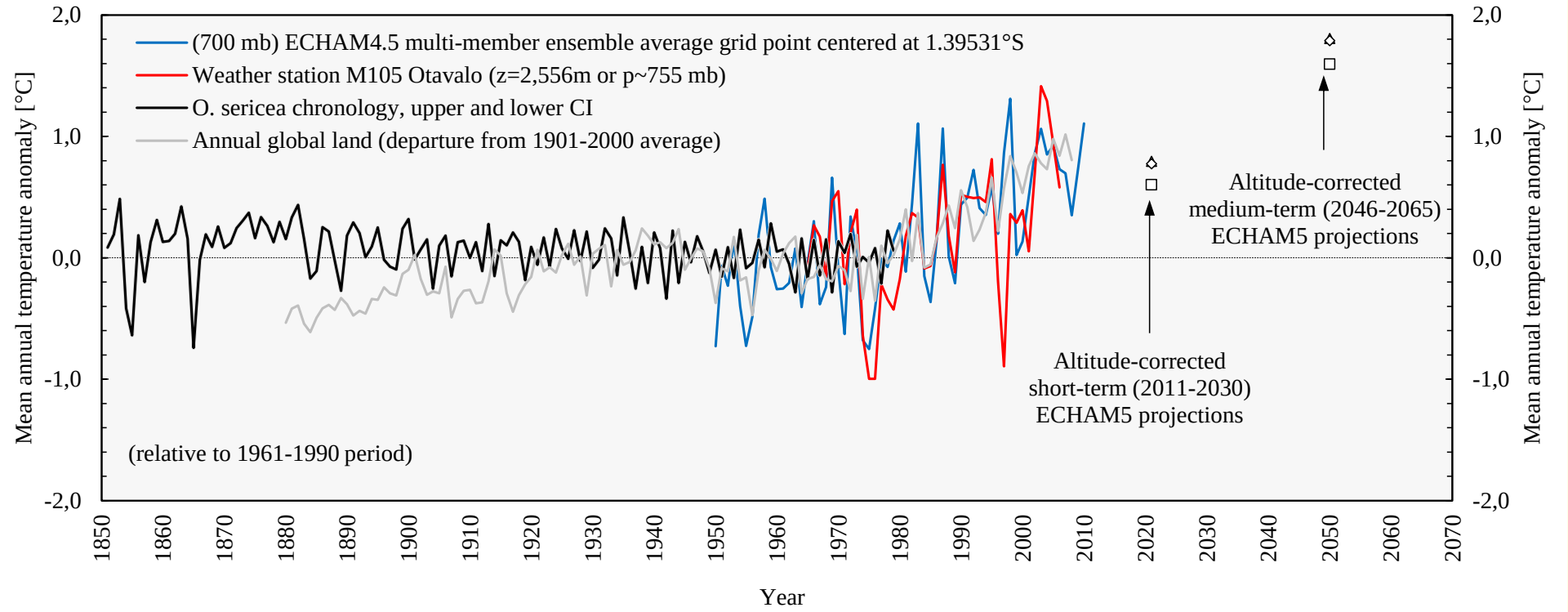
Radiocarbon, Vol 57, Nr 1, 2015, p 1–13 DOI: 10.2458/azu_rc.57.18192

ANNUAL TREE RINGS IN *PSEUDOLMEDIA RIGIDA* FROM BOLIVIA CONFIRMED BY MATCHING DENDROCHRONOLOGICAL DATES WITH THE SOUTHERN HEMISPHERE ^{14}C CURVES

Laia Andreu-Hayles[1,2,†] • Guaciara M Santos[3,†] • David A Herrera-Ramírez[4] • Javier Martin-Fernández[1] • Daniel Ruiz-Carrascal[5,6] • Tatiana E Boza-Espinoza[7] • Alfredo F Fuentes[8,9] • Peter M Jørgensen[9]

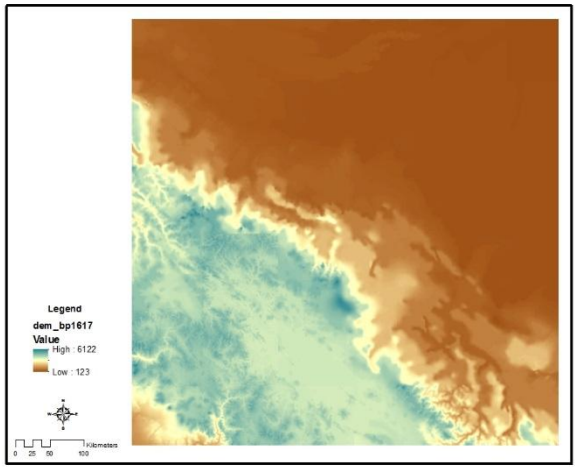


LONG-TERM CONTEXT

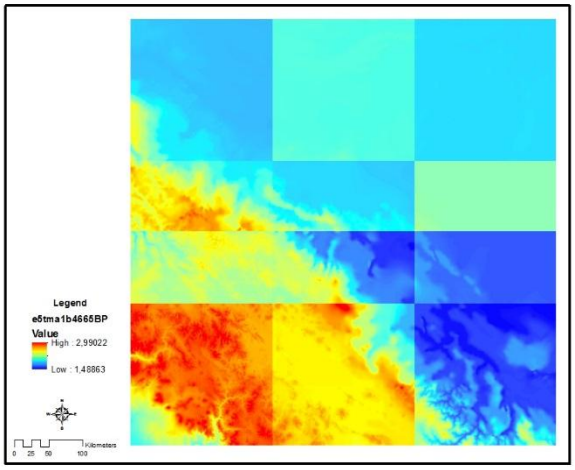


TEMPERATURE ANOMALIES SEVERITY INTERVALS

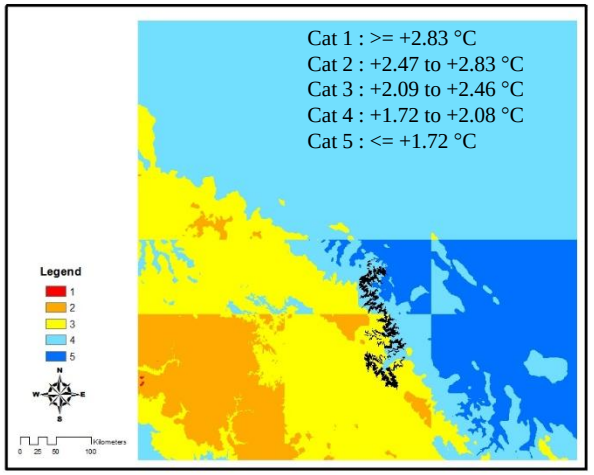
NatureServe	1-km MPIM:ECHAM5 individual, altitude-corrected, multi-member simulation outputs	20-km equally-weighted, altitude-corrected, multi-model ensemble	Long-term context
Cat 1 [> +2.71°C]	[> +2.83°C]	[> +2.42°C]	[> +2.58°C]
Cat 2 [+2.50 to +2.71°C]	[+2.47 to +2.83°C]	[+2.05 to +2.42°C]	[+2.32 to +2.58°C]
Cat 3 [+2.29 to +2.49°C]	[+2.09 to +2.46°C]	[+1.68 to +2.04°C]	[+2.06 to +2.31°C]
Cat 4 [+2.06 to +2.28°C]	[+1.73 to +2.08°C]	[+1.32 to +1.67°C]	[+1.79 to +2.05°C]
Cat 5 [< +2.06°C]	[< +1.72°C]	[< +1.31°C]	[< +1.78°C]



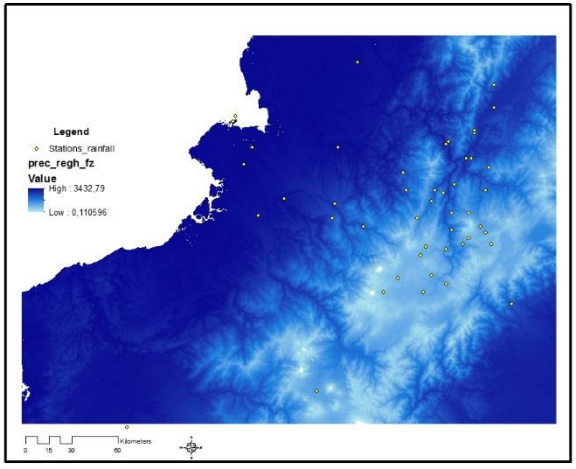
DTM, Bolivia - Perú study region (123 to 6,122 masl)



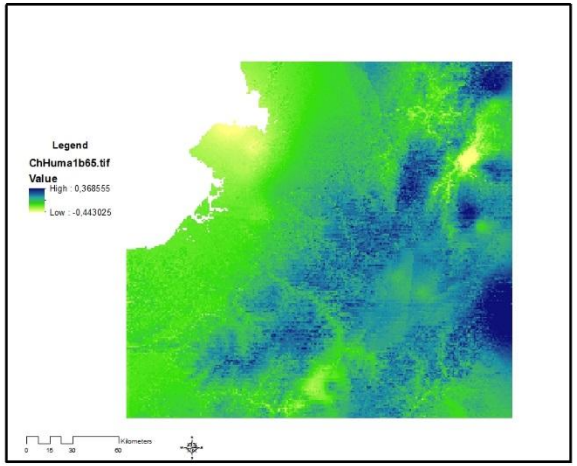
Altitude-corrected mean temperature anomaly, 2046-2065 prospective period, A1B representative pathway (+1.49°C to +3.00°C)



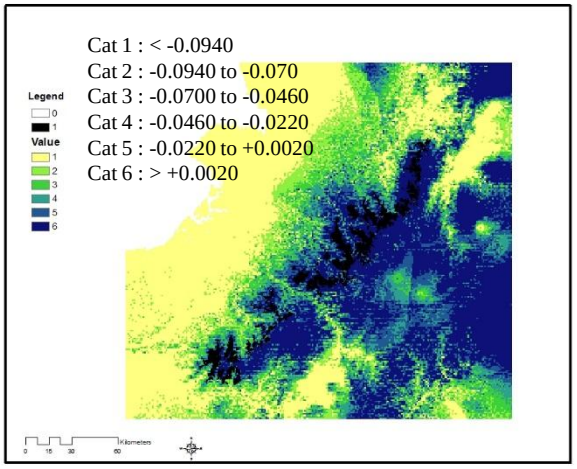
Classified temperature anomaly severity intervals *Ontherus bridgesi* Dung Beetle species distribution



Total annual rainfall (0.11 to 3,432.8 mm)

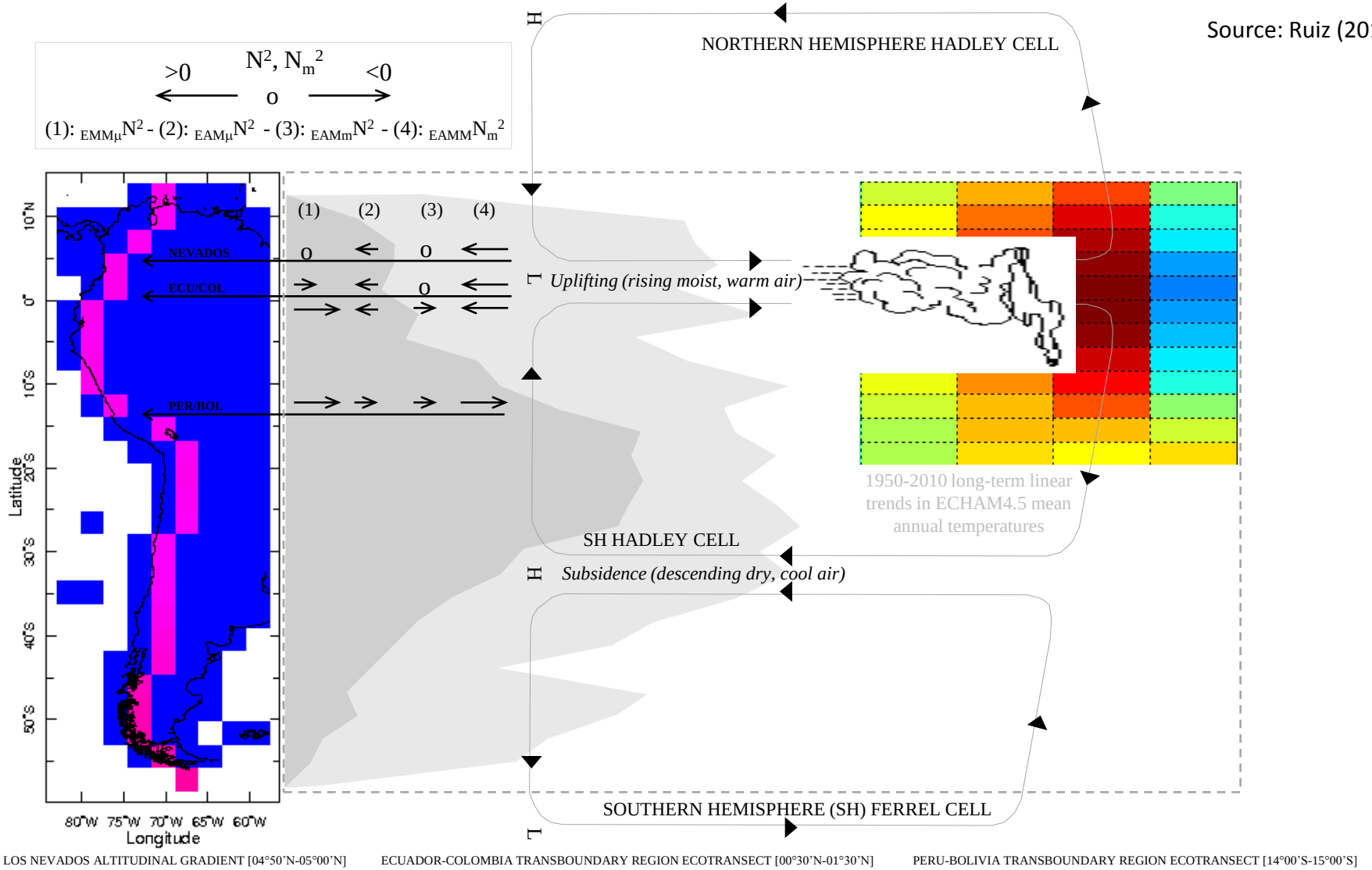


Change in humidity, 2046-2065 prospective period, A1B representative pathway (-0.44 to +0.37)



Classified humidity anomaly severity intervals *Aberrans* Dung Beetle species distribution

Source: Ruiz (2013)



Idealized representation of the large-scale atmospheric circulation over the axis of the Andes Cordillera, along with the 1950-2010 long-term linear trends in ECHAM4.5 mean annual temperatures. The thermal equator is assumed to be static at around 0-5°N, approximately

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LinkedIn public profile:
http://www.linkedin.com/pub/daniel-ruiz-carrascal/31/a70/94

ResearchGate public profile:
http://www.researchgate.net/profile/Daniel_Ruiz_Carrascal/

Twitter public profile:
http://twitter.com/#!/RuizCarrascalD