Florestas, rios aéreos e a bomba biótica de umidade

Live para o CBPF

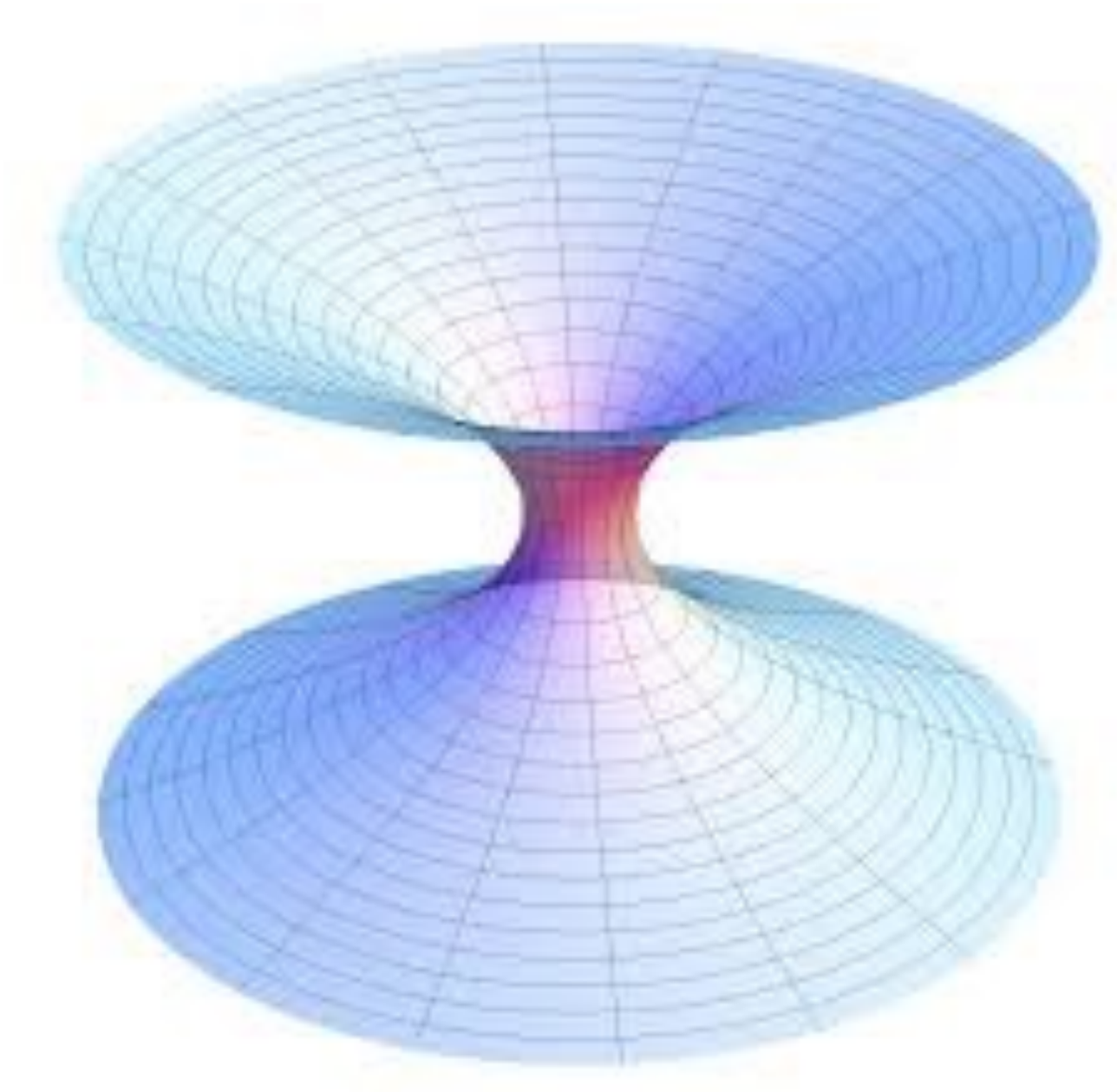
4/março/2021

Antonio Donato Nobre, PhD

Programa de Doutorado em Ciência do Sistema Terrestre INPE

A física fundamental como aliada no combate ao negacionismo

Modelo Teórico



Leis Naturais

Colocando a fisica teórica de volta nas ciências atmosféricas

Anastassia Makarieva

Victor Gorshkov

Victor Gorshkov

in memorian

Amante da natureza

Respeitado físico teórico de partículas

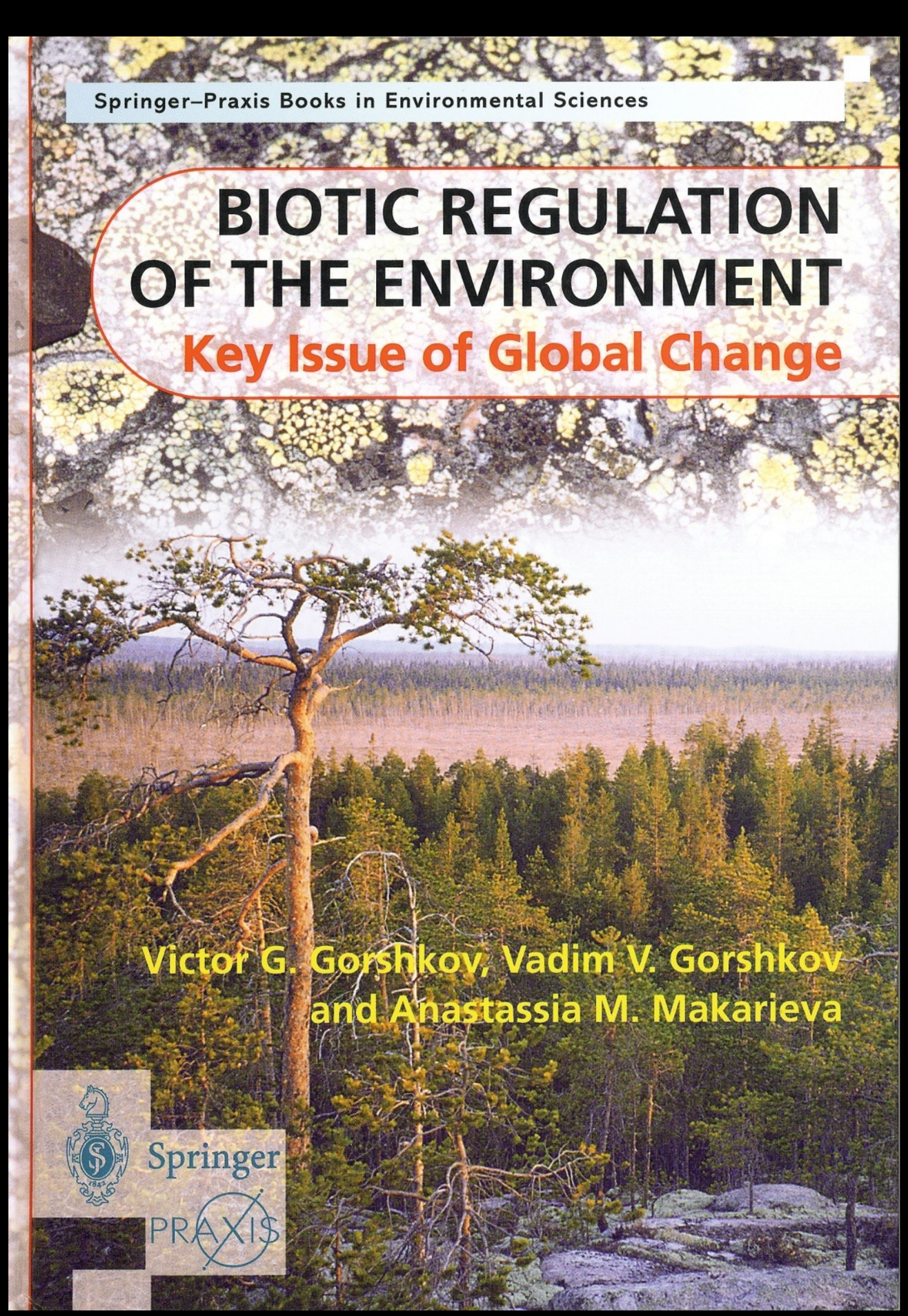
Autor da teoria da regulação biótica do ambiente

Pai da teoria da bomba biótica

Springer–Praxis Books in Environmental Sciences

BIOTIC REGULATION OF THE ENVIRONMENT

Key Issue of Global Change



Victor G. Gorshkov, Vadim V. Gorshkov
and Anastassia M. Makarieva

Springer
PRAXIS

2000

The early insights, during the LBA project

Is the Amazonian Rainforest a Sitting Duck for Climate Change?

A.D. Nobre, INPA

ESSP Open Science Conference
Session 41 Modeling
9-12 November 2006, Beijing China

Paleoclimates and Vegetation:

Sugestions from the Mega fauna

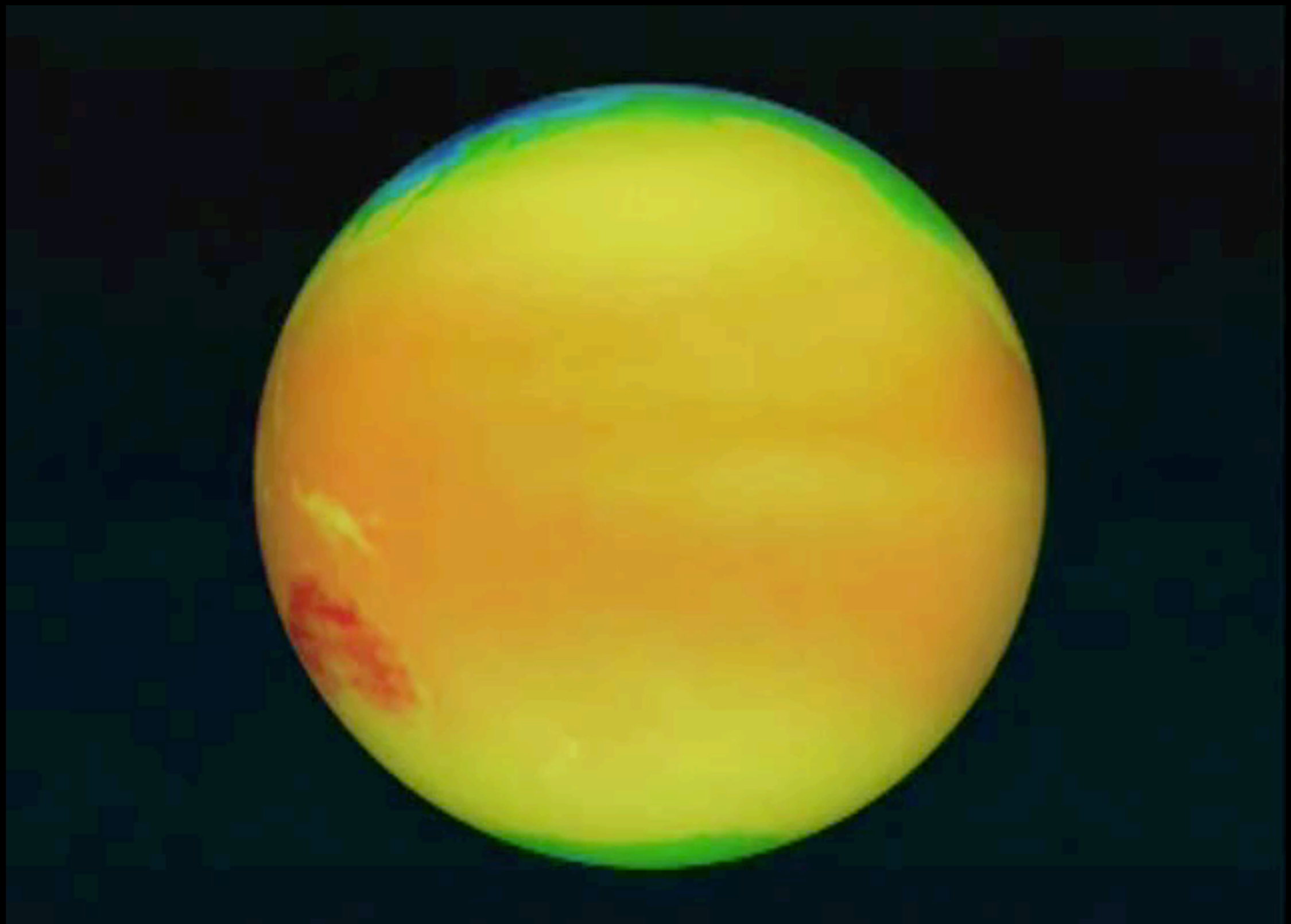
Paleoclimates evidences of continued rainfall (Baker et al 2001)

Faunal evidences of less extensive savannas in South America (Vivo & Carmignotto 2004)

Biological evidences of connection between Atlantic and Amazon forests (Costa 2003)

Orbital and cosmic effects on climate

Temperature Paradox in the Meteorological Paradigm



Hydrol. Earth Syst. Sci., 11, 1013–1033, 2007
www.hydrol-earth-syst-sci.net/11/1013/2007/

Hydrology and Earth System Sciences

Biotic pump of atmospheric moisture as driver of the hydrological cycle on land

A. M. Makarieva and V. G. Gorshkov

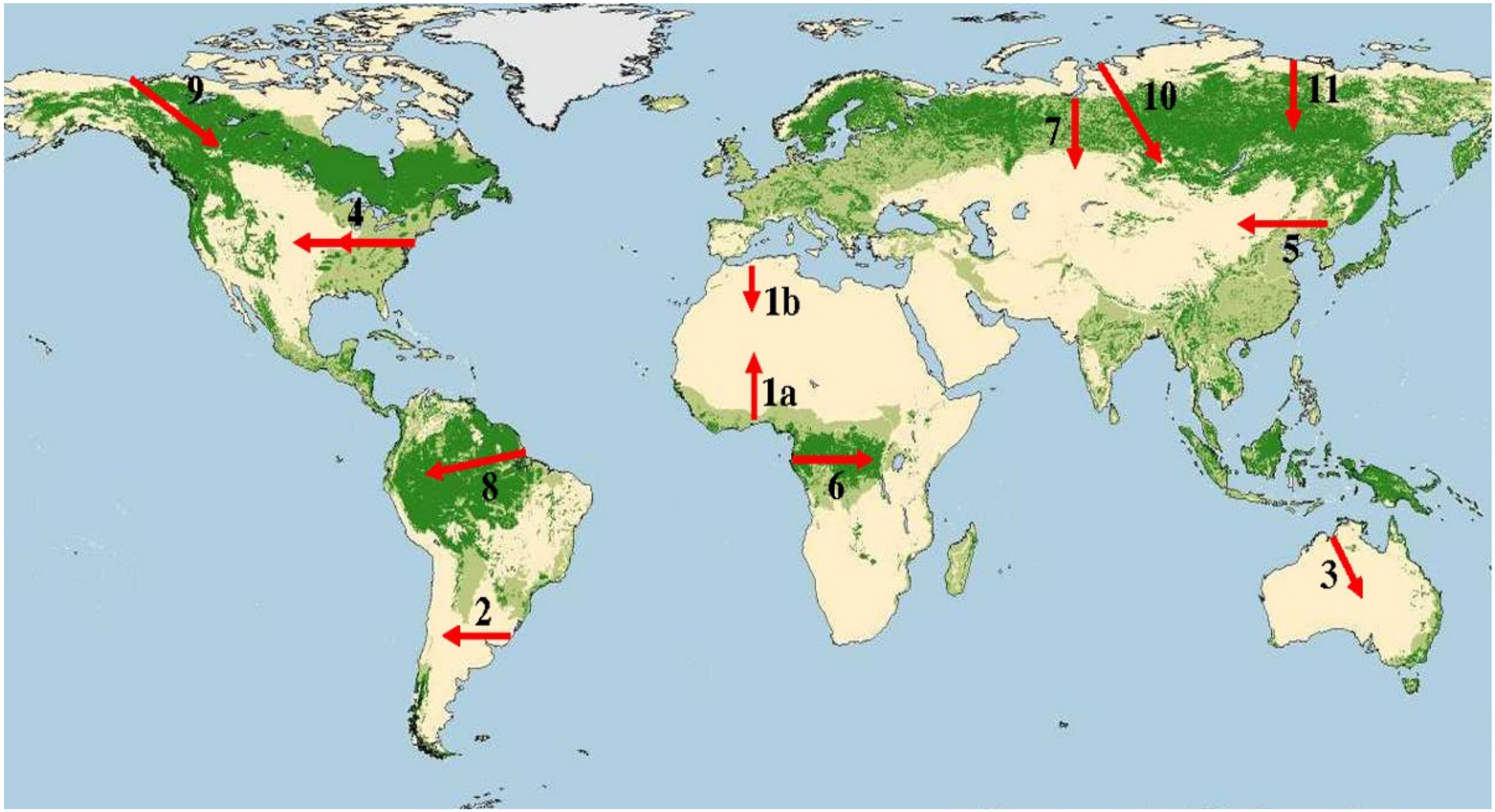
Petersburg Nuclear Physics Institute, Gatchina, St. Petersburg, Russia

Received: 31 March 2006 – Published in Hydrol. Earth Syst. Sci. Discuss.: 30 August 2006
Revised: 15 March 2007 – Accepted: 15 March 2007 – Published: 27 March 2007

Abstract. In this paper the basic geophysical and ecological principles are jointly analyzed that allow the landmasses of Earth to remain moistened sufficiently for terrestrial life to be possible. 1. Under gravity, land inevitably loses water to the ocean. To keep land moistened, the gravitational water runoff must be continuously compensated by the atmospheric ocean-to-land moisture transport. Using data for five terrestrial transects of the International Geosphere Biosphere Program we show that the mean distance to which air fluxes cover by a low leaf index vegetation leads to an up to tenfold reduction in the mean continental precipitation and runoff, in contrast to the previously available estimates made without accounting for the biotic moisture pump. The analyzed body of evidence testifies that the long-term stability of an intense terrestrial water cycle is unachievable without the recovery of natural, self-sustaining forests on continent-wide areas.

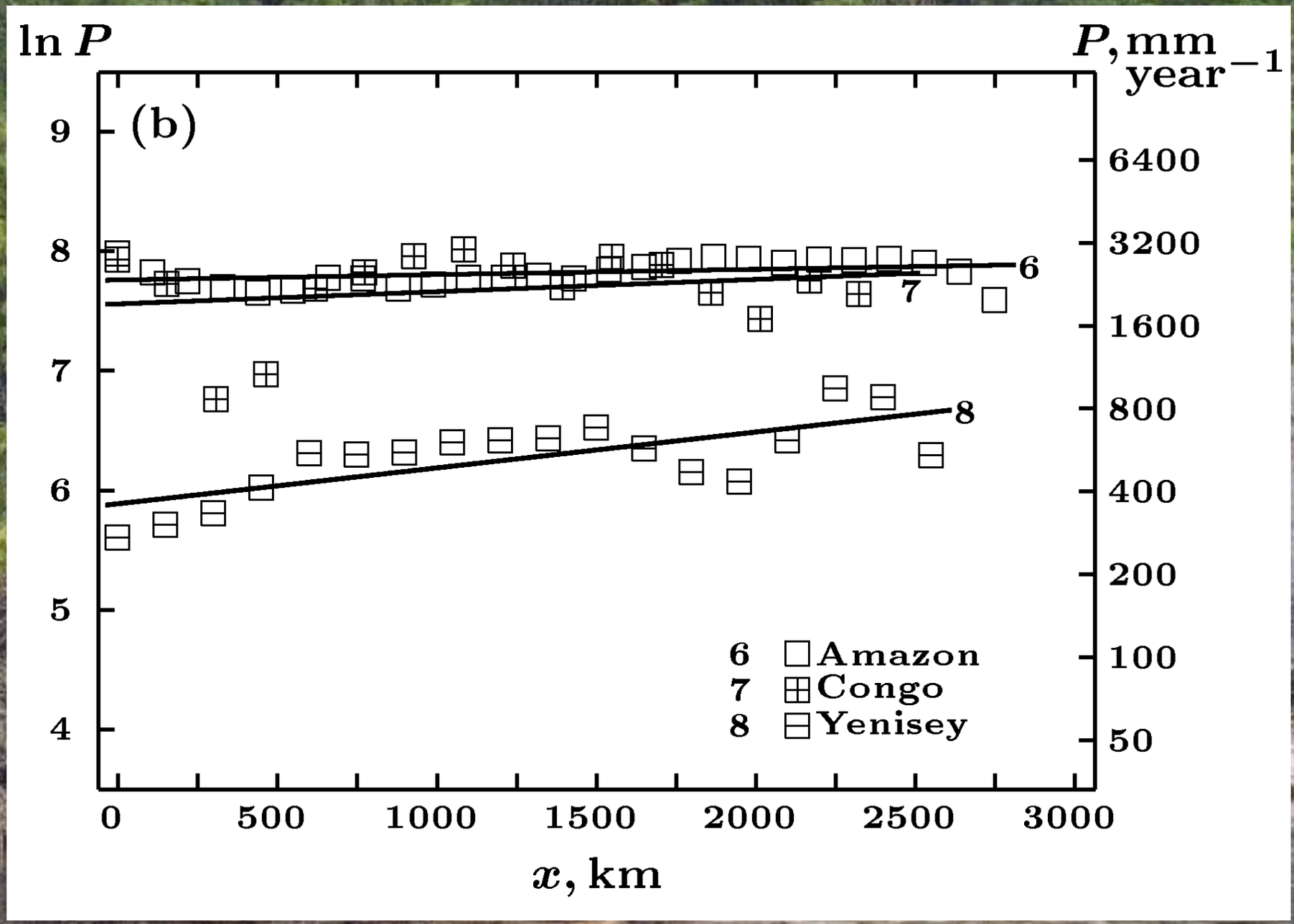
O paper seminal que introduziu a teoria fisicamente baseada, resolvendo paradoxos meteorológicos

Vegetation and precipitation



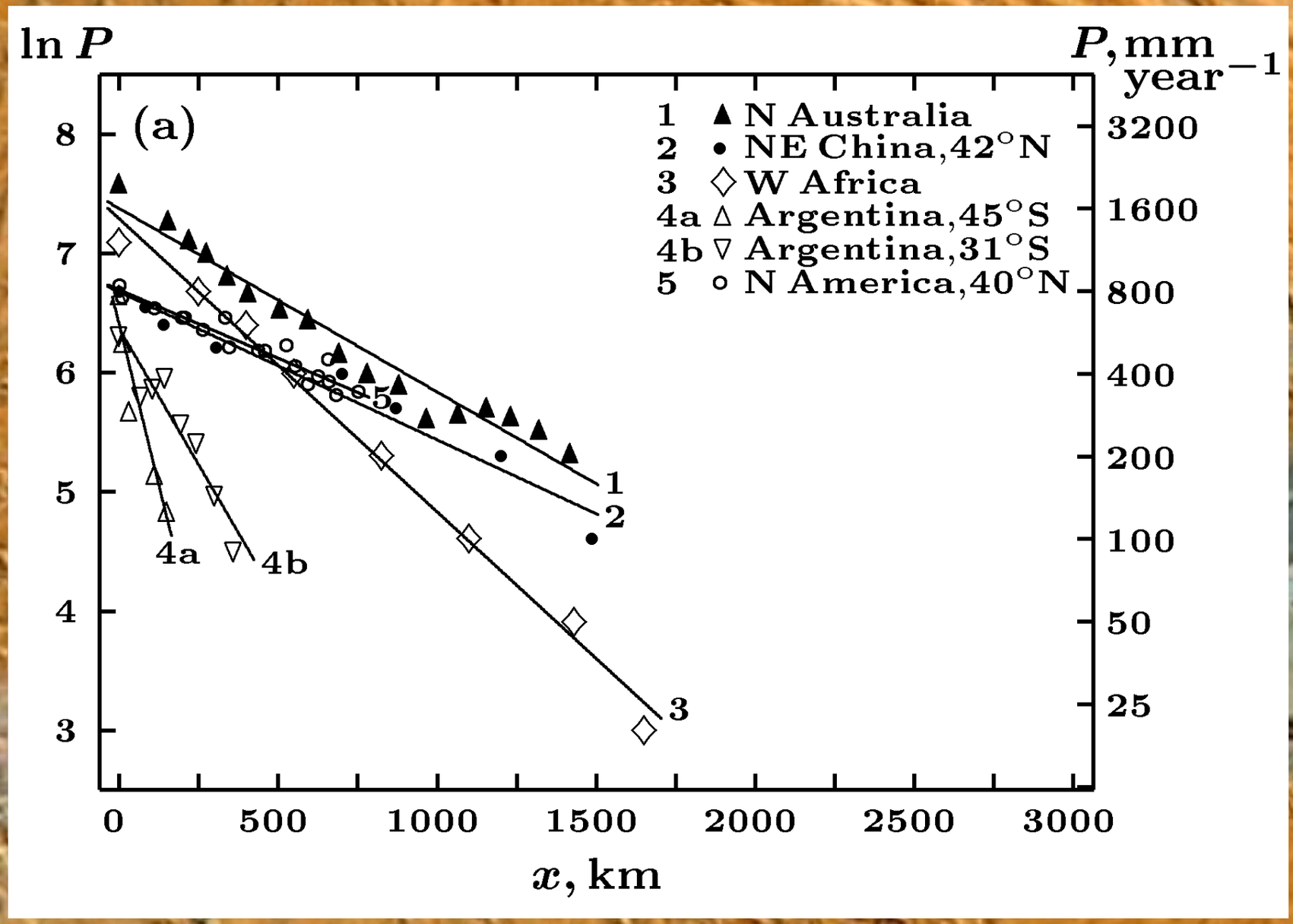
Regions of the world where spatial patterns of precipitation were studied (CCMLP and LBA datasets, time period 1950-1995)

Precipitation versus distance in forest-covered world regions



Precipitation does not decrease with distance from the ocean.

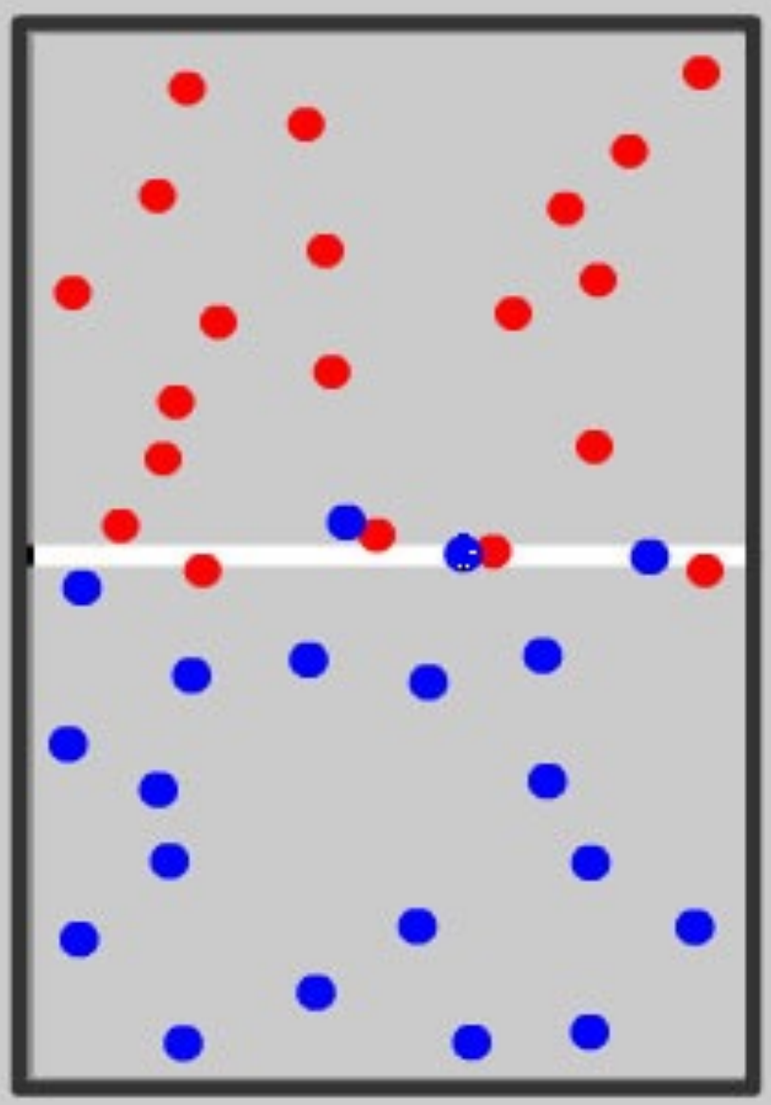
Precipitation versus distance in non-forested regions of the world



Precipitation drops exponentially with distance from the ocean.

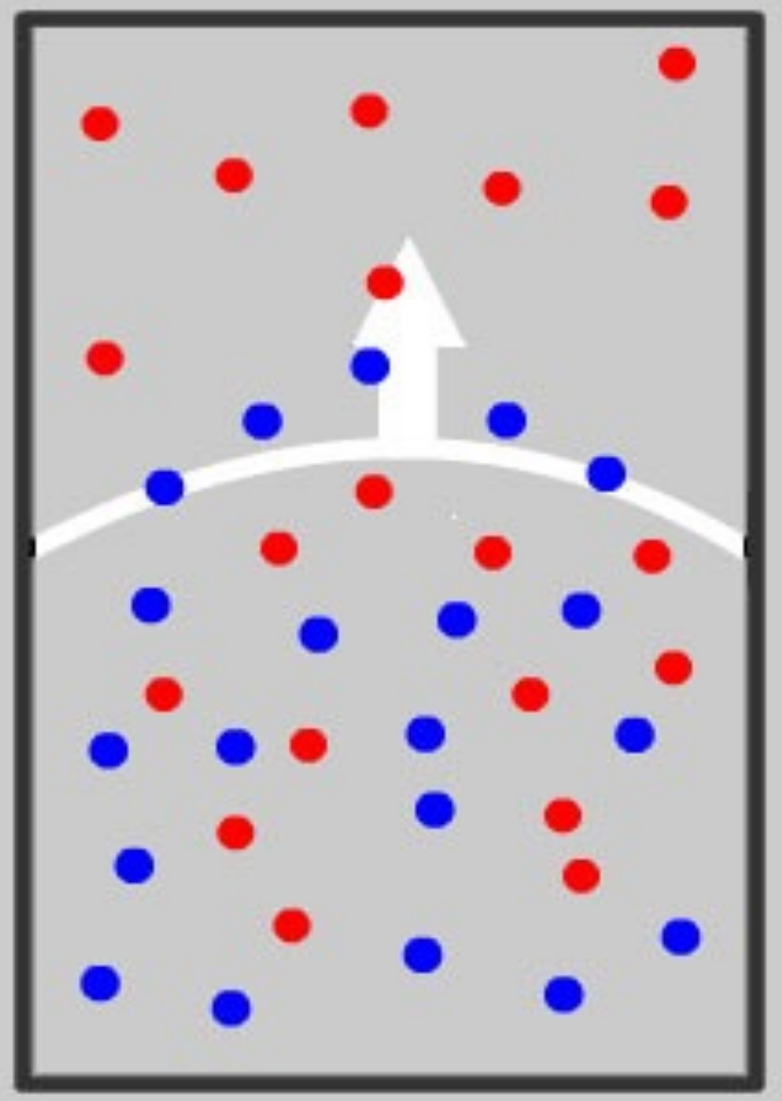
Gases: diffusional and dynamic fluxes

A: no pressure gradient, diffusional flux



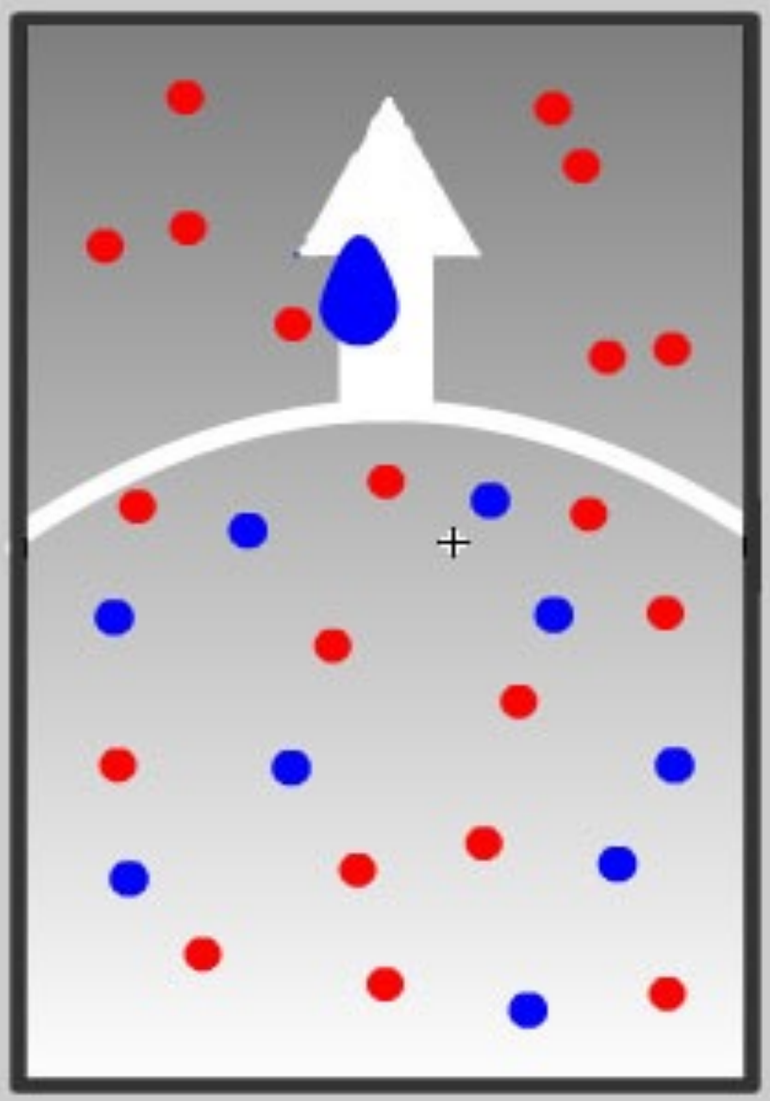
play stop

B: pressure gradient, dynamic flux



play stop

C: condensable gas in temperature gradient



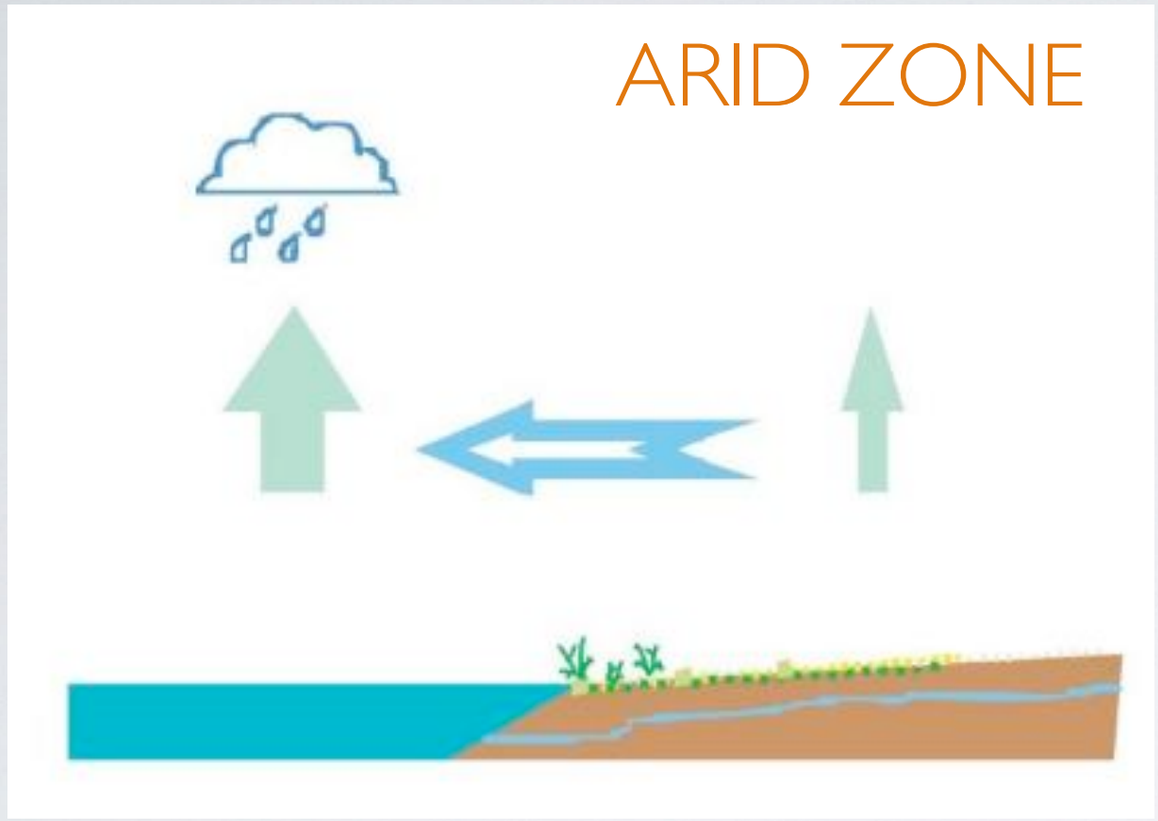
play stop

Notations : - molecule of non-condensable gas

- molecule of condensable gas

- cold

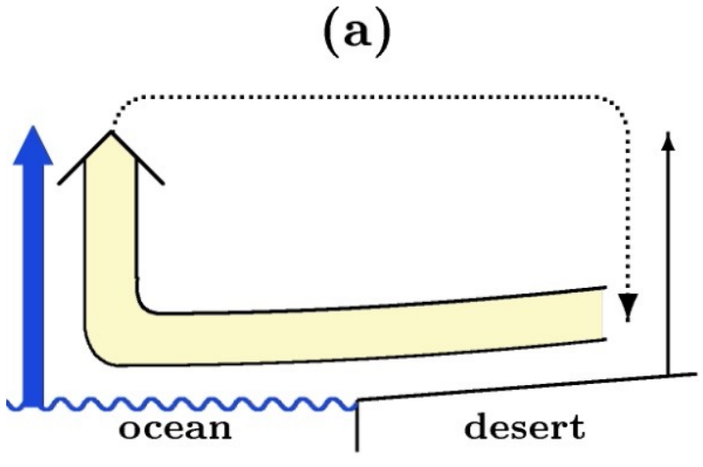
- warm



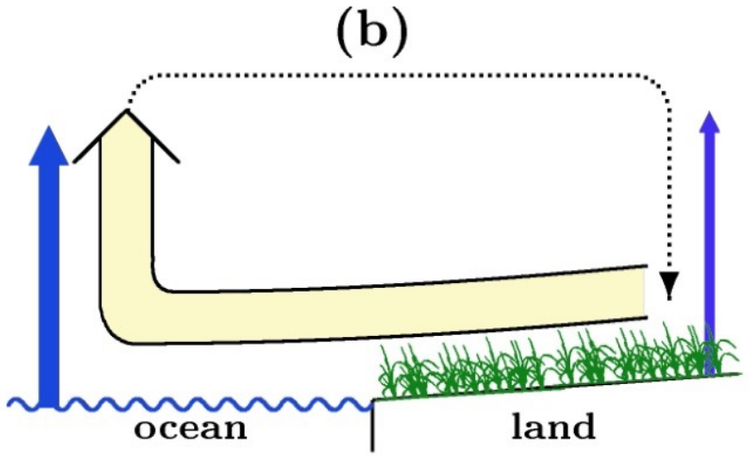
BIOTIC PUMP OF MOISTURE

From Makarieva & Gorshkov BP Theory (2007) drawing from Sheil et al .

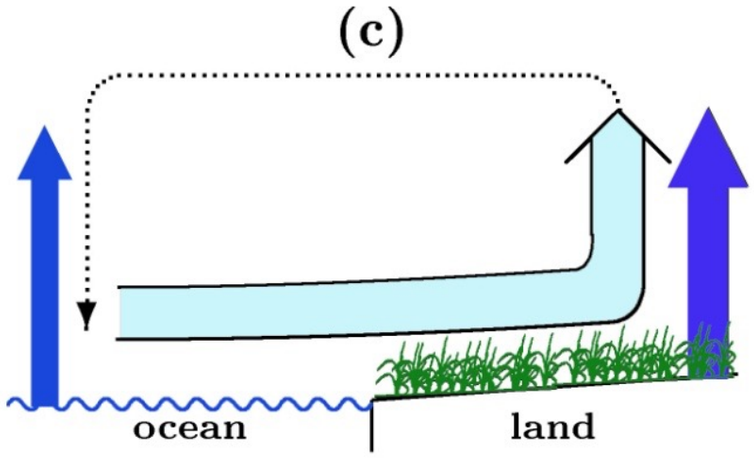
Evaporation, vegetation and atmospheric circulation



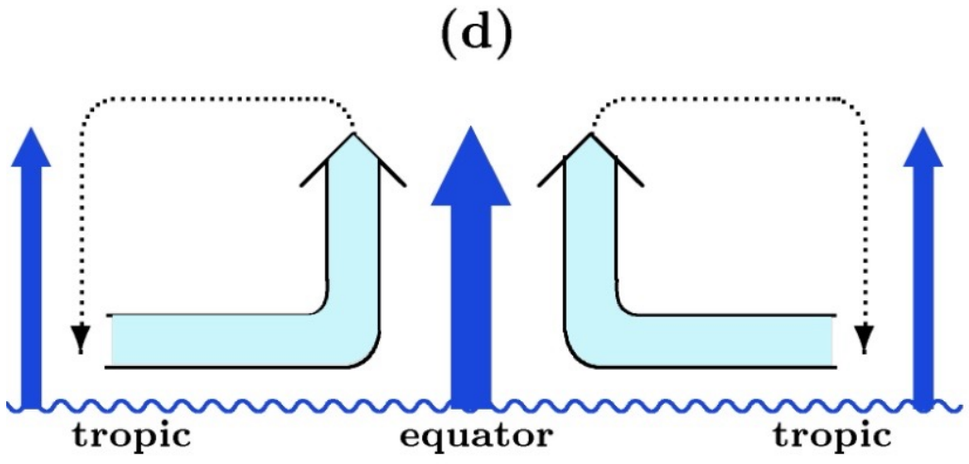
desert locked for moisture



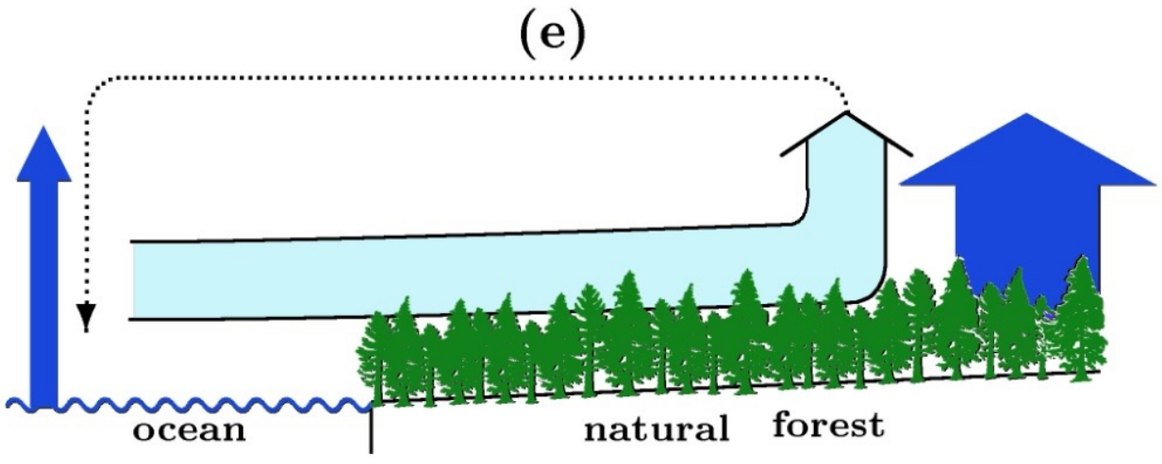
winter monsoon



summer monsoon



Hadley circulation



biotic pump of atmospheric moisture

TWISTER

On the validity of representing hurricanes as Carnot heat engine

A. M. Makarieva et al.

Manuscript submitted to ACPD 2008
Critique of hurricane models

Status: closed

AC: Author comment | **RC**: Referee comment | **SC**: Short comment | **EC**: Editor comment

- Printer-friendly version S - Supplement

AC S7325: 'Response to preliminary criticisms', Anastassia M. Makarieva, 20 Sep 2008
- **RC** S7915: 'Review ', Anonymous Referee #1, 03 Oct 2008
  - **AC** S7947: 'Response to Review of Referee 1', Anastassia M. Makarieva, 04 Oct 2008
    - **RC** S8170: 'Follow-up', Anonymous Referee #1, 12 Oct 2008
      - **AC** S8193: 'Response to Follow-Up by Referee 1', Anastassia M. Makarieva, 13 Oct 2008
      - **AC** S9182: 'Final Response: Heat Release to Space', Anastassia M. Makarieva, 16 Nov 2008

SC S7609: 'Latent work', Anastassia M. Makarieva, 29 Sep 2008
- **SC** S8318: 'Motion from condensation', Semen Sherman, 17 Oct 2008
  - **AC** S8340: 'Latent work: Convective potential energy', Anastassia M. Makarieva, 18 Oct 2008

SC S8164: 'The novel hurricane physics', Andrei Nefiodov, 11 Oct 2008

RC S8531: 'Review ', Anonymous Referee #2, 25 Oct 2008
- **AC** S8904: 'Condensation as Air Circulation Driver', Anastassia M. Makarieva, 10 Nov 2008
  - **RC** S9081: 'Extraordinary novel atmosphere physics', Anonymous Referee #2, 13 Nov 2008
- **SC** S11826: 'Considerations of turbulent friction', Anastassia M. Makarieva, 22 Mar 2009

RC S8627: 'This paper is incoherent', Anonymous Referee #3, 29 Oct 2008
- **AC** S8635: 'Response to Referee #3', Anastassia M. Makarieva, 30 Oct 2008

RC S8627: 'This paper is incoherent', Anonymous Referee #3, 29 Oct 2008
- **AC** S8635: 'Response to Referee #3', Anastassia M. Makarieva, 30 Oct 2008

SC S8669: 'The Sun does not orbit around the Earth.', Paulo Nobre, 30 Oct 2008

SC S8916: 'paper contains bad physics', Antoon Meesters, 10 Nov 2008
- **AC** S8923: 'Bad physics: Latent heat does not warm', Anastassia M. Makarieva, 10 Nov 2008
  - **SC** S8979: 'latent heat in the atmosphere', Antoon Meesters, 11 Nov 2008
    - **AC** S8998: 'Latent heat is irrelevant', Anastassia M. Makarieva, 12 Nov 2008

- **AC** S8931: 'On carelessness and responsibility', Anastassia M. Makarieva, 10 Nov 2008
  - **SC** S9060: 'dissipative engine etc.', Antoon Meesters, 12 Nov 2008

- **SC** S8953: 'The "subtle" issue of perpetuum mobile', Semen Sherman, 11 Nov 2008
  - **AC** S11647: 'Comment on the dissipative heat engine', Anastassia M. Makarieva, 15 Mar 2009

- **AC** S9342: 'Final Response to Dr. Meesters', Anastassia M. Makarieva, 20 Nov 2008
- **AC** S11254: 'Final Response: List of Revisions', Anastassia M. Makarieva, 14 Feb 2009
- **AC** S11260: 'Revised manuscript, part I', Anastassia M. Makarieva, 14 Feb 2009
- **AC** S11275: 'Revised manuscript, part II', Anastassia M. Makarieva, 14 Feb 2009

AC S12153: 'Appeal to the ACP executive committee', Anastassia M. Makarieva, 02 May 2009

EC S12168: 'Editor Report', Peter Haynes, 04 May 2009

EC S12406: 'Final Editor Comment (ACP Exec. Editors)', Ulrich Pöschl, 14 Oct 2009
- **EC** S12426: 'Appendices 1 to 7', Ulrich Pöschl, 15 Oct 2009

Conclusion:

K. Emanuel (MIT) hurricane model violated first and second thermodynamic principles
> recycling waste heat
> Perpetuum Mobile <

Física: explicando furacões, tornados e ciclones

Physics Letters A 373 (2009) 4201–4205

Contents lists available at ScienceDirect

Physics Letters A

www.elsevier.com/locate/pla

Condensation-induced kinematics and dynamics of cyclones, hurricanes and tornadoes

A.M. Makarieva *, V.G. Gorshkov

Theoretical Physics Division, Petersburg Nuclear Physics Institute, Gatchina, St. Petersburg, Russia

ARTICLE INFO

Article history:
Received 15 August 2009
Accepted 2 September 2009
Available online 23 September 2009
Communicated by V.M. Agranovich

PACS:
47.10.-g
47.90.+a
47.45.-n
51.90.+r

Keywords:
Condensation
Water vapor
Rotation
Atmospheric circulation
Radial symmetry

ABSTRACT

A universal equation is obtained for air pressure and wind velocity in cyclones, hurricanes and tornadoes as dependent on the distance from the center of the considered wind pattern driven by water vapor condensation. The obtained theoretical estimates of the horizontal profiles of air pressure and wind velocity, eye and wind wall radius in hurricanes and tornadoes and maximum values of the radial, tangential and vertical velocity components are in good agreement with empirical evidence.

FURACÃO

uma implosão em câmara lenta gerada pela condensação em um sumidouro de vapor, com aceleração centrípeta e rotação gerada pelo efeito de Coriolis

European Geosciences Union

Atmospheric Chemistry and Physics

Article

Atmos. Chem. Phys., 13, 1039–1056, 2013
https://doi.org/10.5194/acp-13-1039-2013

Research article

25 Jan 2013

Where do winds come from? A new theory on how water vapor condensation influences atmospheric

Blogosphere Peer Review

(before publication)

The Air Vent, 1500+ comments

https://noconsensus.wordpress.com/2010/10/15/where-do-winds-come-from/

https://noconsensus.wordpress.com/2010/10/19/momentary-lapse-of-reason/

The Blackboard: 400+ comments (http://rankexploits.com/musings/2010/equation-34/)

Climate, Etc.: appeal to find two formal reviewers for ACP

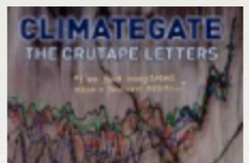
(after publication):

Climate, Etc.: 1404 comments (https://judithcurry.com/2013/01/31/condensation-driven-winds-an-update-new-version/)

And others, of great repercussion.

Search

JeffId1 at gmail dot com



« Nice Job Russia — Good call.

Robust? »

Where do winds come from?

Posted by **Jeff Id** on October 15, 2010

Discussion continued at this post:

Again, some very important (and simple) confirmation of condensation driven winds. When you see the top of clouds forming or evaporating, it should make you think. The paper is open for scientific commentary there and blog commentary here.

———-

Anastassia Makarieva

Where do winds come from? A new theory on how water vapor condensation influences atmospheric pressure and dynamics

Makarieva A.M., Gorshkov V.G., Sheil D., Nobre A.D., Li B.-L.

now up for public discussion at ACPD:

Atmos. Chem. Phys., 13, 1039–1056, 2013
www.atmos-chem-phys.net/13/1039/2013/
doi:10.5194/acp-13-1039-2013

Atmospheric Chemistry and Physics

Where do winds come from? A new theory on how water vapor condensation influences atmospheric pressure and dynamics

A. M. Makarieva[1,2], V. G. Gorshkov[1,2], D. Sheil[3,4,5], A. D. Nobre[6,7], and B.-L. Li[2]

[1]Theoretical Physics Division, Petersburg Nuclear Physics Institute, 188300, Gatchina, St. Petersburg, Russia
[2]XIEG-UCR International Center for Arid Land Ecology, University of California, Riverside, CA 92521, USA
[3]School of Environment, Science and Engineering, Southern Cross University, P.O. Box 157, Lismore, NSW 2480, Australia
[4]Institute of Tropical Forest Conservation, Mbarara University of Science and Technology, Kabale, Uganda
[5]Center for International Forestry Research, P.O. Box 0113 BOCBD, Bogor 16000, Indonesia
[6]Centro de Ciência do Sistema Terrestre INPE, São José dos Campos SP 12227-010, Brazil
[7]Instituto Nacional de Pesquisas da Amazônia, Manaus AM 69060-001, Brazil

Correspondence to: A. M. Makarieva (ammakarieva@gmail.com) and D. Sheil (douglassheil@itfc.org)

Received: 5 August 2010 – Published in Atmos. Chem. Phys. Discuss.: 15 October 2010
Revised: 29 April 2011 – Accepted: 3 December 2012 – Published: 25 January 2013

Abstract. Phase transitions of atmospheric water play a ubiquitous role in the Earth's climate system, but their direct

1 Introduction

Publicado junto do paper essa nota dos editores:

Editor Comment.

(1) The paper is highly controversial, proposing a fundamentally new view that seems to be in contradiction to common textbook knowledge.

(2) The majority of reviewers and experts in the field seem to disagree, whereas some colleagues provide support, and the handling editor (and the executive committee) are not convinced that the new view presented in the controversial paper is wrong.

Ou seja, editor e o corpo editorial da revista estavam seguindo as discussões na blogosfera

The authors have presented an entirely new view of what may be driving dynamics in the atmosphere. This new theory has been subject to considerable criticism which any reader can see in the public review and interactive discussion of the manuscript in ACPD (http://www.atmos-chem-phys-discuss.net/10/24015/2010/acpd-10-24015-2010-discussion.html). Normally, the negative reviewer comments would not lead to final acceptance and publication of a manuscript in ACP. After extensive deliberation however, the editor concluded that the revised manuscript still should be published – despite the strong criticism from the esteemed reviewers – to promote continuation of the scientific dialogue on the controversial theory. This is not an endorsement or confirmation of the theory, but rather a call for further development of the arguments presented in the paper that shall lead to conclusive disproof or validation by the scientific community. In addition to the above manuscript-specific comment from the handling editor, the following lines from the ACP executive committee shall provide a general explanation for the exceptional approach taken in this case and the precedent set for potentially similar future cases: (1) The paper is highly controversial, proposing a fundamentally new view that seems to be in contradiction to common textbook knowledge. (2) The majority of reviewers and experts in the field seem to disagree, whereas some colleagues provide support, and the handling editor (and the executive committee) are not convinced that the new view presented in the controversial paper is wrong. (3) The handling editor (and the executive committee) concluded to allow final publication of the manuscript in ACP, in order to facilitate further development of the presented arguments, which may lead to disproof or validation by the scientific community.

Half of the Amazon's rain comes from the forest's own moisture. Could it also make winds that ferry rain across continents? BRUSINI AURÉLIEN/HEMIS/ALAMY STOCK PHOTO

A controversial Russian theory claims forests don't just make rain—they make wind

By Fred Pearce | Jun. 18, 2020 , 12:00 PM

The Biotic Pump: How Forests Create Rain

https://www.youtube.com/watch?v=kKL40aBg-7E

Os Rios Voadores:
não deixando espaço para o negacionismo

VOL. 17, NO. 12 JOURNAL OF CLIMATE 15 JUNE 2004

Climatology of the Low-Level Jet East of the Andes as Derived from the NCEP–NCAR Reanalyses: Characteristics and Temporal Variability

JOSE A. MARENGO AND WAGNER R. SOARES

CPTEC/INPE, São Paulo, Brazil

CELESTE SAULO AND MATILDE NICOLINI

CIMA/University of Buenos Aires, Buenos Aires, Argentina

(Manuscript received 15 January 2003, in final form 14 January 2004)

ABSTRACT

A climatology of the South American low-level jet east of the Andes (SALLJ) is developed using the 1950–2000 circulation and moisture fields from the NCEP–NCAR reanalyses and available upper-air observations made in Bolivia and Paraguay since 1998. Upper- and low-level circulation fields were derived for seasonal means and SALLJ composites during the warm and cold seasons. The Bonner criterion 1 was applied for sites in central Bolivia and downstream near northern Paraguay, to determine the spatial and temporal characteristics of the SALLJ. On the circulation characteristics, SALLJ composites during the warm season show the enhanced low-level meridional moisture transport coming from equatorial South America as well as an upper-level wave train emanating from the west Pacific propagating toward South America. The intensification of the warm season SALLJ follows the establishment of an upper-level ridge over southern Brazil and a trough over most of Argentina. The circulation anomalies at upper and lower levels suggest that the intensification of the SALLJ would lead

Brasil das Águas

Gerard Moss
Margi Moss

Rios Voadores

TEDx “tem um rio em cima de nós”

http://tedxamazonia.com.br/tedtalk/antonio-donato

Rios são as Veias da Terra

Photo Credit: Margie Moss, Rios Voadores

nascente

Oceano Azul

Photo Credit: Margie Moss, Rios Voadores

curso

Oceano Verde

PhotoCredit: Antonio Donato Nobre, LBA

foz

Terra da Gente...

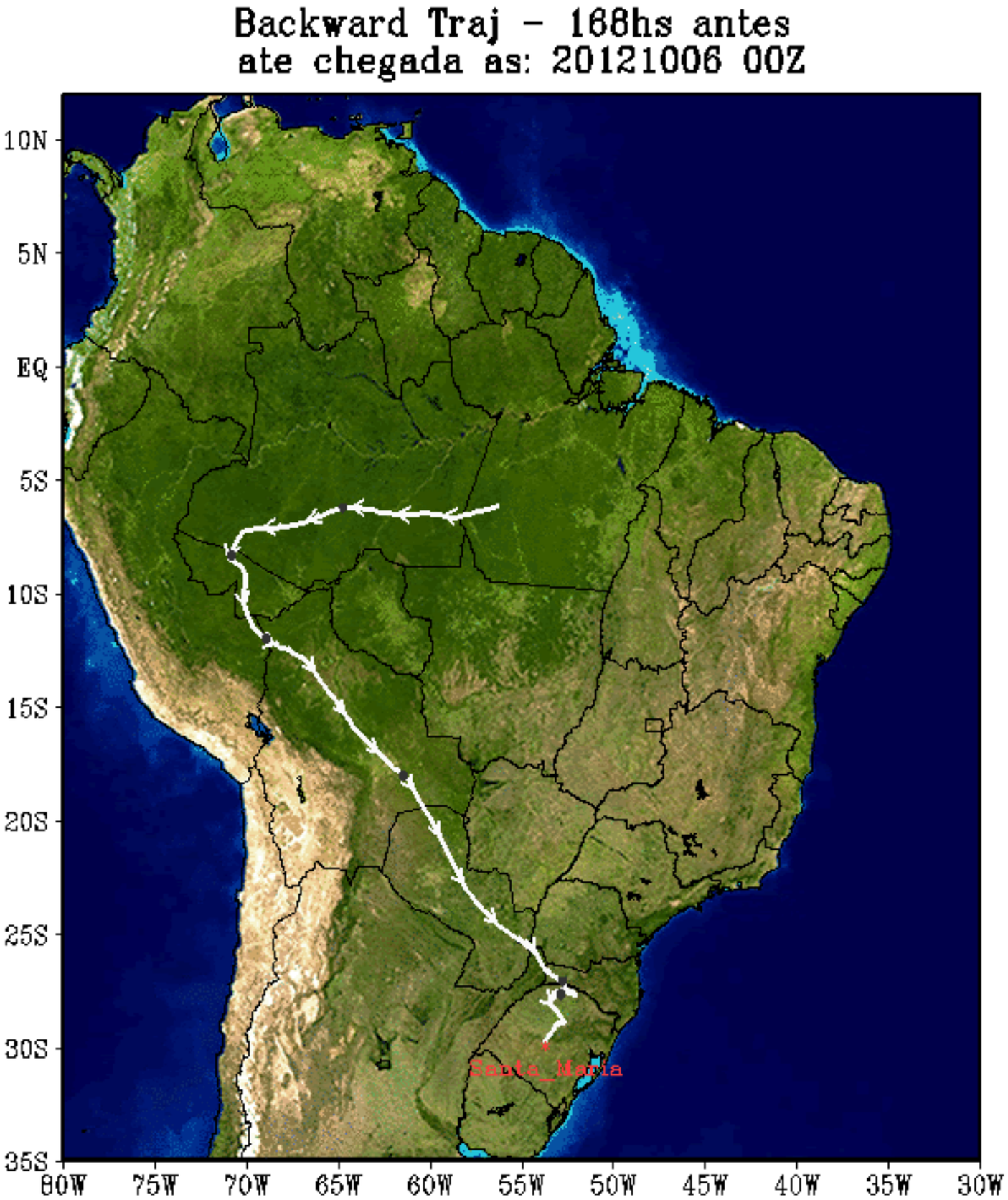
Photo Credit: Margie Moss, Rios Voadores

conquistando o senso comum...

credits: flying rivers project

Santa Maria RS

6/outubro/2012



Trajetória de massa de ar úmido computada com modelo lagrangiano

Créditos Projeto Rios Voadores
Computação Demerval Soares Moreira


1 Calor equatorial evapora oceano
2 Nuvens avançam trocando umidade com a floresta
3 Chegando nos Andes, chuvas formam cabeceira do Amazonas
4 O resto da umidade vem irrigar o Sul e Sudeste
RIOS AÉREOS
SÃO DESTRUÍDOS PELO DESMATAMENTO

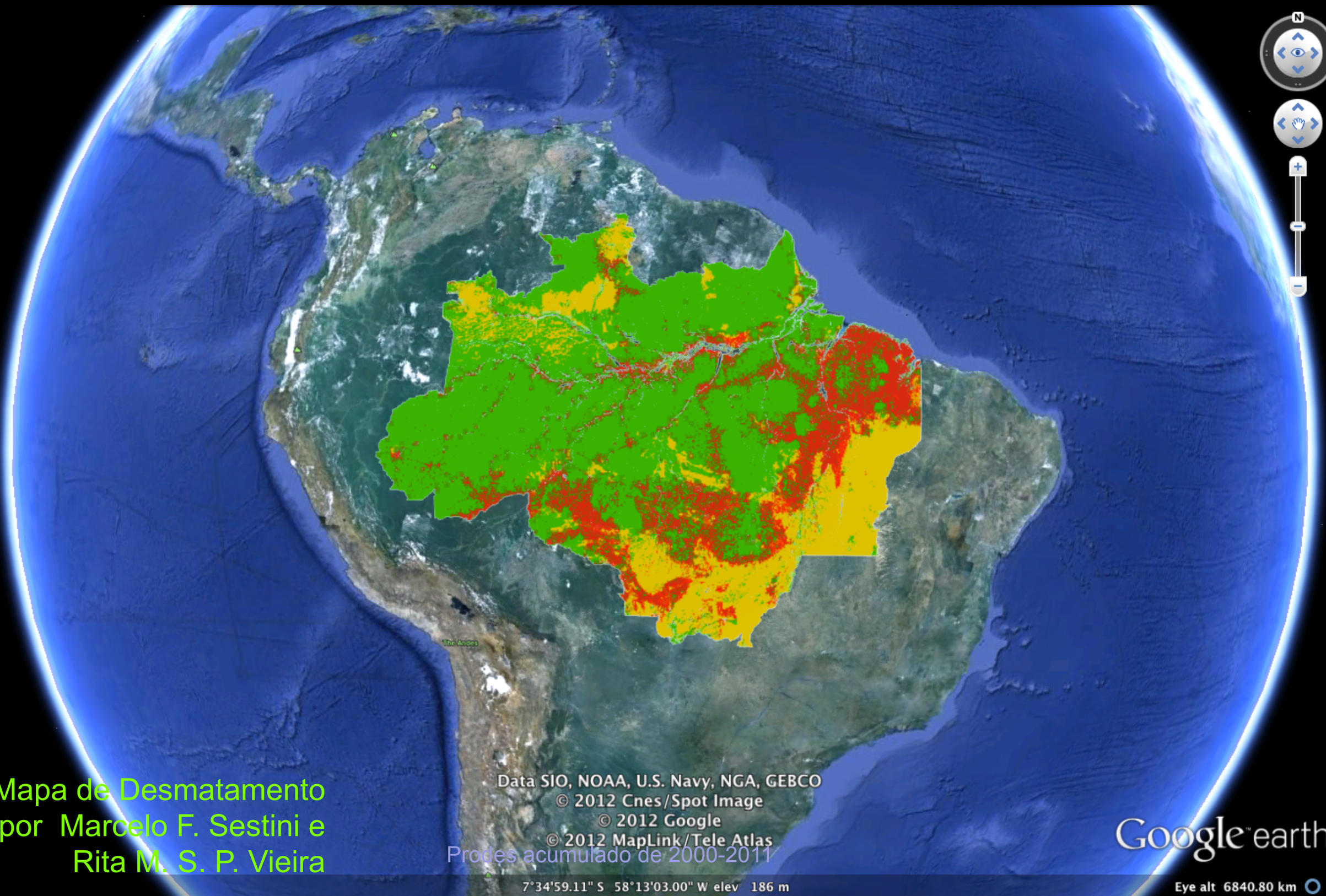

RIOS AÉREOS SÃO ARTÉRIAS
A floresta
bombeia água
pelo continente
RIOS SÃO VEIAS

Bomba Biótica e os Rios Voadores

Vegetação no Tempo de Cabral

Mapa de Vegetação por
Marcelo F. Sestini e
Rita M. S. P. Vieira

Desmatamento: quebrando a bomba, secando os rios voadores



Mapa de Desmatamento
por Marcelo F. Sestini e
Rita M. S. P. Vieira

para reflexão

- A partir do paper The Art of Hydrology, ler duas peças da discussão na HESSD:

  - Models and theories

…to the degree the model is a model and not a theory, it lacks the predictive power. Because of the obvious fact that it cannot be expected that the calibrations made on the basis of the known data will remain valid in the domain of predicted (i.e. still unknown) data. This is a conceptual, fundamental problem with the modeling approach.

  - Theories vs data simulation spectrum

Teoria: independe de observações

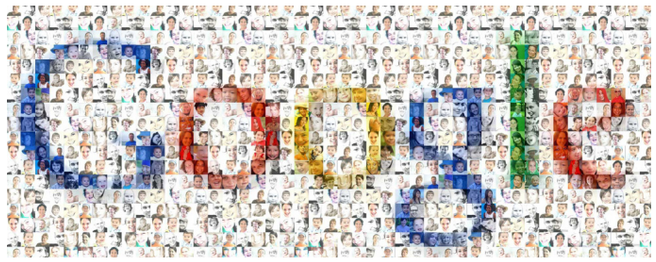
tem capacidade preditiva

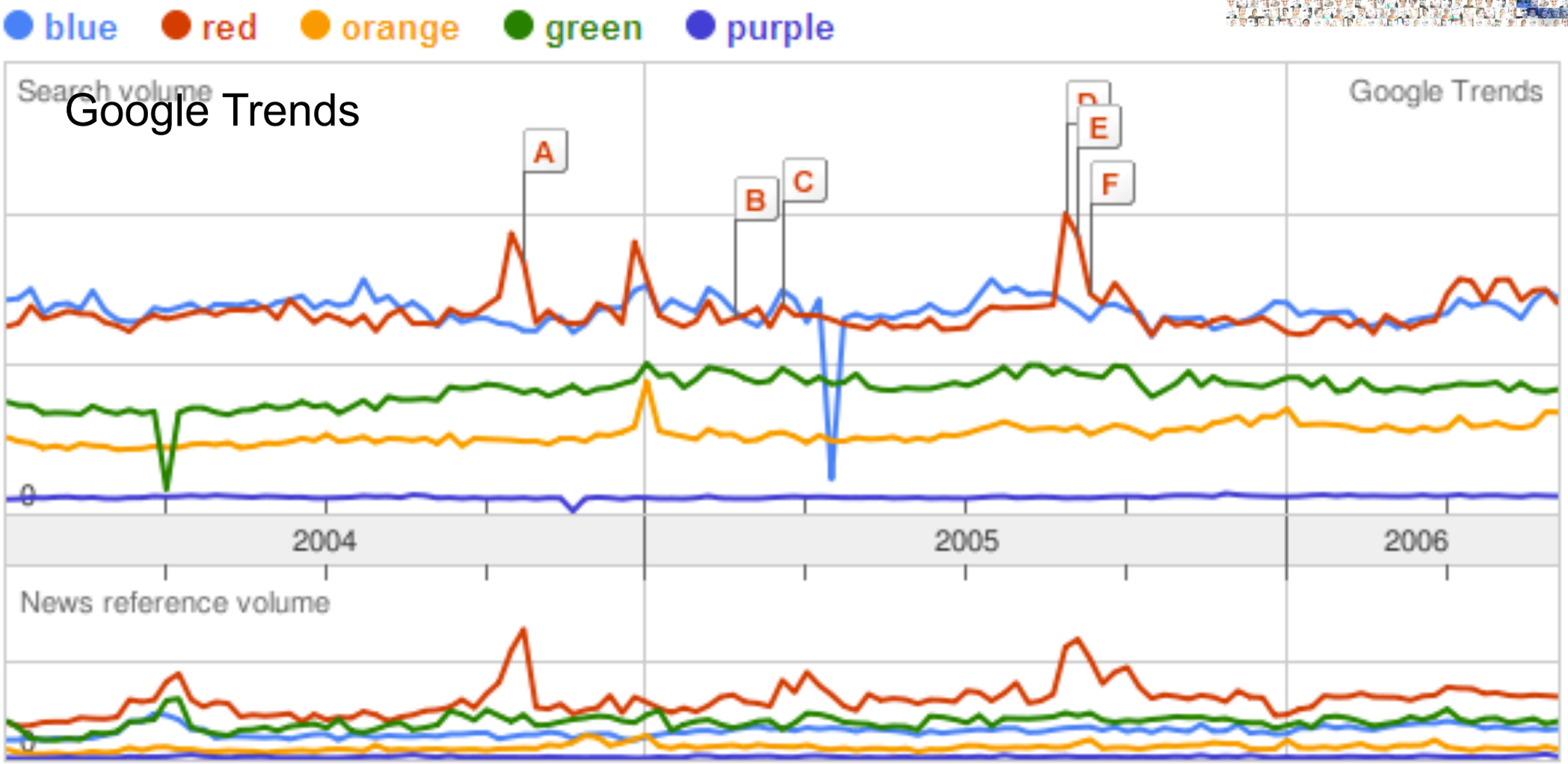
Estrutura cognitiva baseada
nas leis da Natureza

Modelo empírico: depende de observações

não tem capacidade preditiva

(só descritiva e extrapolativa)



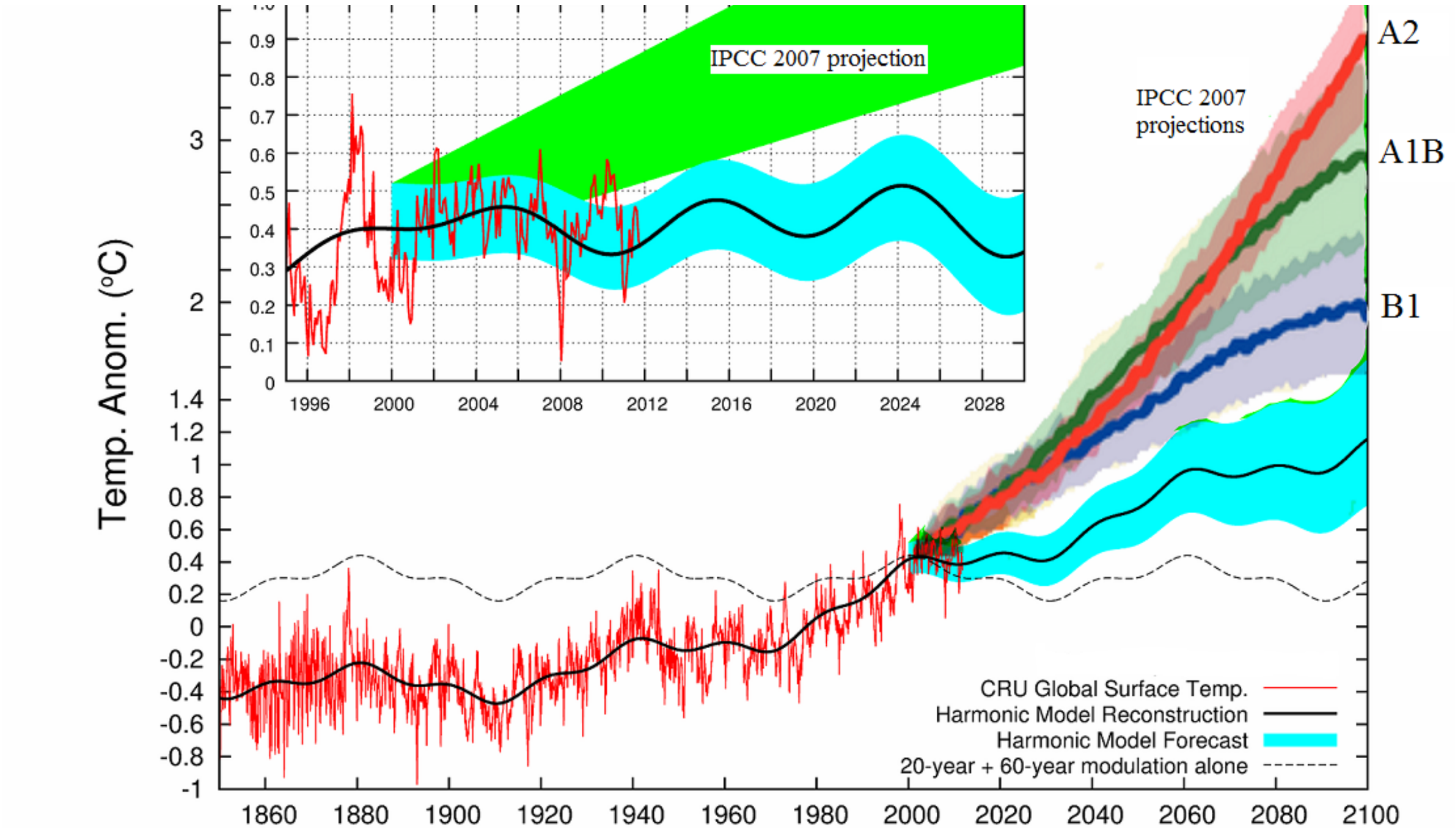


Estrutura cognitiva baseada na mímica dos dados (ou comportamento)

Modelo Ambiental: o pior dos dois mundos!!

fraca referencia às leis da Natureza

fraca disponibilidade de dados observacionais



Modelos vs Teorias (segundo Makarieva)

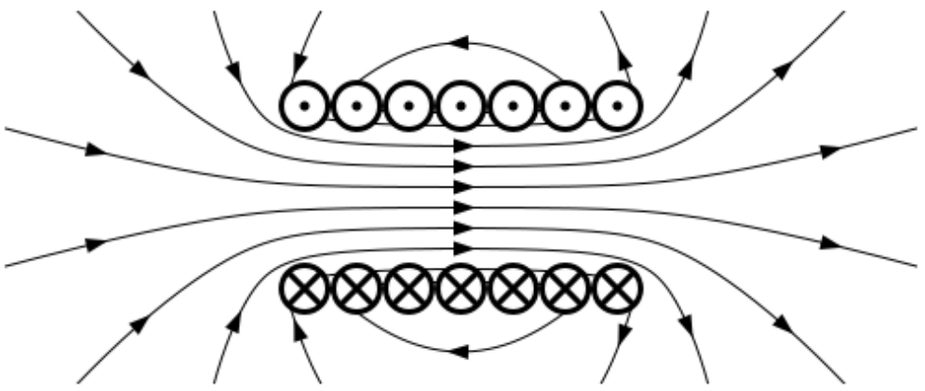
- Qual a diferença entre modelos e teorias?
  - Modelos buscam primeiro concordar com os dados
  - Teorias buscam primeiro concordar com as leis da Natureza; e então explicam os dados

Teorias e leis da Natureza não são correlações estatísticas, mas sim relações exatas de variáveis mensuráveis e estritamente definidas (Brillouin, 1956)

diferente abordagens

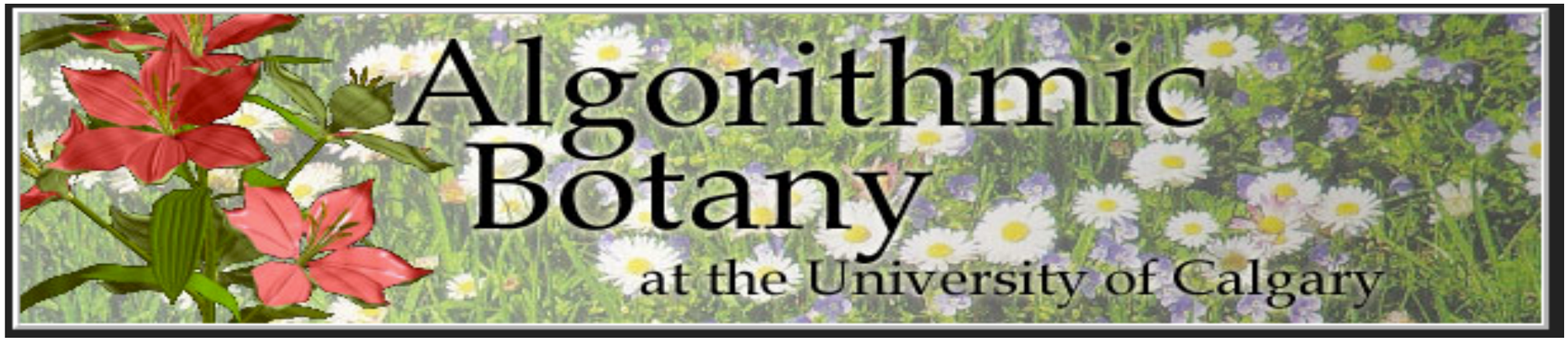
Imitativo: descrição gráfica (ou estatística) das linhas do campo magnético [amostrando a distribuição das partículas de Fe que são orientadas pelo campo]

Germinativo: descrição com a lei da Natureza [explicada na teoria] que determina o campo magnético .



$$\mathbf{F} = \nabla (\mathbf{m} \cdot \mathbf{B})$$

Modelos Germinativos



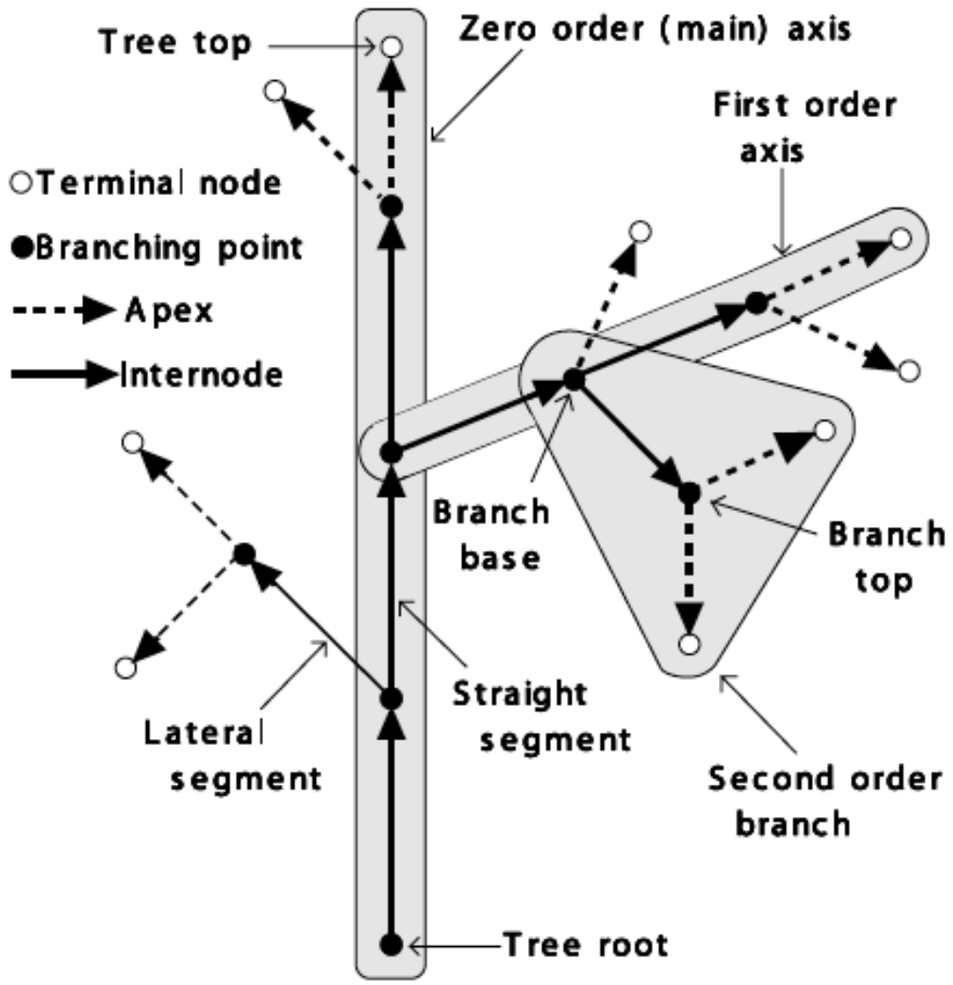
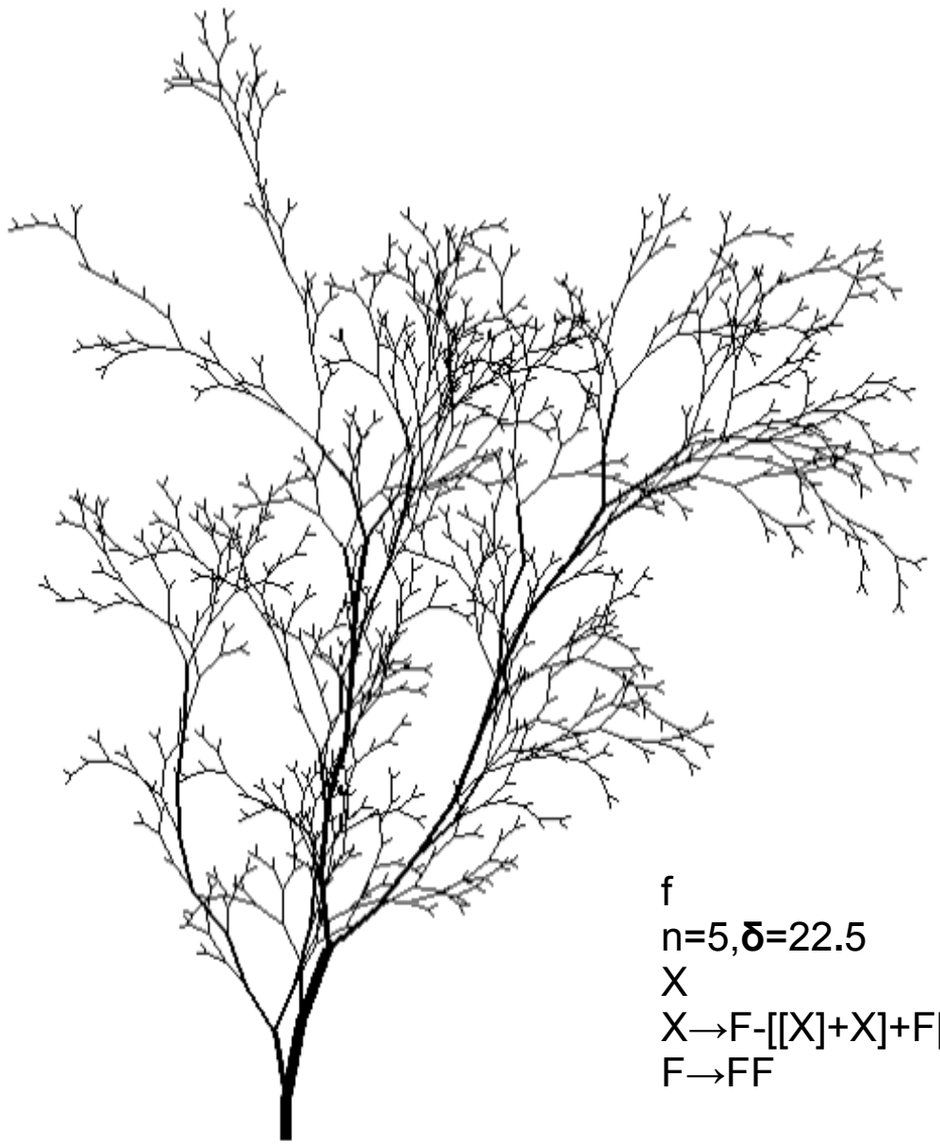


Figure 1.20: An axial tree

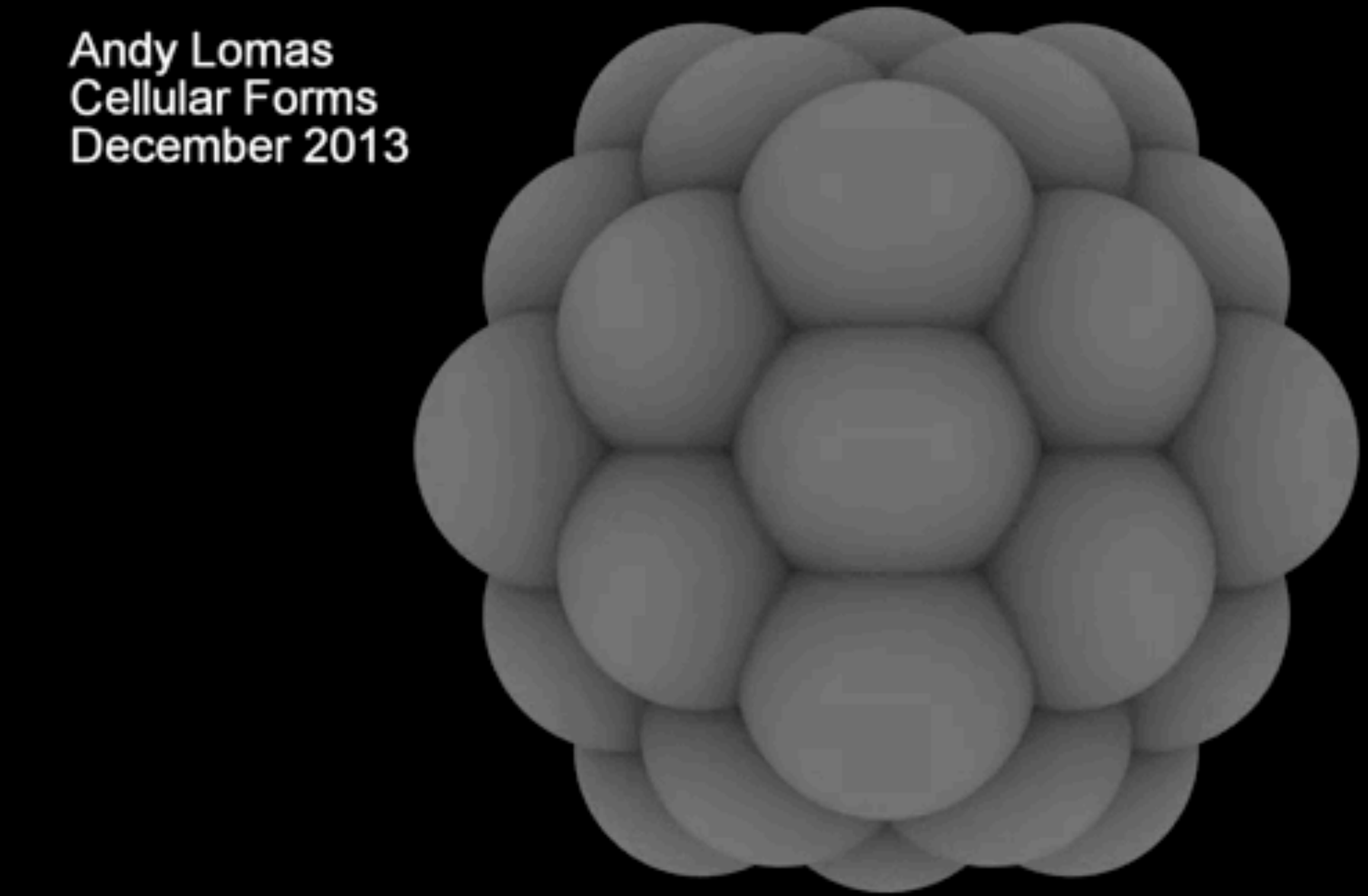


f
n=5,δ=22.5
X
X→F-[[X]+X]+F[+FX]-X
F→FF

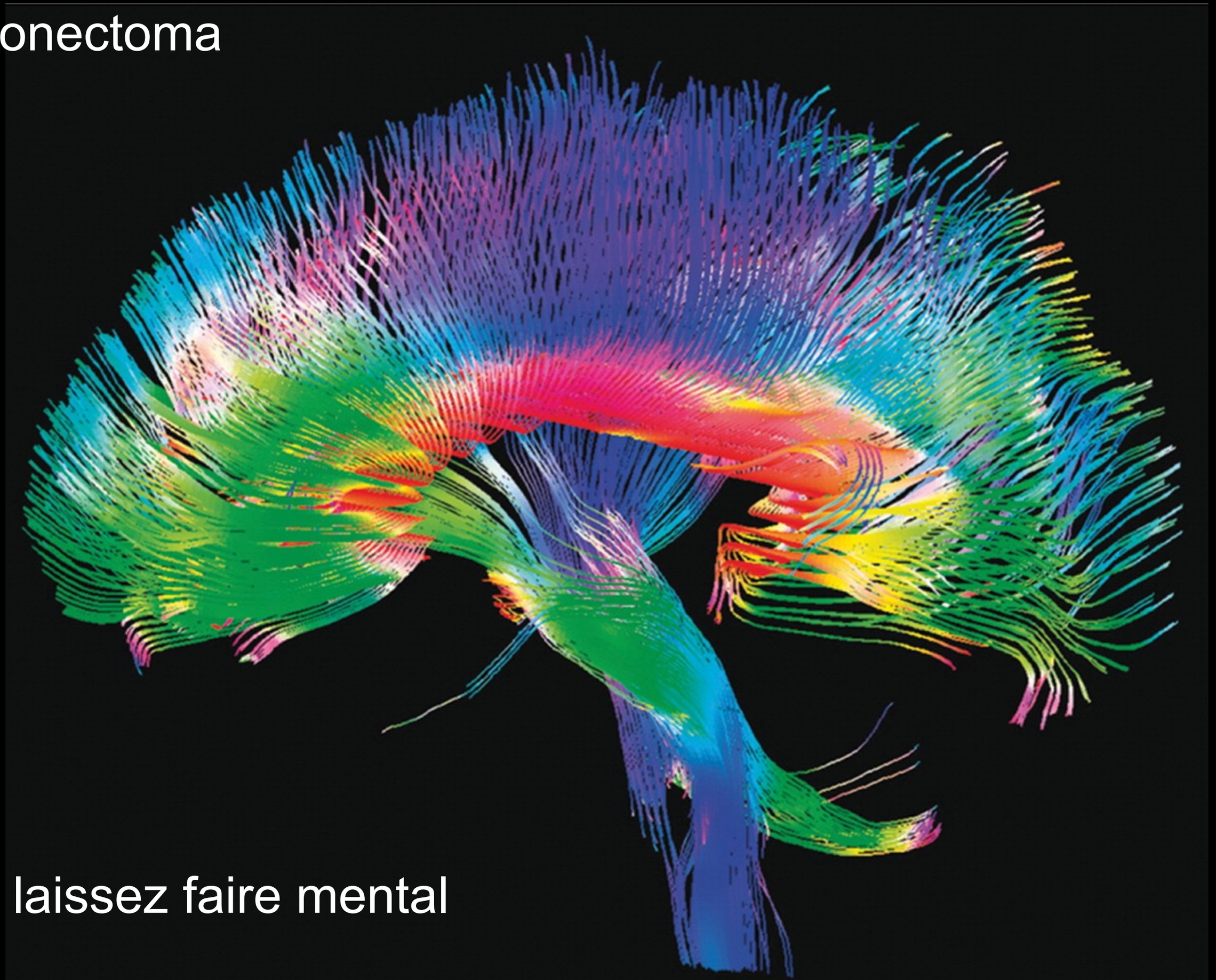
Figure 1.21: Sample tree generated using a method based on Horton–Strahler analysis of branching patterns

Modelo Germinativo

A incrível coreografia do crescimento em uma população simulada de células



conectoma



laissez faire mental

agua liquida na superfície é instável

reflexão do sol

aprisionamento calor

gelo

vapor

Planeta congelado

Planeta Sauna

resfriamento

aquecimento

grato pela atenção