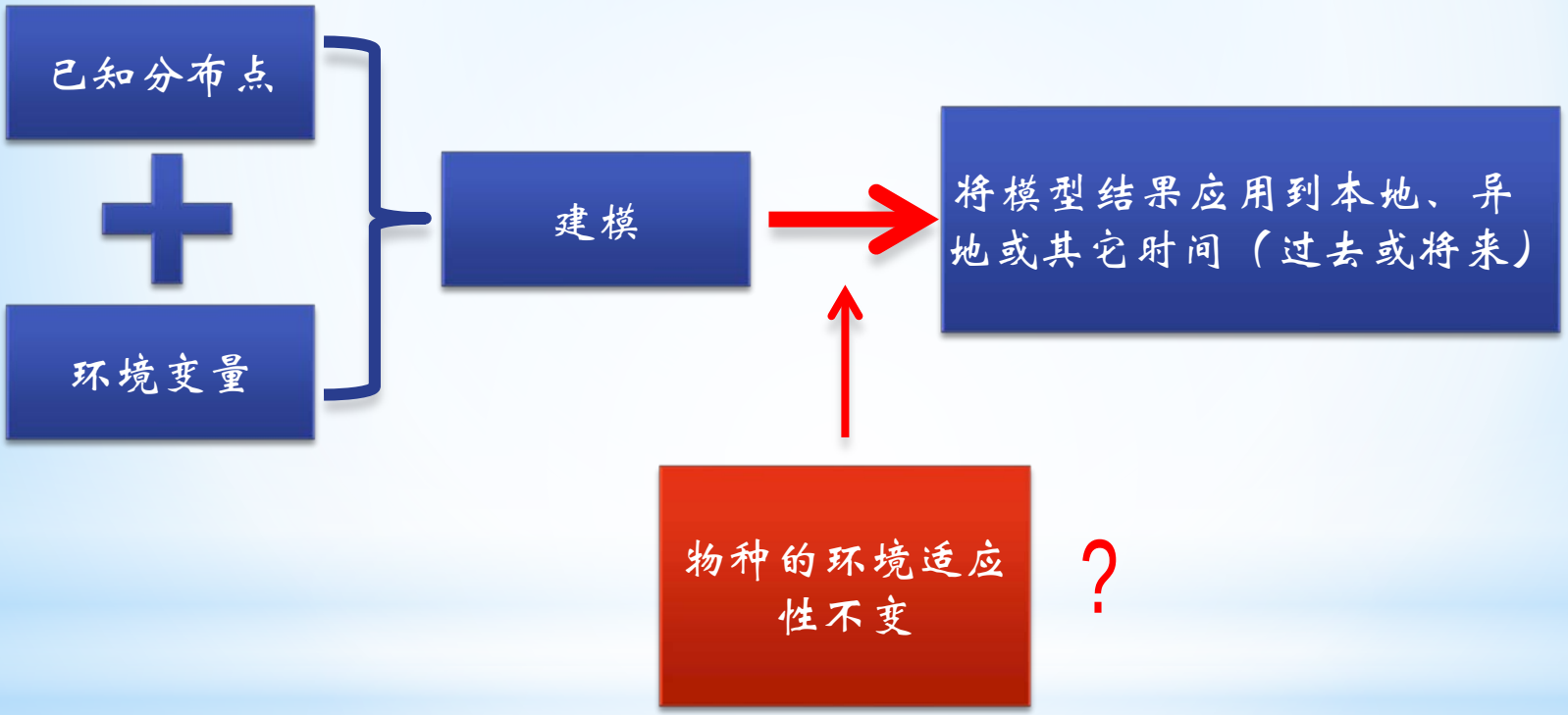
*衡量生态位的变化

中科院动物所 乔慧捷

2014-8-15

*从生态位模型/物种分布模型/栖息地模型说起



*研究背景与现状

* **科学问题：** 物种的（基础）生态位是保守还是多变的
* **研究对象：** 不同物种（近缘种，姊妹种），同一物种（外来种，气候变化）
* **评价指标：** 生态位重叠程度
* **研究方法**
  * 基于生态位模型的比较方法，如ENMTools利用Maxent比较模型结果的相似度
  * 基于分布点环境与背景数据，比较分布点环境的差异度与背景差异度之间的关系等
* **结论：** 生态位是保守还是多变，尚无定论。较为公认的结论是生态位在小的时间尺度上保守，大的时间尺度上多变。但也有很多反例。
* **现状：** 活跃；观点众多；完整的推理/逻辑链条；可用的研究方法有限；软件成熟，流程化。
* 典型文献
  * Warren, D. L., et al. (2010)、Broennimann, O., et al. (2012)、Owens, H. L., et al. (2013)、Guisan, A., et al. (2014)

*研究背景与现状

SELECTED QUOTES FROM SURVEY RESPONDENTS

"The research question and the data should be king, with an approach being selected on the basis that it is appropriate to both the research question and the data rather than the research question and the data being selected to fit the approach which a person knows how to use."

"I regularly see peer-reviewed articles that apply SDM incorrectly from either a statistical or inferential perspective. This is largely a user problem rather than a software problem as some people treat [SDM Software] as black boxes rather than inferential tools, and thus do not put in the intellectual effort required to do good work."

"We don't need fancier software, we need people who understand ecology and the importance of multiple types of data … The key is the ability to think in ecological terms."

Joppa, L. N., et al. (2013). Science **340(6134): 814-815.**

*软件成熟为什么不好？

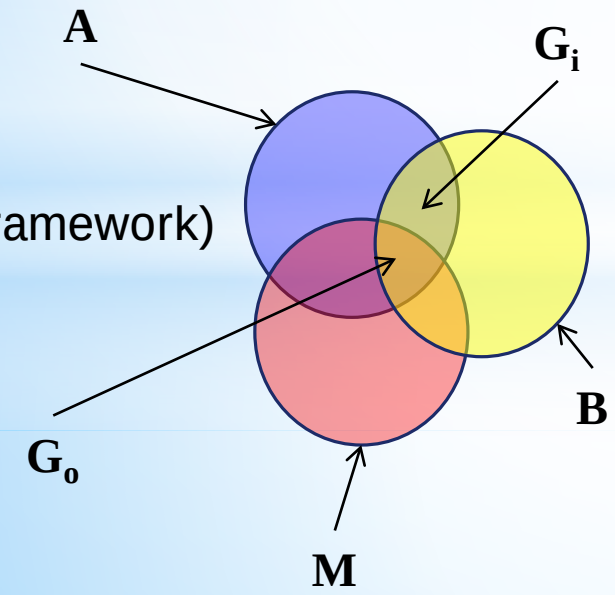
利用现有的软件对数据进行黑箱分析是有风险的行为。因此，我们需要一个有效的手段，从概念出发，对数据进行逐级、逐步的分析。

概念

* 基本概念
  * 基础生态位 (N_F)
  * 实际生态位 (N_R)
* 衍生概念
  * 实际基础生态位/潜在生态位 (N_{F*})
  * 耐受生态位 (N_T)

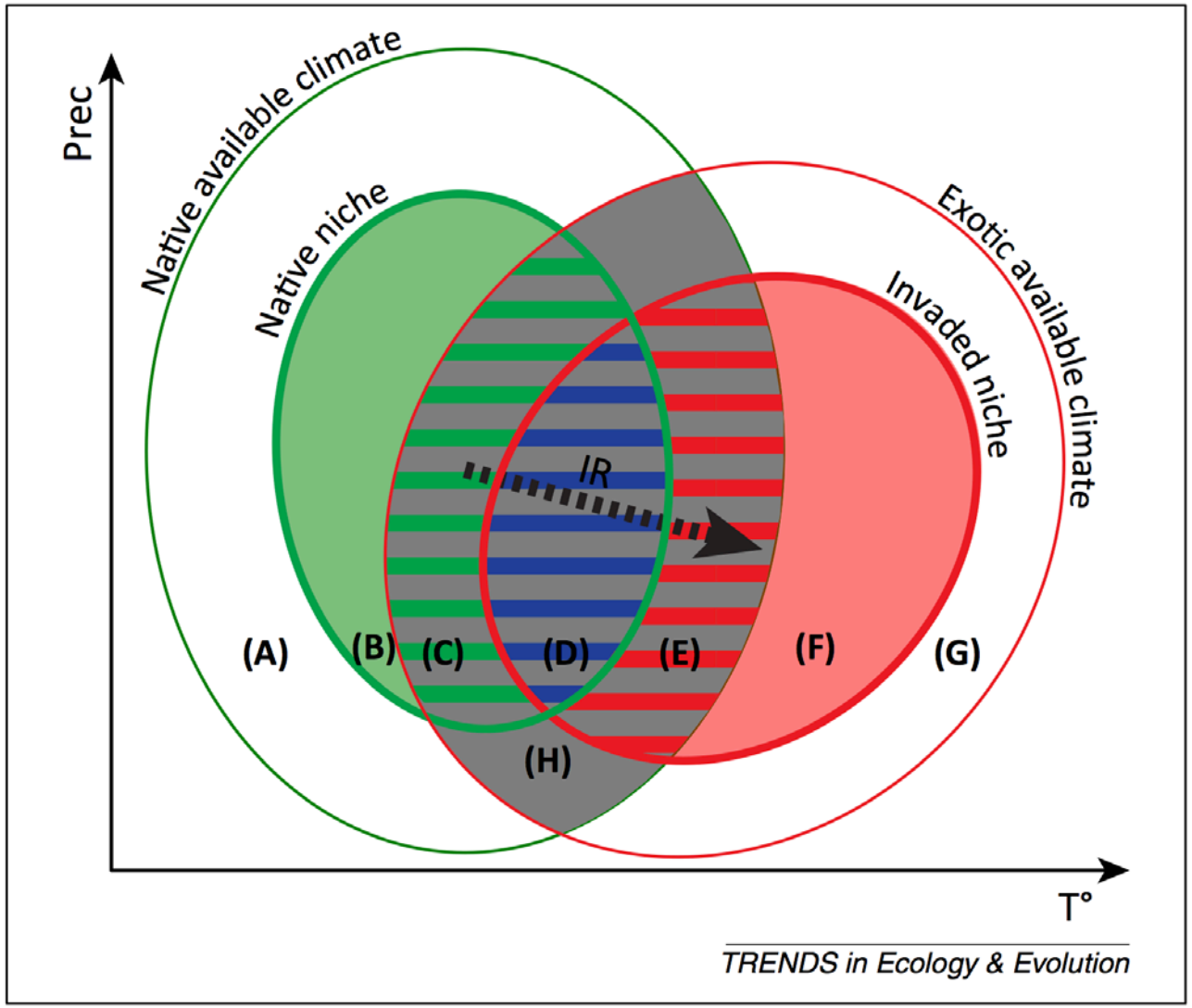
相关概念

* 分布地 (Distribution)
* 栖息地，生境等 (Habitat, Biotope)
* 空间
  * 地理空间(G), N_{F*}
  * 环境空间/生态位空间 (E), N_F

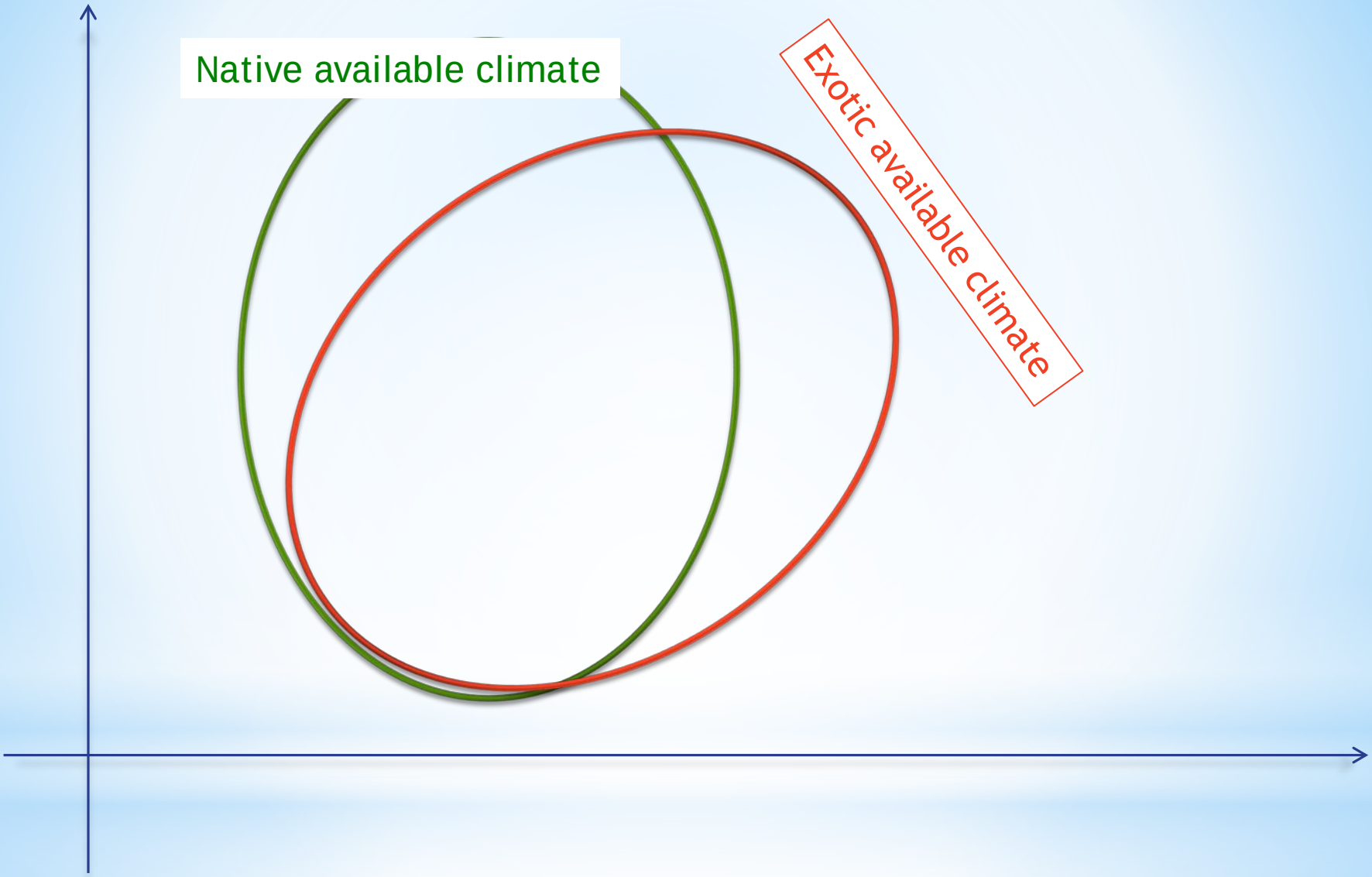


(BAM Framework)

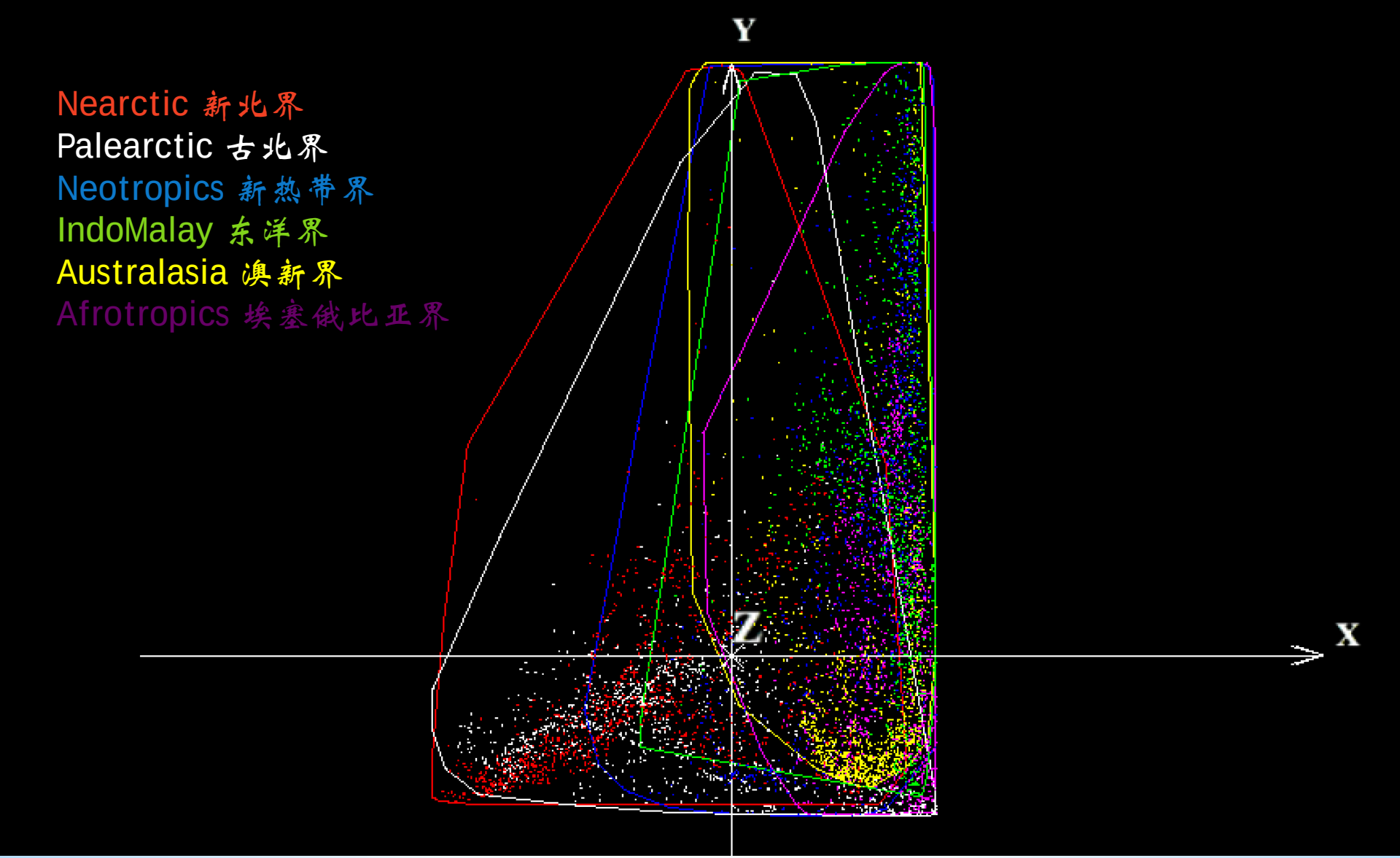
* 何为生态位？



* Guisan, A., et al. (2014)

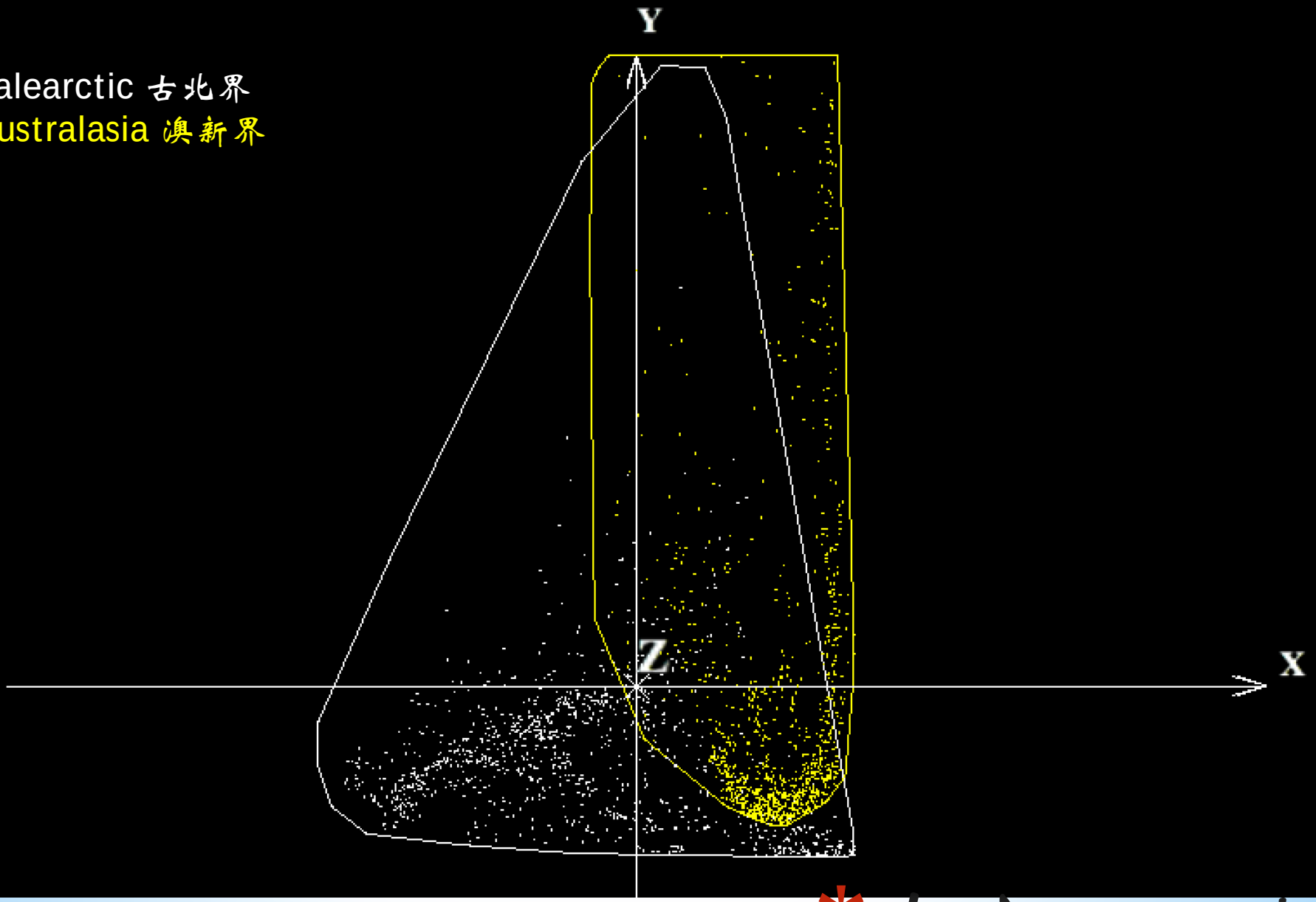


* 图形分解


Nearctic 新北界
Palearctic 古北界
Neotropics 新热带界
IndoMalay 东洋界
Australasia 澳新界
Afrotropics 埃塞俄比亚界
Y
Z
X

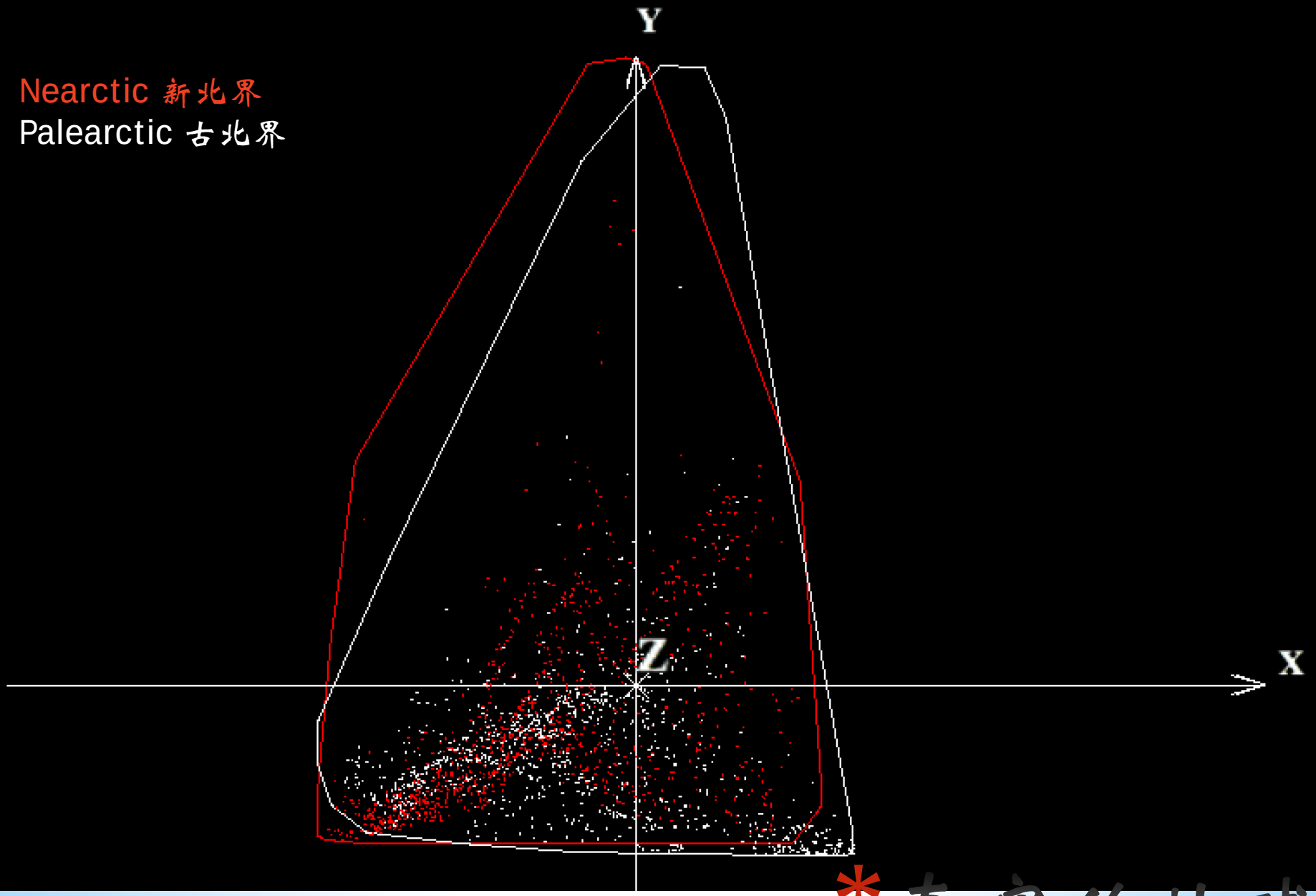
*真实的地球

Palearctic 古北界
Australasia 澳新界



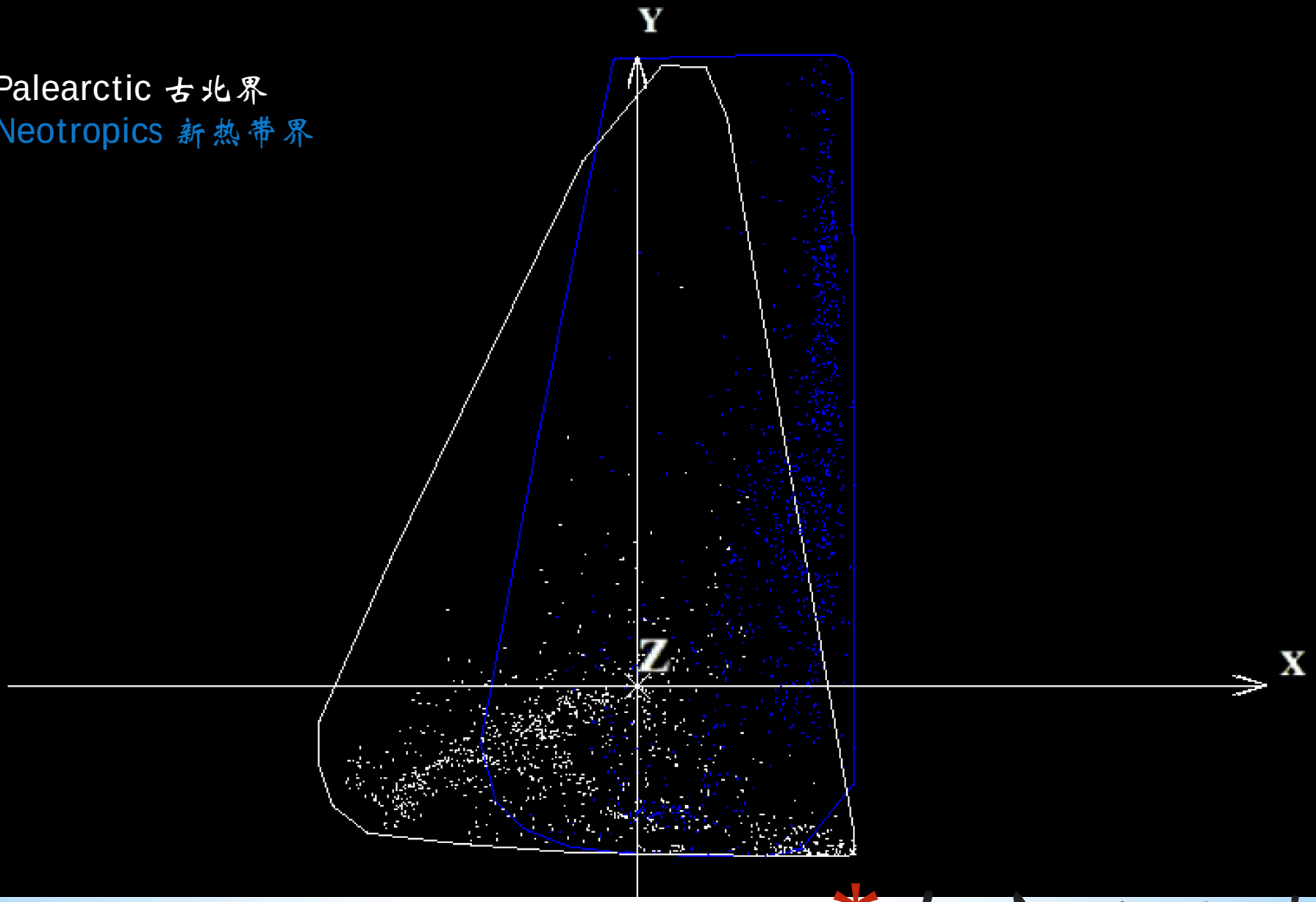
*真实的地球

Nearctic 新北界
Palearctic 古北界

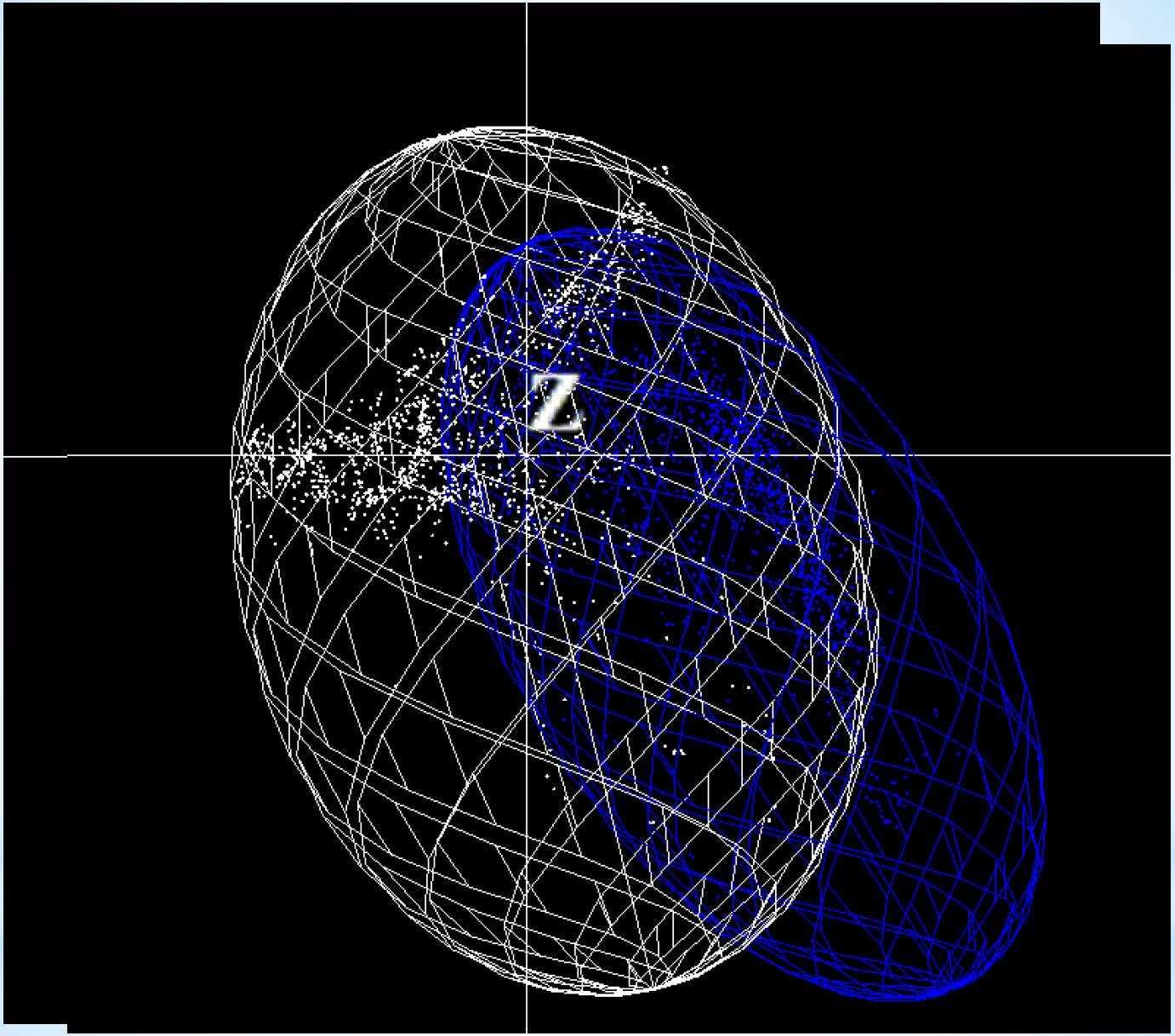


*真实的地球

Palearctic 古北界
Neotropics 新热带界



*真实的地球



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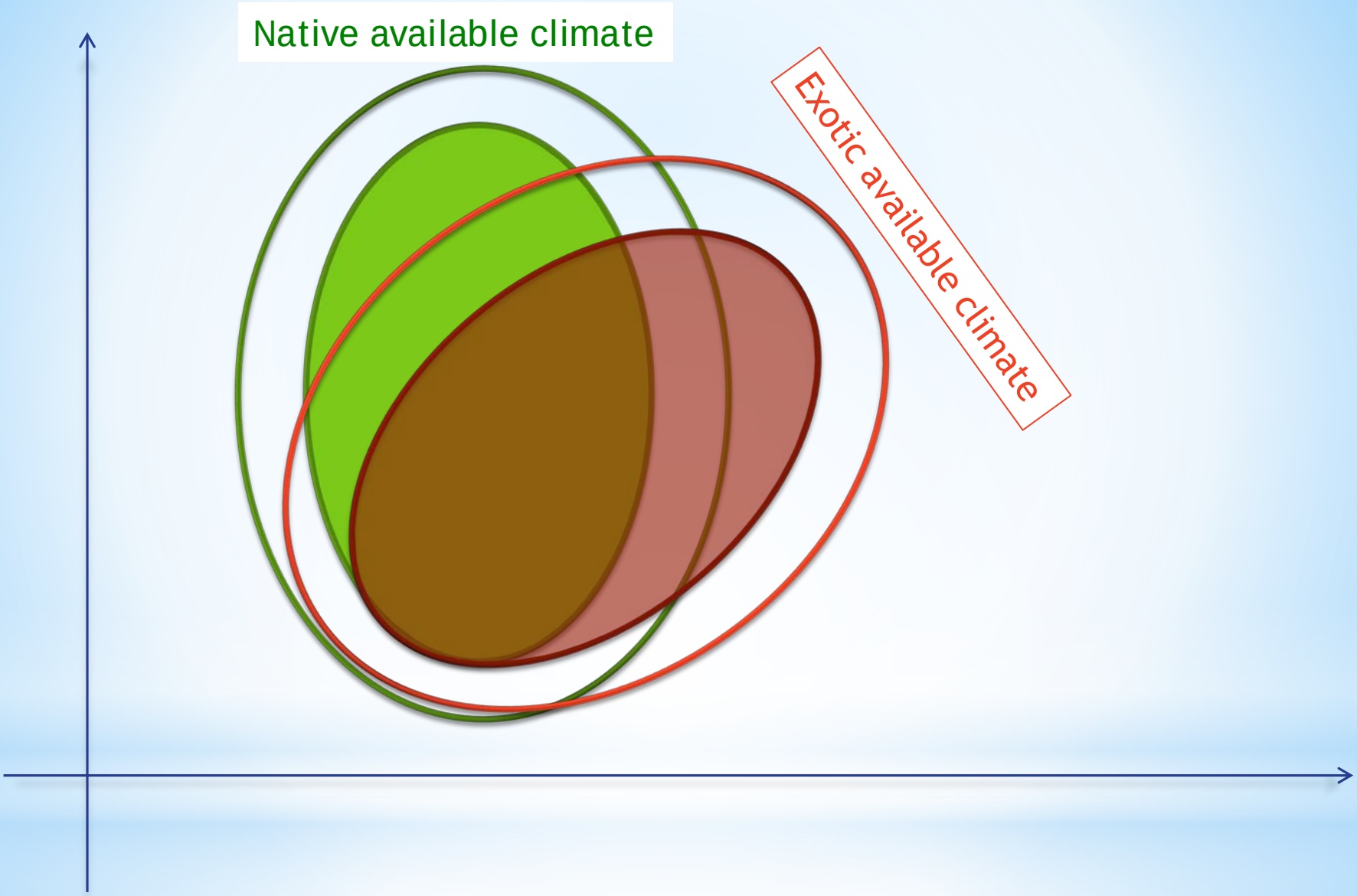
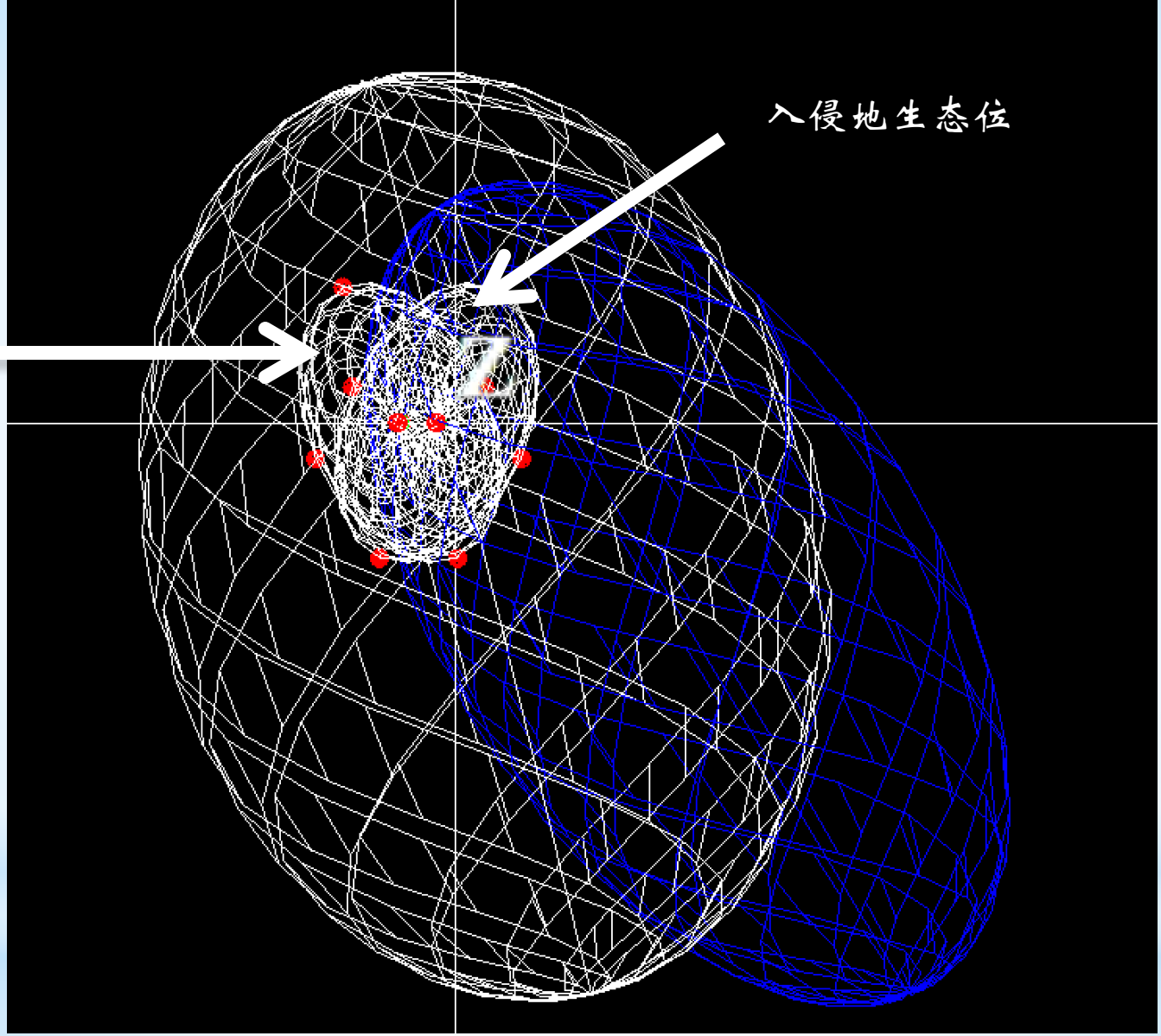
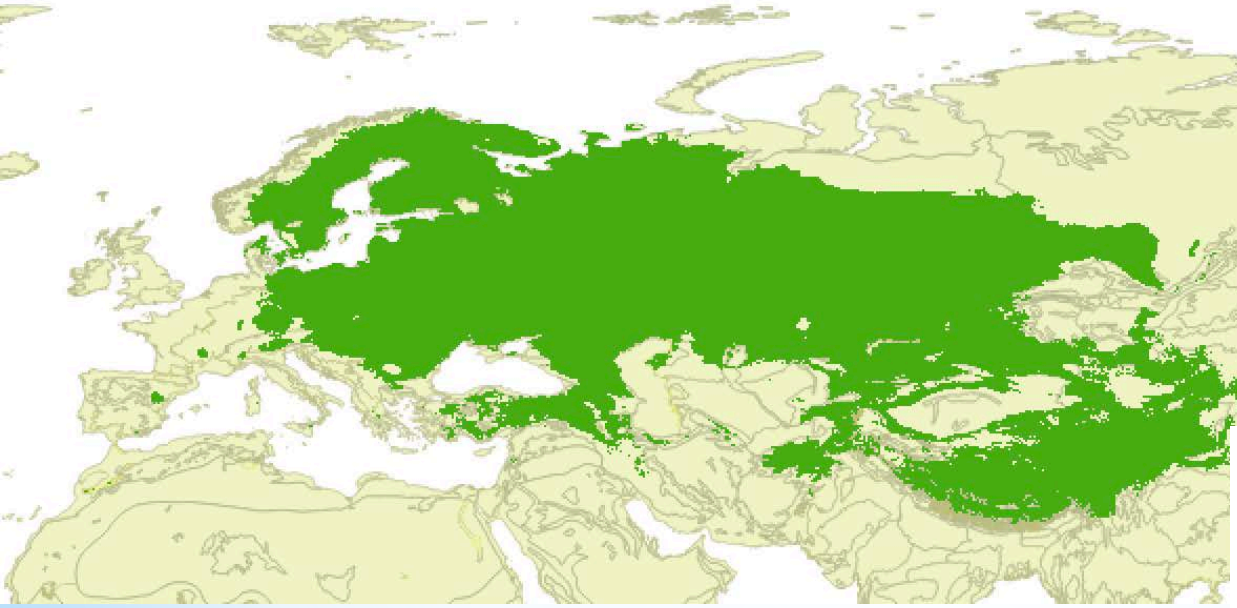


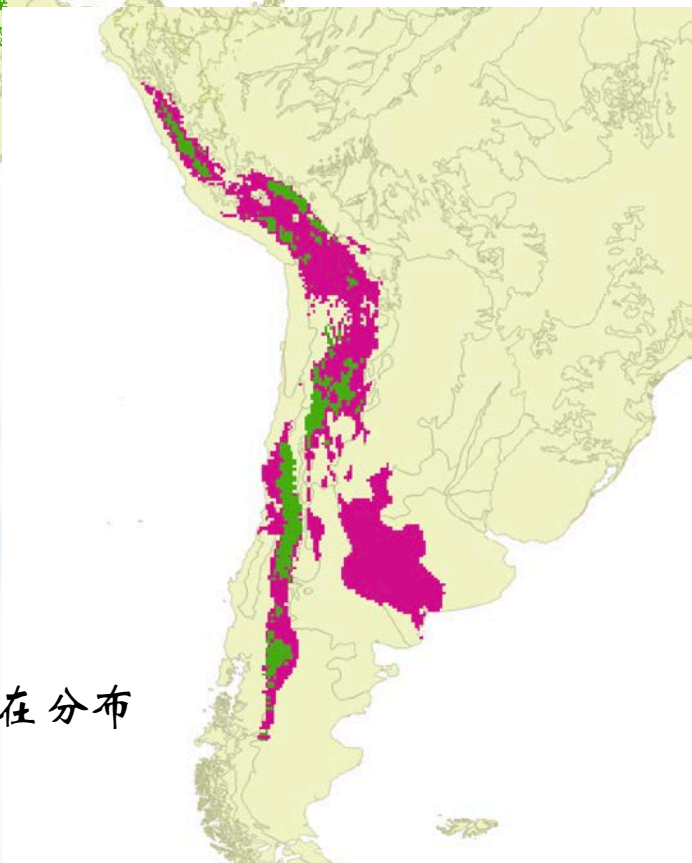
*图形分解



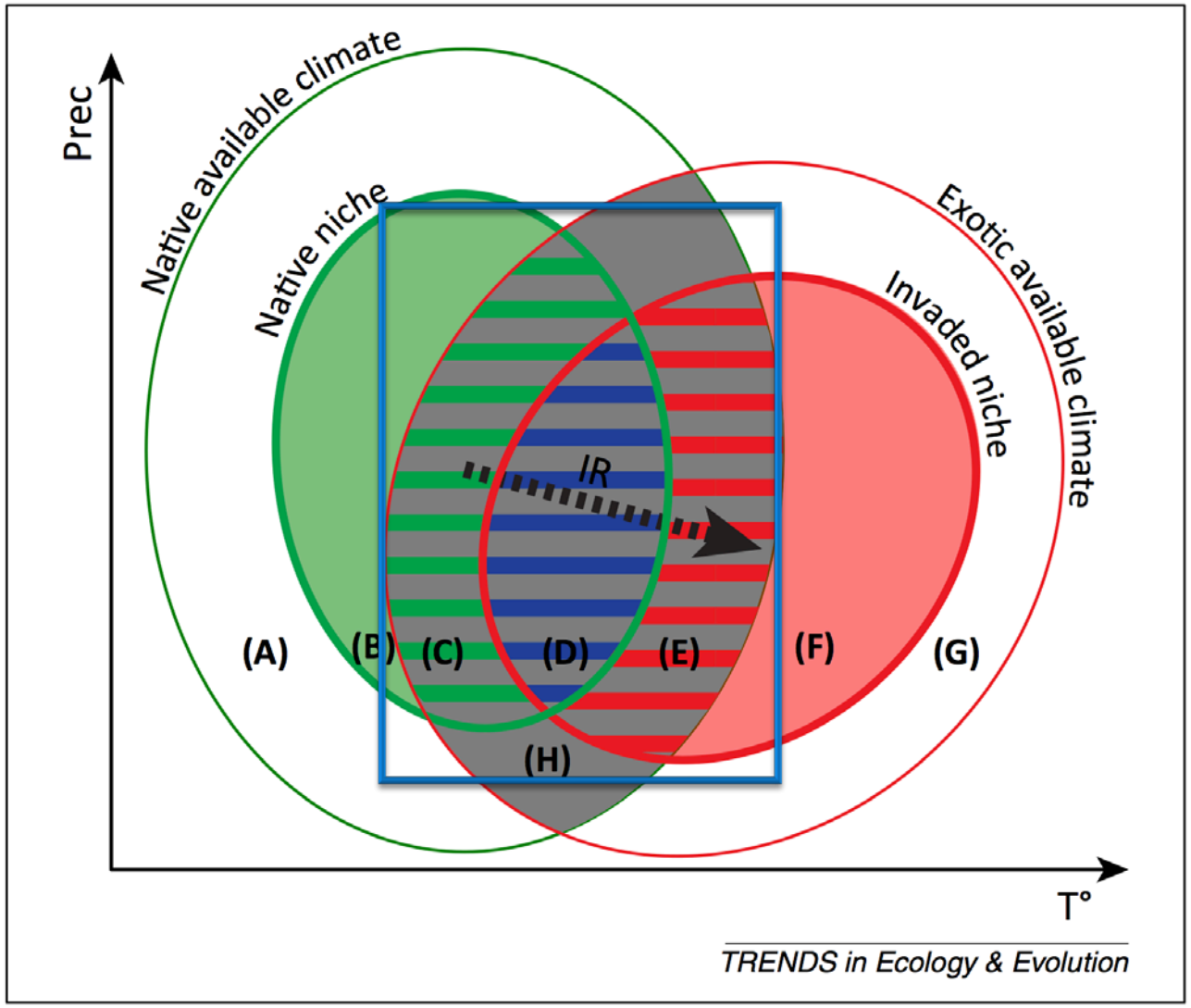
*虚拟物种



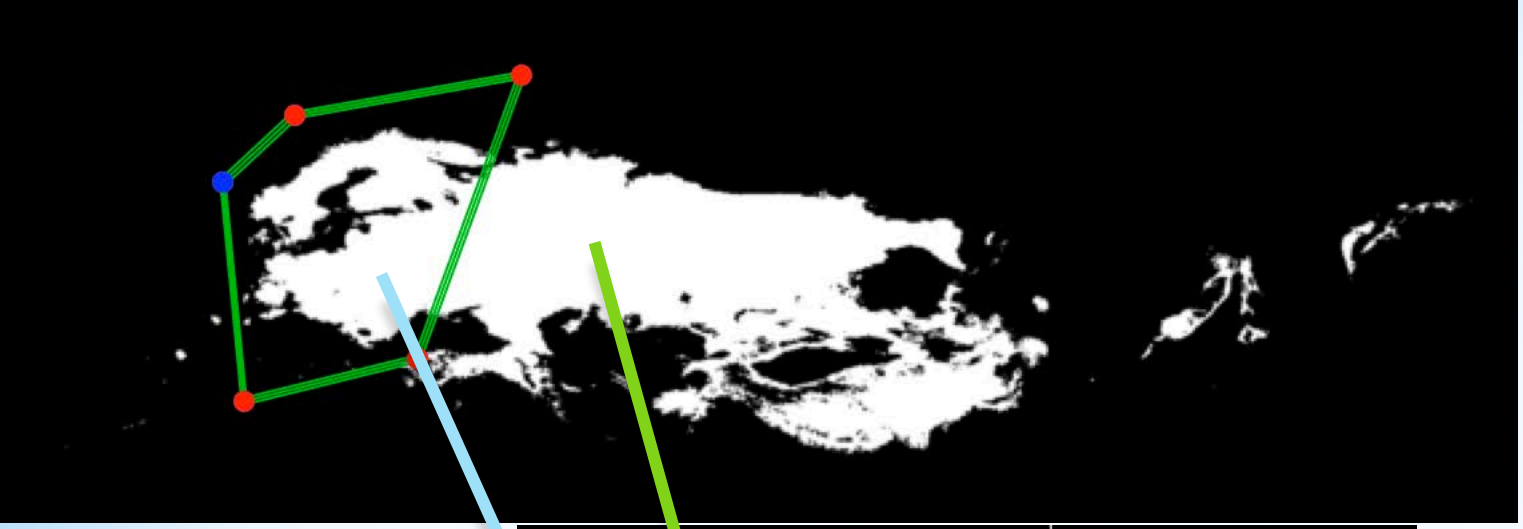
原产地潜在分布

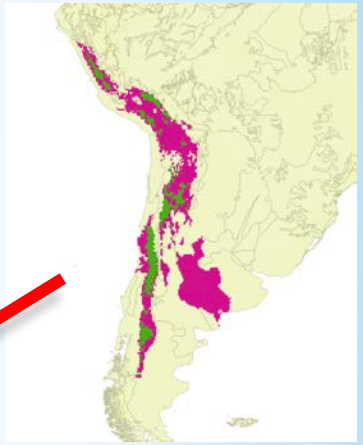


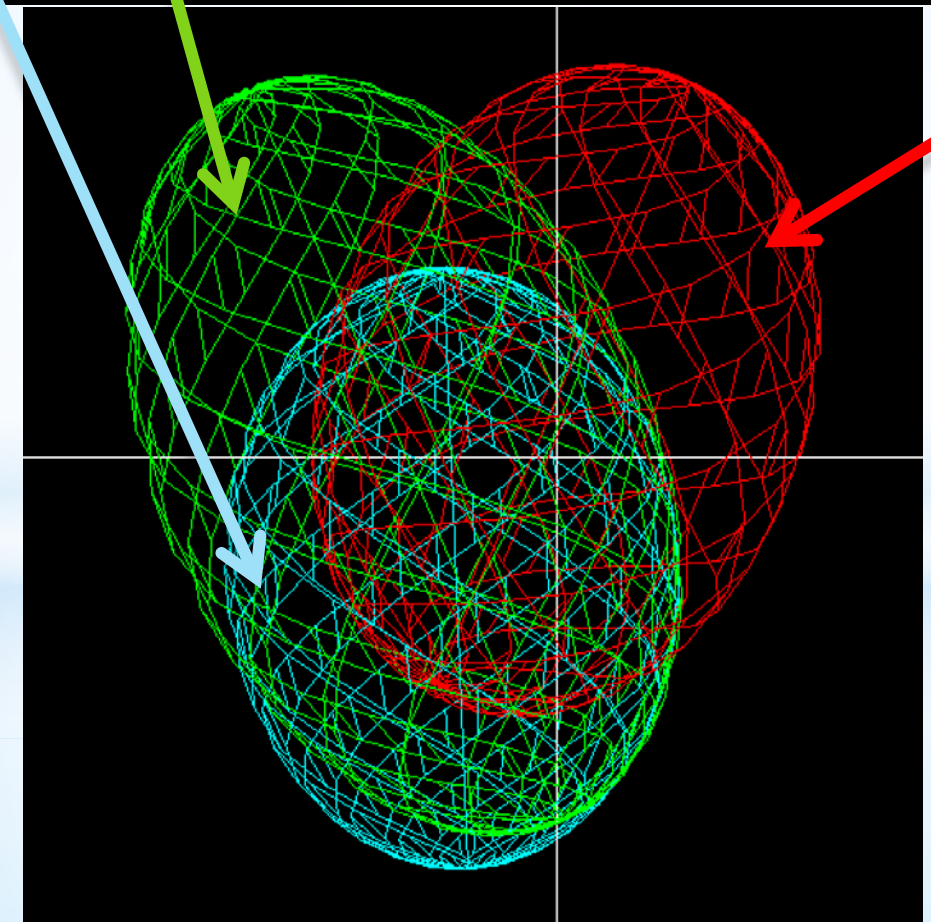
入侵地潜在分布



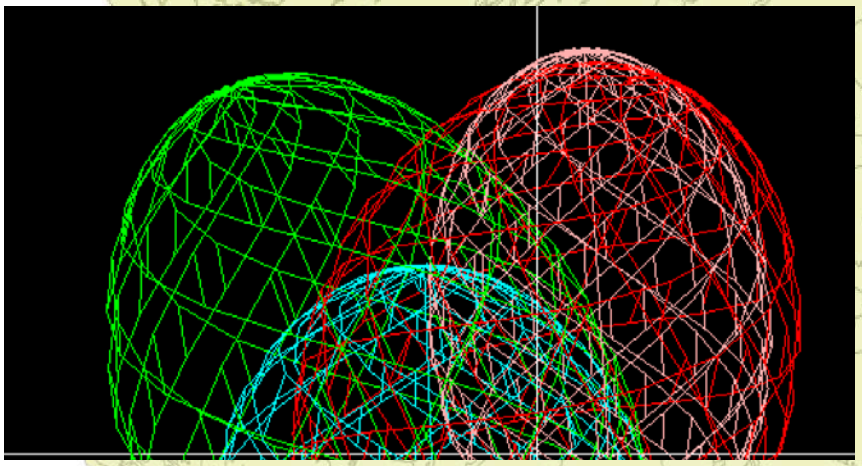
* Guisan, A., et al. (2014)

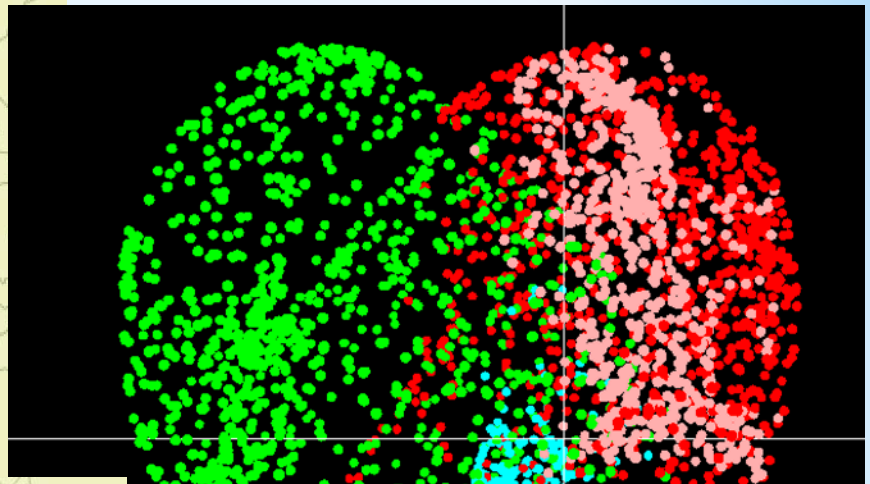


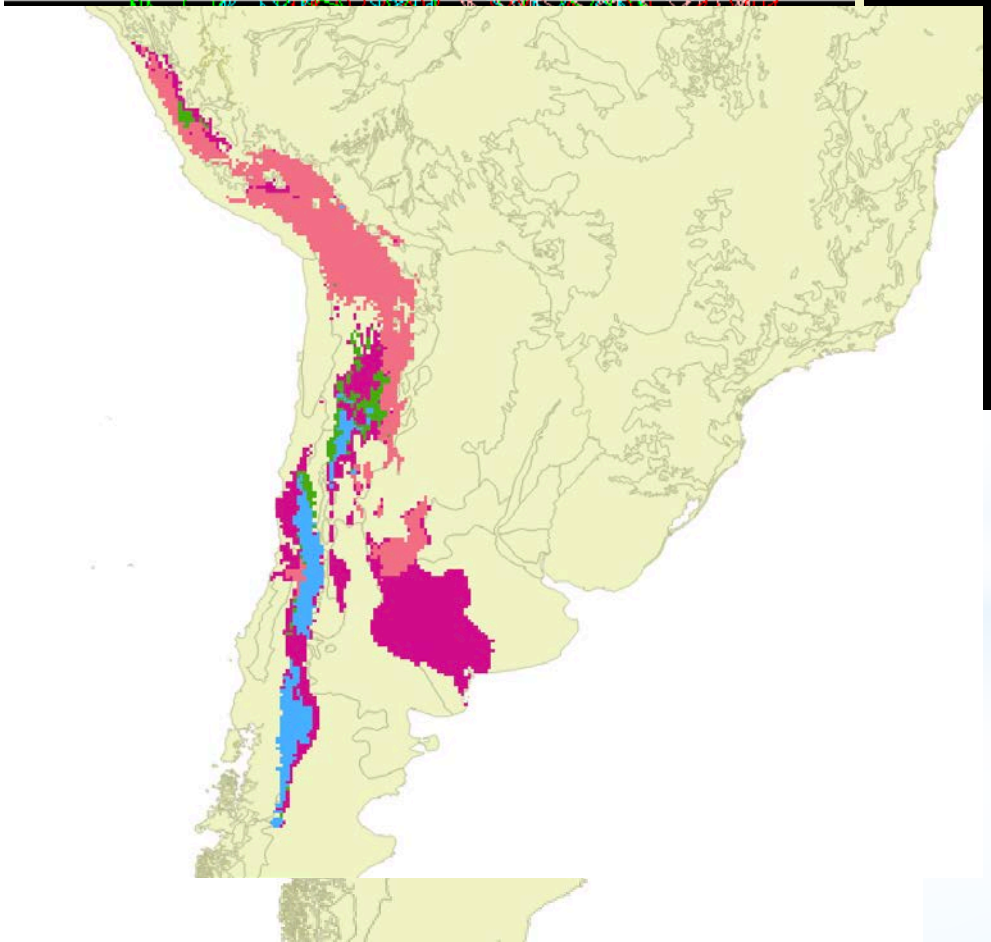


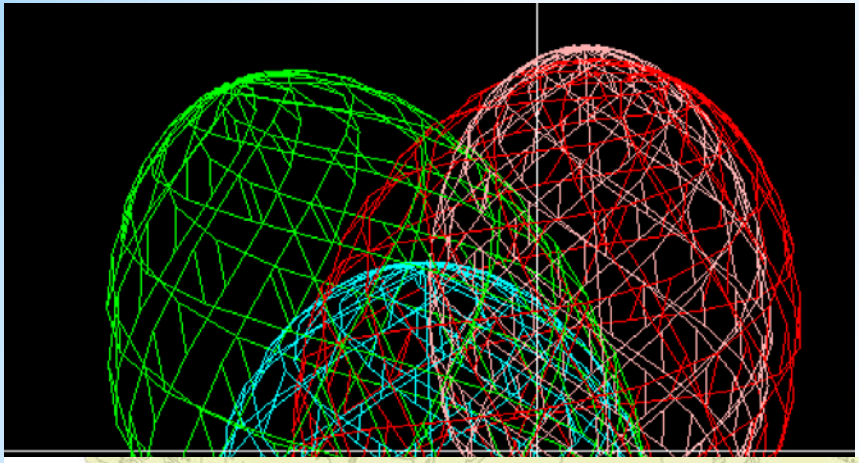


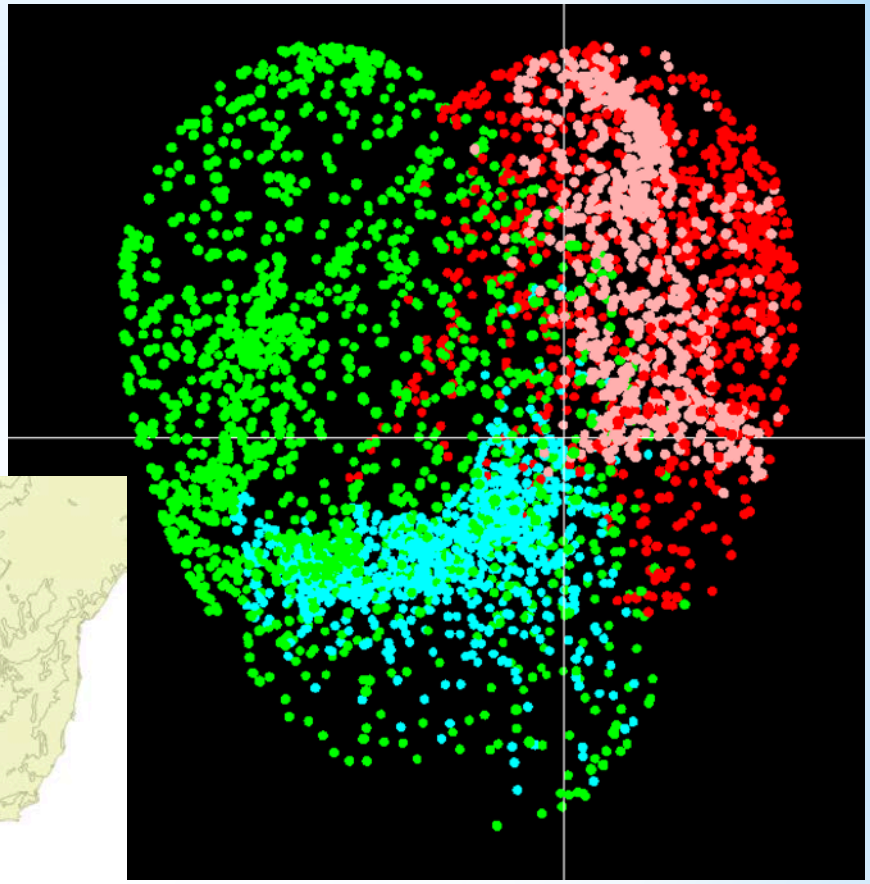
实际分布

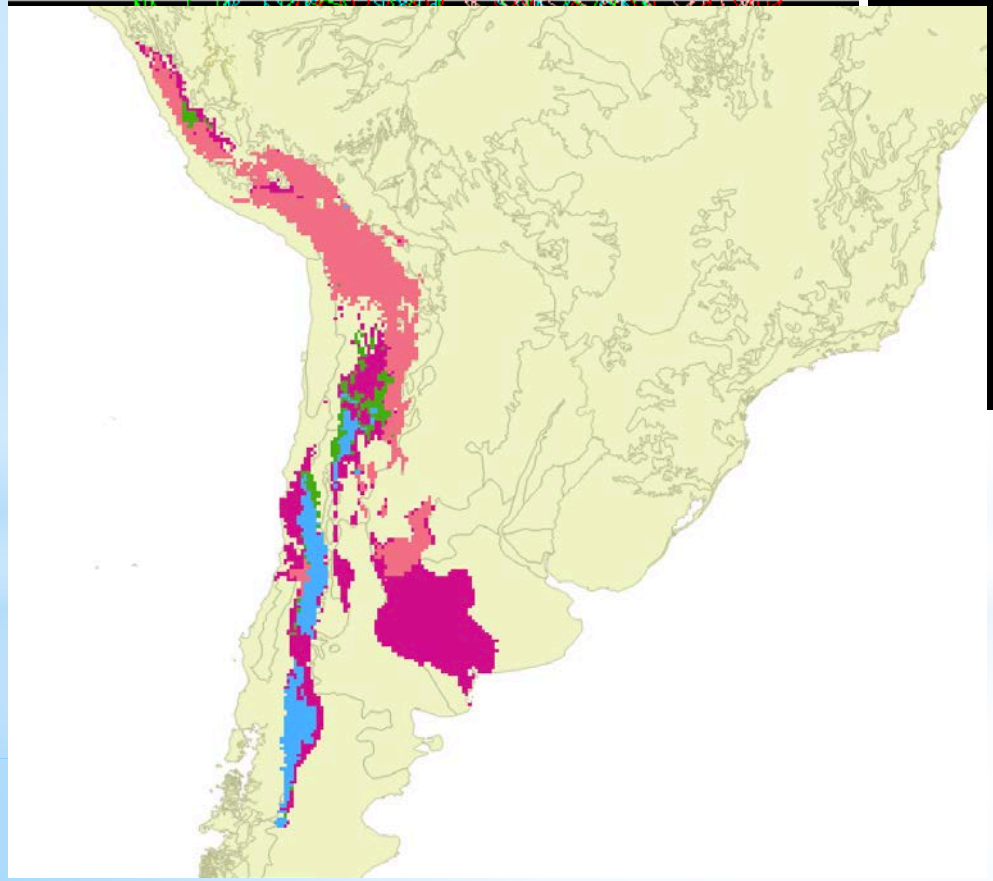


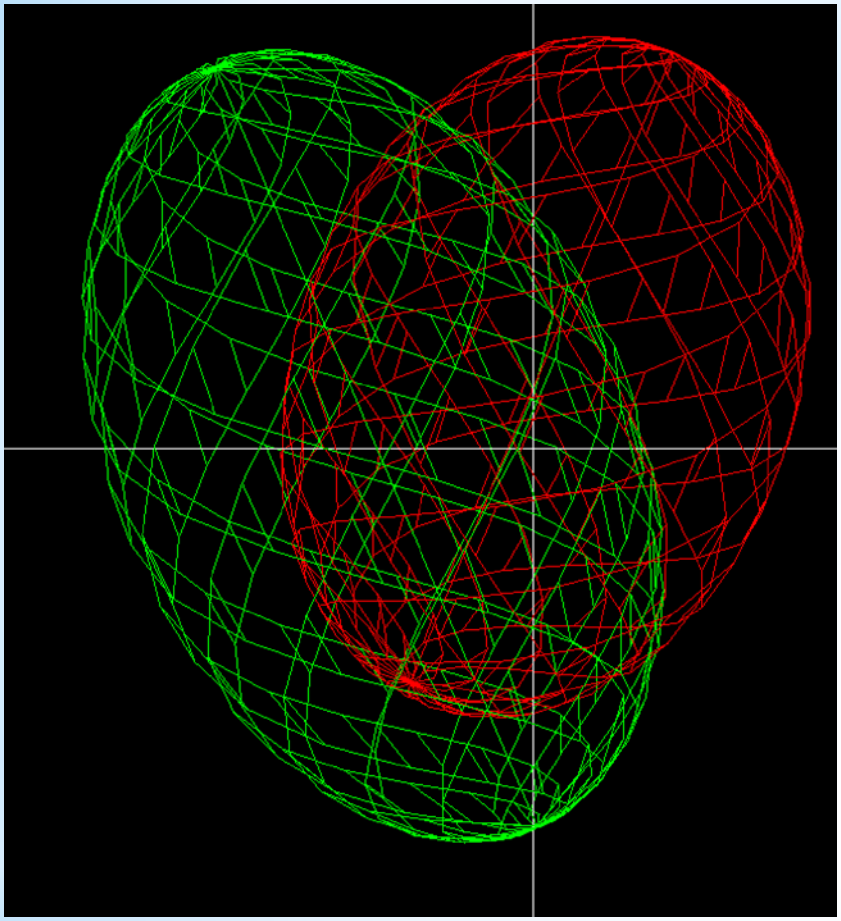


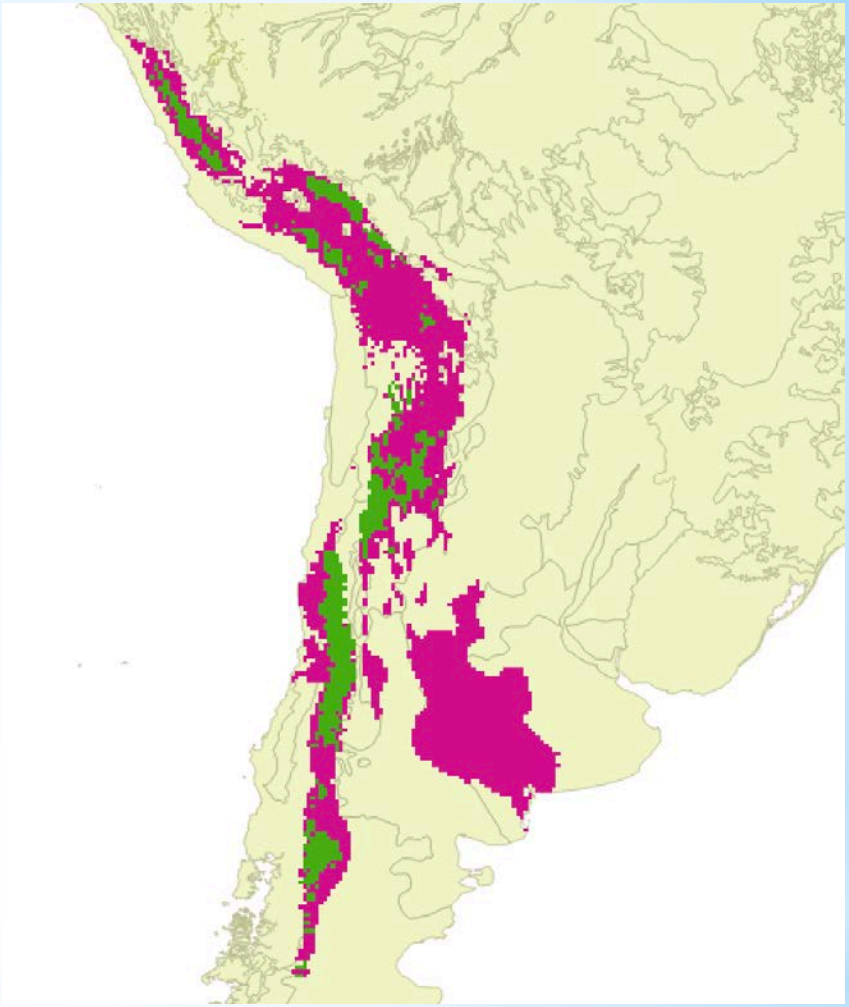




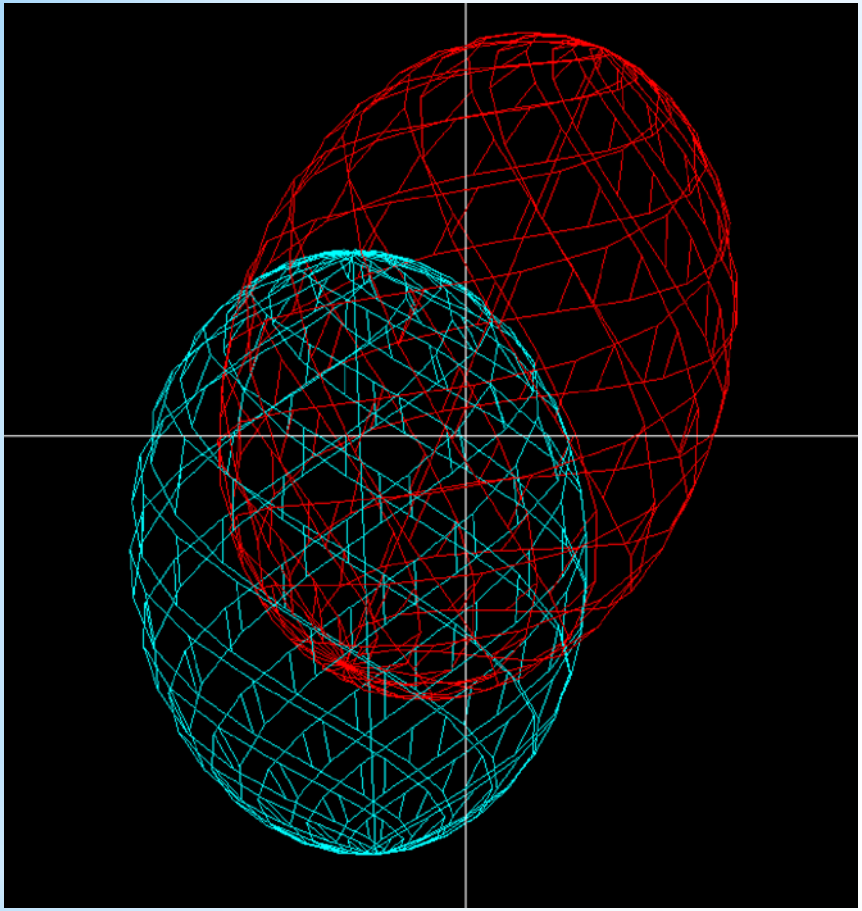


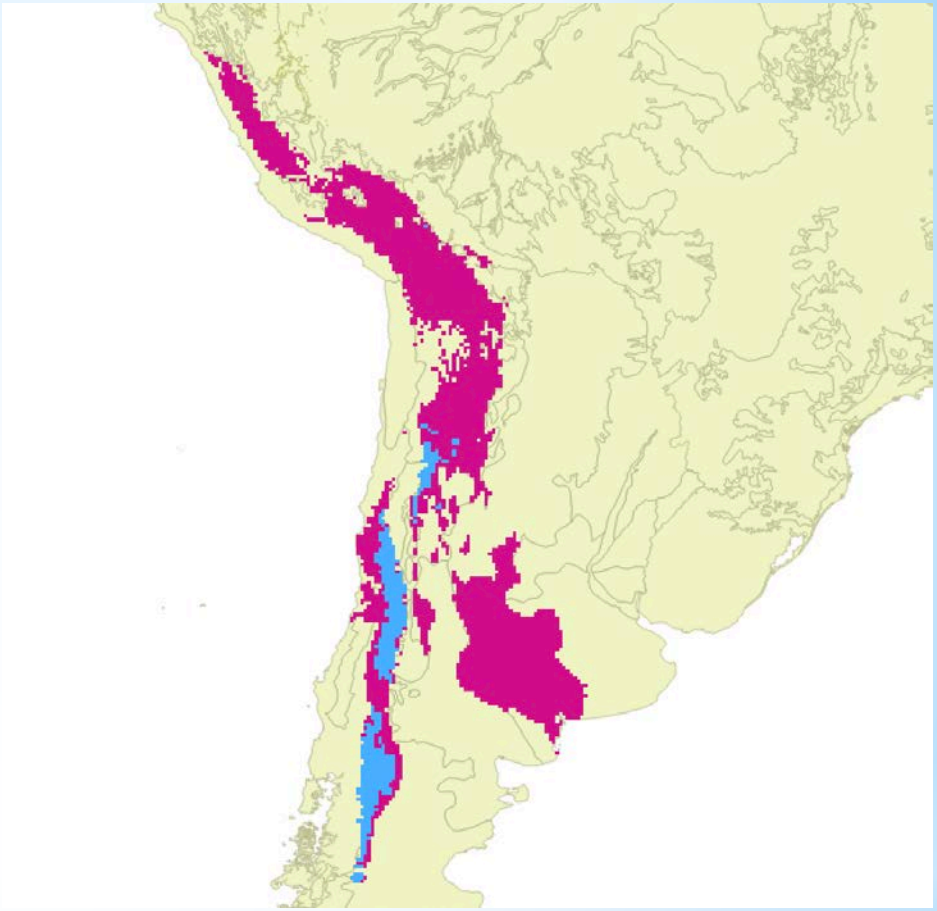




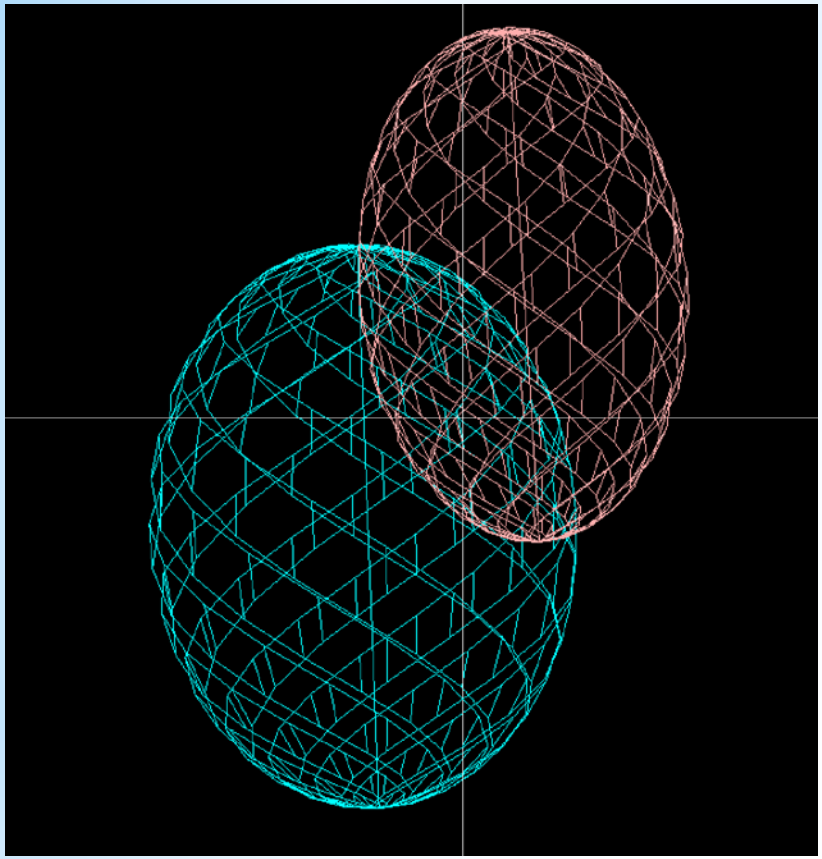


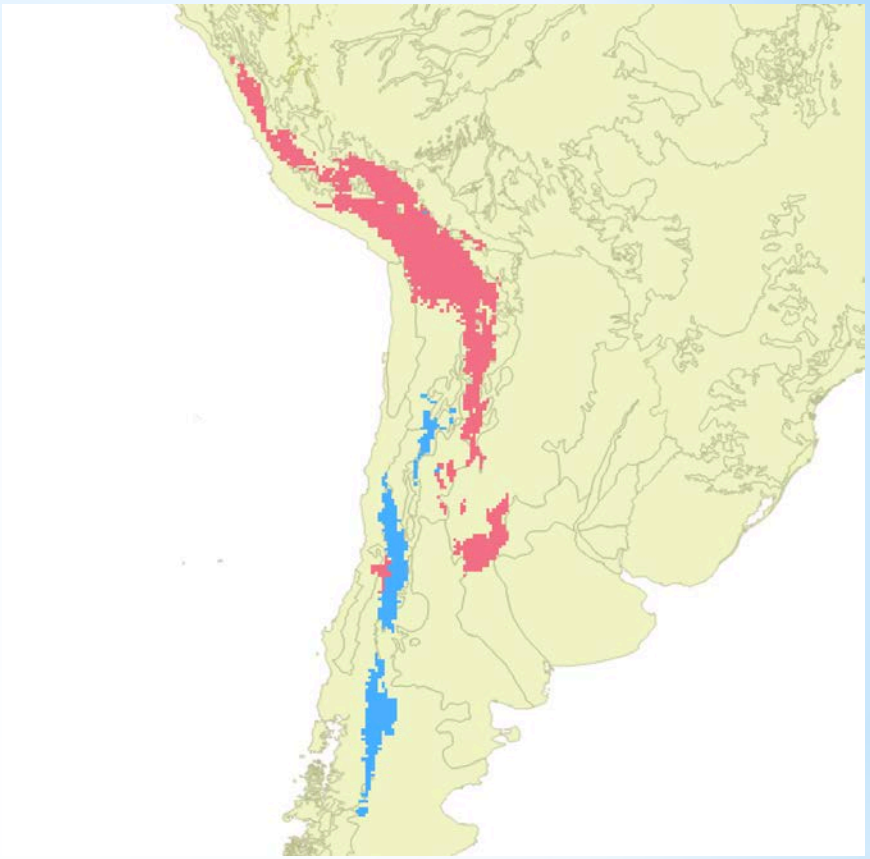
*希望得到的结果





* 由于原产地的样本偏差





* 由于入侵地的样本偏差

* 衡量生态位的变化应该是基础生态位，而不是实际生态位的变化。
* 在地理空间的重叠程度并不能代表（用来能量）生态位的重叠
* 由于扩散能力、采样偏差等因素的限制，导致物种无法占据理论上的全部生态位空间，由此会导致一些连带问题。
* 背景数据的一致性是衡量生态位重叠（变化）程度的重要因素。
* 将背景数据限制在一定相似度下进行生态位变化的比较是可信的，但会牺牲样本数据的可用性；相反，使用全部样本数据，不考虑背景数据的相似度，结果是不可信的。如何平衡二者，将是不久的将来，本领域热门的议题之一。

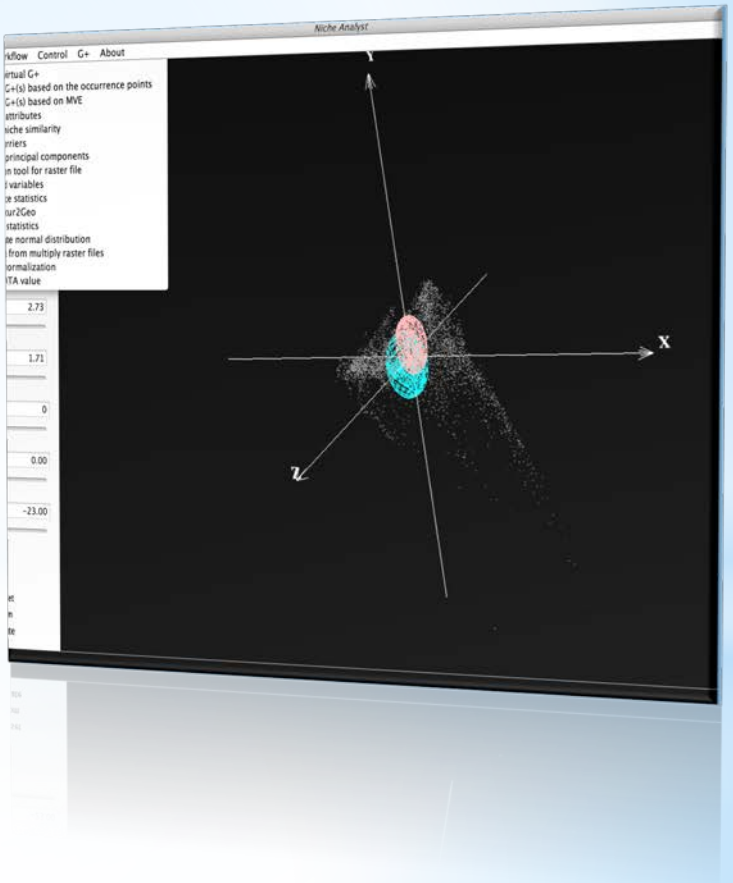
* 不是结论

* 作者：Huijie Qiao, Luis E. Escobar, A. Townsend Peterson, Lindsay Campbell and Jorge Soberón

* 开发状态：持续开发，开源，免费

敬请各位老师

给予宝贵意见



*Niche Analyst 2.0 beta

http://biodiversity-informatics-training.org/software-data-sources/nichea/