Networking as a strategy for hunter-gatherer resilience in the Kuril Islands

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To reconsider the “island laboratory” analogy... again

“The value of islands as natural laboratories does not lie in the supposed uniqueness, isolation or divergence from the main paths of history or evolution. On the contrary, islands are good places to study the world because they are numerous, because they occur in many sizes, shapes and degrees of ecological complexity....” (Terrell 1977, 79)
Small and Remote Islands

Vagar Island, Faroe Islands (www.lonelyplanet.com)

Nuku Hiva Island, Marquesas Islands, (www.dxnews.com)

Adak Island, Aleutian Islands (www.lonelyplanet.com)

Senkaku Islands (www.japantimes.co.jp)

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Networking as a strategy for resilience

Information Networks Model (Fitzhugh et al. 2011)

1. Networks help to reduce the vulnerability of small islands by providing access to non-local information and resources.

2. Interaction costs and environmental predictability are two key factors in the structure of small island networks.

- High Interaction Costs
- Predictability
  - Isolated

- Low Interaction Costs
- Predictability
  - Integrated
The Kuril Islands

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Methodology of Constructing Networks

- Distance-weighted network (Nearest Neighbor)
- Probability of sites occupied at same time
- Level of integration measured by degree centralization

Probability of sites occupied at same time $\times$ Distance-weighted network of contemporaneous sites
Network Results

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Network Results

Adapted from Fitzhugh et al. 2016
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Abandonment of remote Kuril Islands

Adapted from Fitzhugh et al. 2016
Discussion

• What caused the abandonment of the remote islands?
  • Increasing connectivity can be harmful for small island ecosystems and populations

• Scenario #1: More frequent interactions increase vulnerability by encouraging a greater reliance on foreign, non-local goods (metal implements)

• Scenario #2: More frequent interactions increase vulnerability by introducing greater risks to infectious diseases (smallpox)
Conclusions

• Nearest-neighbor networks suggest increasing centralization and connectivity between communities, with peak centralization occurring from 1050-650 cal BP

• Despite the presence of interconnected networks, abandonment of the small and remote Kuril Islands occurs around 600 cal BP

• Integrated networks may have short-term benefit but long-term harm for small island communities
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Questions?

References:


Epi-Jomon (2600-1300 cal BP)

Okhotsk (1300-700 cal BP)

Gjesfjeld 2014
1) Estimate probability of occupation at each site at every 5-year temporal interval

*Assumption that when probability of site occupation is 0, no occupation occurs (i.e. absence of evidence = evidence of absence)
Constructing a probabilistic network

2) Estimate the probability of simultaneous site occupation for all pairs of sites (dyads) at each temporal interval

- Use only sites with 3 or more radiocarbon dates
- 32 sites, 330 dates
- A network of 496 dyads with probabilities calculated at each of the 1200 temporal intervals
- Contemporaneous site occupation (CSO) network
3) Build network with edges weighted by geographic distance (or whatever external measurement is used)

- Weibull survival function ($\lambda = 5$, $\kappa = 0.5$)