

<sup>1</sup> **Practical drone ecology: Data management**

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<sup>10</sup> **Abstract**

<sup>11</sup> “Small science” ecology labs are increasingly collecting “big data” from drone-based instruments [1]. There is  
<sup>12</sup> currently a lack of a consensus framework on how to best manage these data from collection to publication.  
<sup>13</sup> Here, we propose a guide for established “data levels” for ecological applications akin to those developed for  
<sup>14</sup> NASA and USGS Earth observation data as well as practical suggestions for ensuring data privacy, data  
<sup>15</sup> redundancy, and reproducible workflows using drone-derived data.

<sup>16</sup> **Introduction**

<sup>17</sup> **Methods**

<sup>18</sup> **Study system**

<sup>19</sup> Figure 1

<sup>20</sup> **Results**

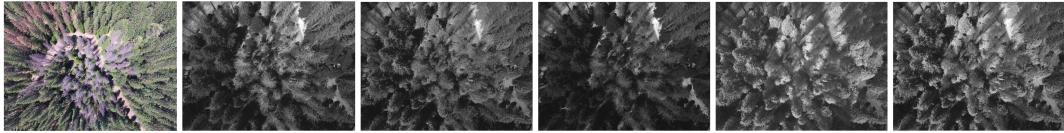
<sup>21</sup> **Discussion**

<sup>22</sup> **Acknowledgements**

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<sup>24</sup> Assessment Center (WWETAC) as well as the CU-Boulder Grand Challenge.

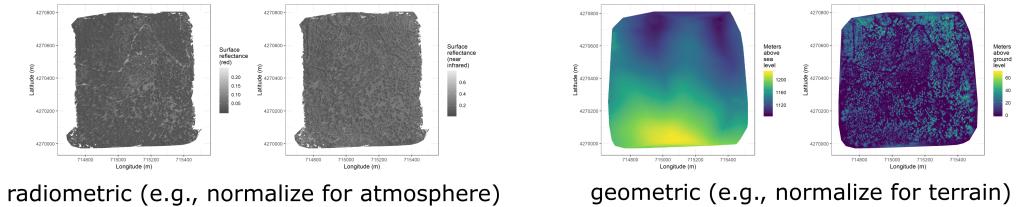
### Level 0: raw data from sensors



### Level 1: basic outputs from photogrammetric processing

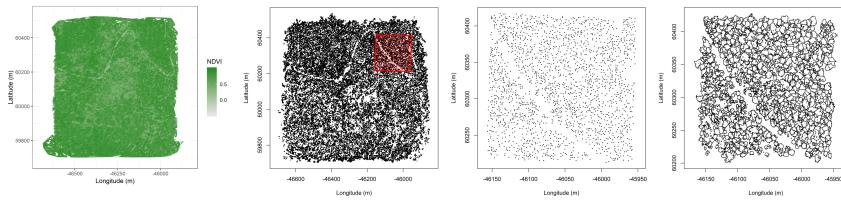


### Level 2: corrected outputs from photogrammetric processing

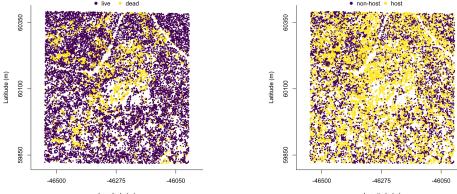


### Level 3: domain-specific information extraction

L3a  
spectral  
OR  
geometric



L3b  
spectral  
AND  
geometric



### Level 4: aggregations to regular grids

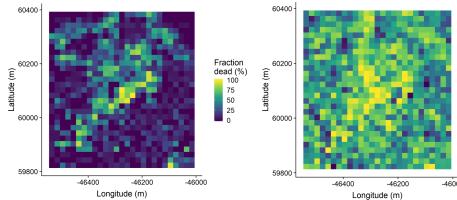


Figure 1: Proposed data levels for drone-derived data used in ecology applications.

<sup>25</sup> **References**

- <sup>26</sup> 1. Wyngaard, J.; Barbieri, L.; Thomer, A.; Adams, J.; Sullivan, D.; Crosby, C.; Parr, C.; Klump, J.; Raj  
<sup>27</sup> Shrestha, S.; Bell, T. Emergent Challenges for Science sUAS Data Management: Fairness through Community  
<sup>28</sup> Engagement and Best Practices Development. *Remote Sensing* **2019**, *11*, 1797.