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*Supplement of*

## **Variational assimilation of IASI SO<sub>2</sub> plume height and total column retrievals in the 2010 eruption of Eyjafjallajökull using the SILAM v5.3 chemistry transport model**

**Julius Vira et al.**

*Correspondence to:* Julius Vira (julius.vira@fmi.fi)

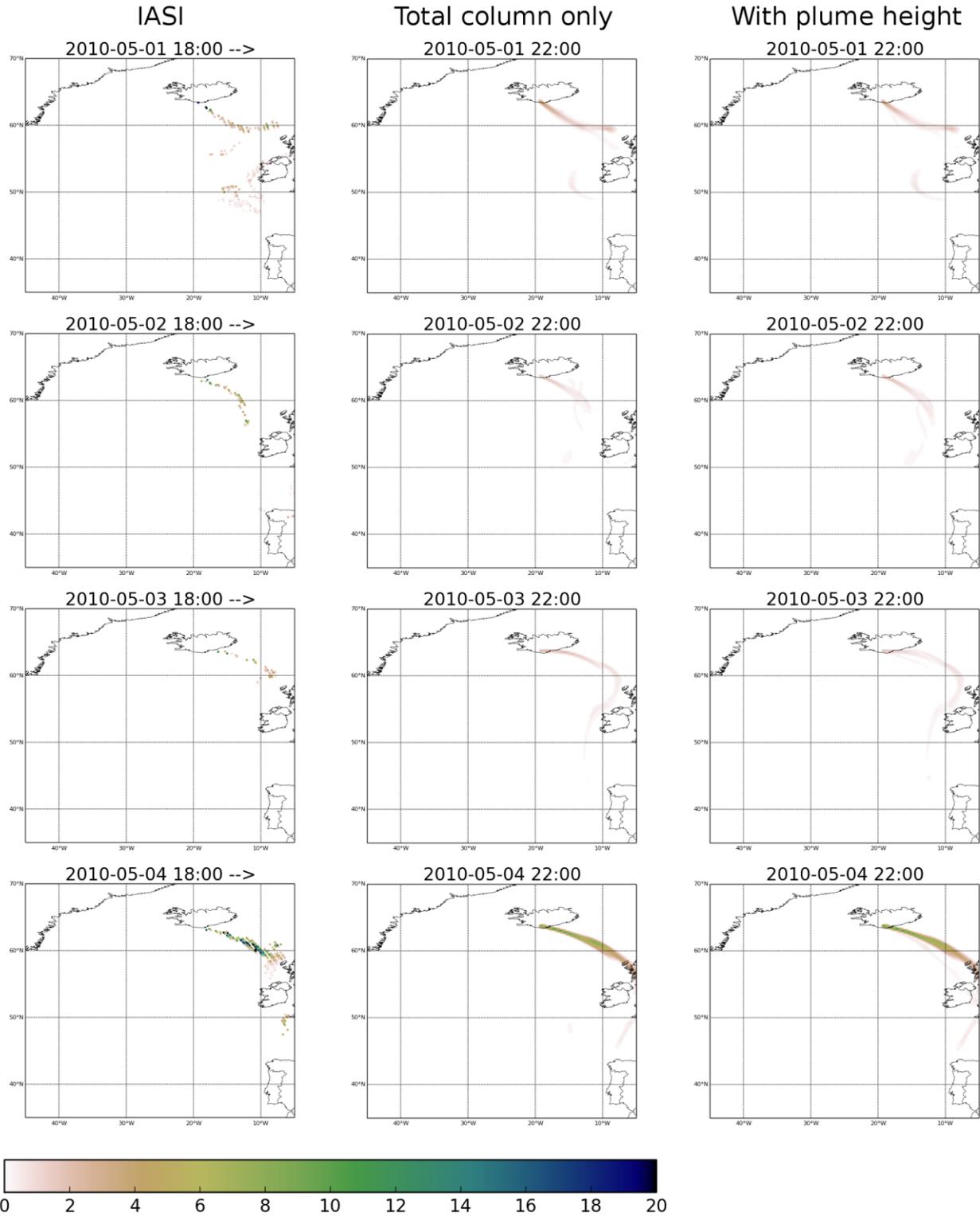
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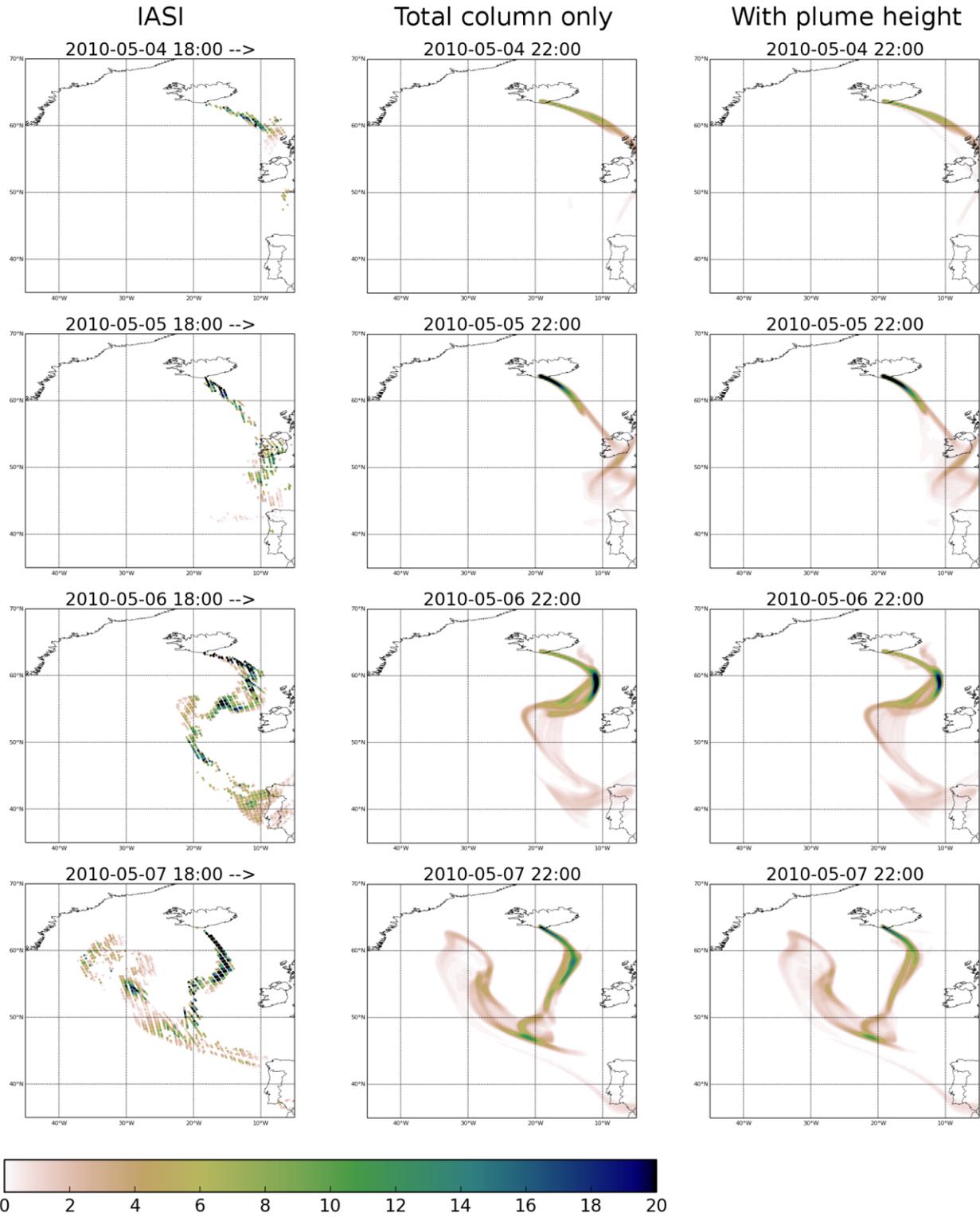
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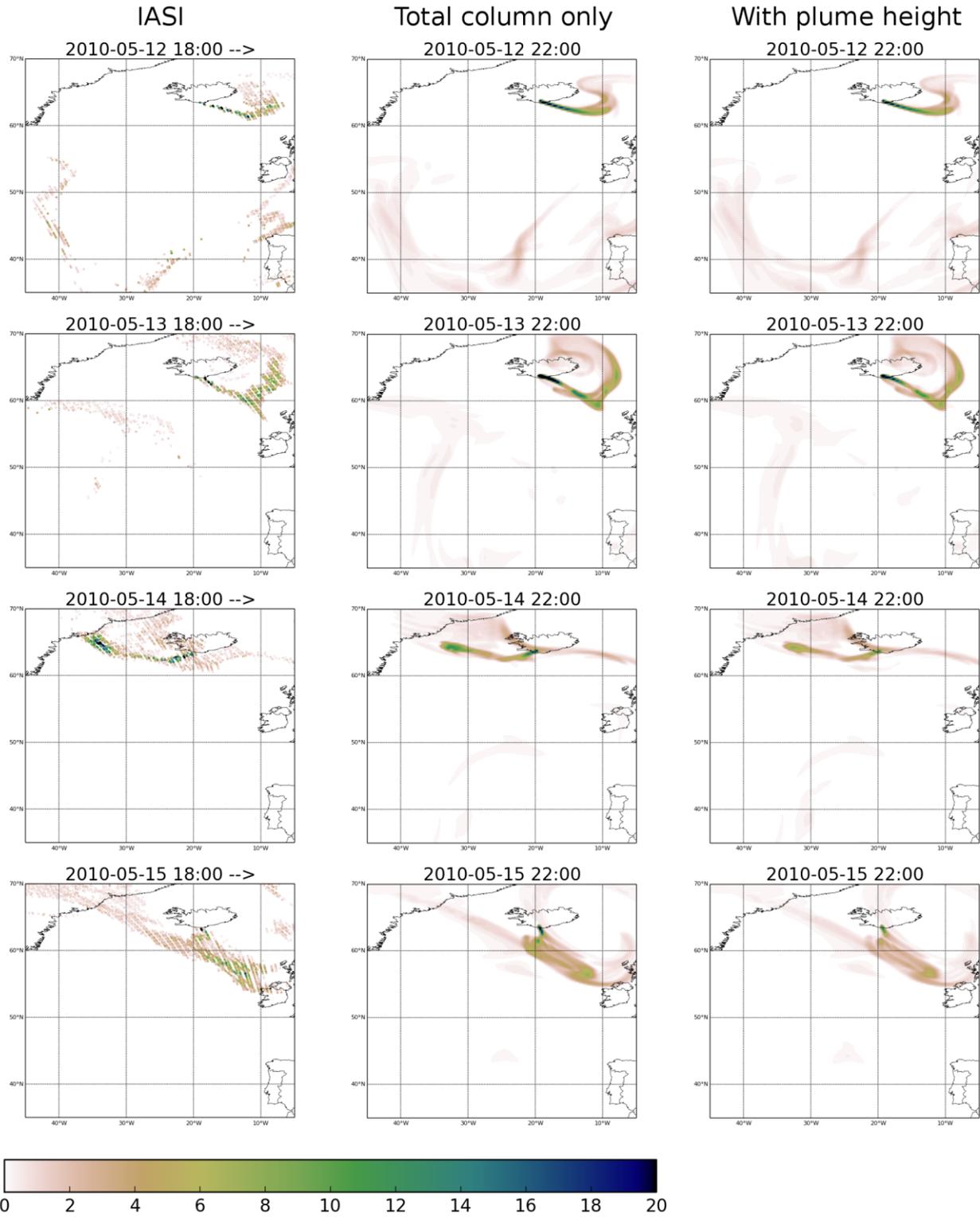
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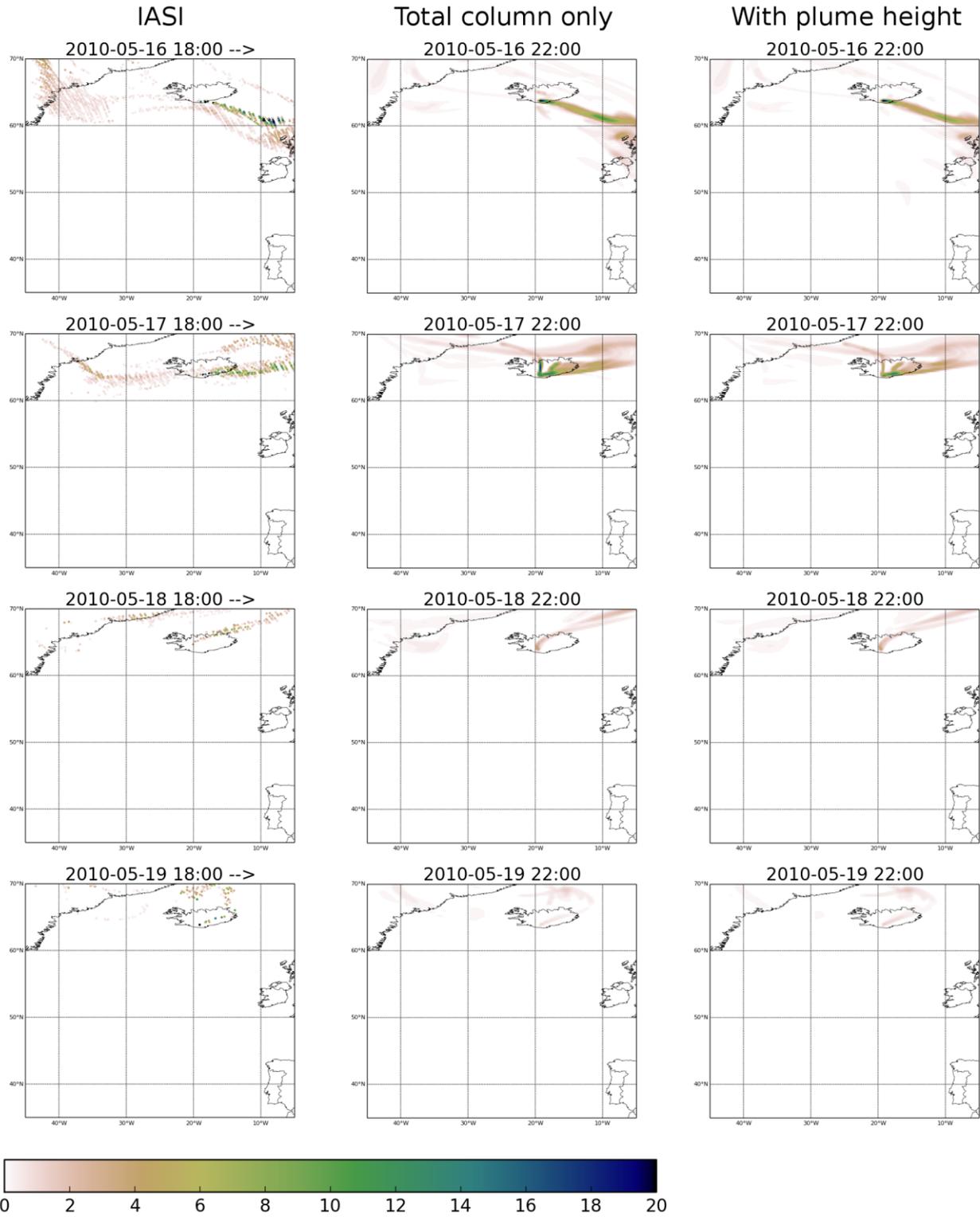
# 1. Comparison of simulated and IASI total columns, 1-20 May, 2010

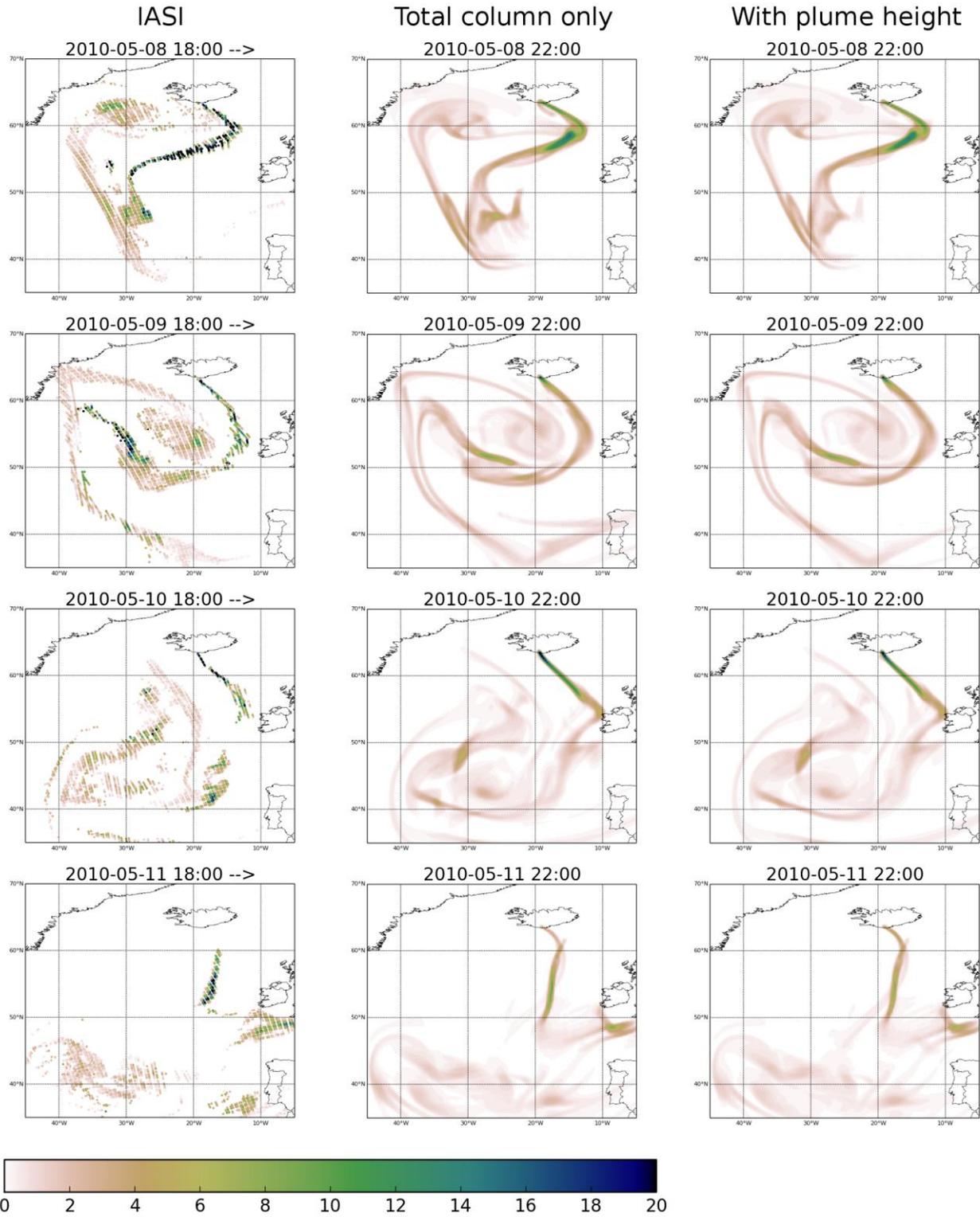
All figures show column density in DU. Further details are given with Fig. 9 in the main manuscript.

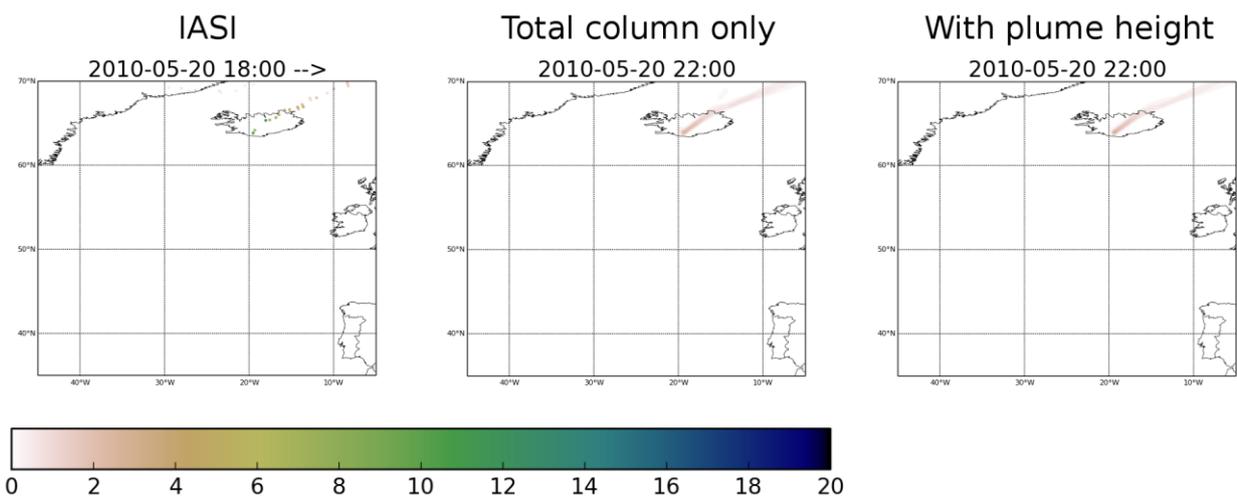






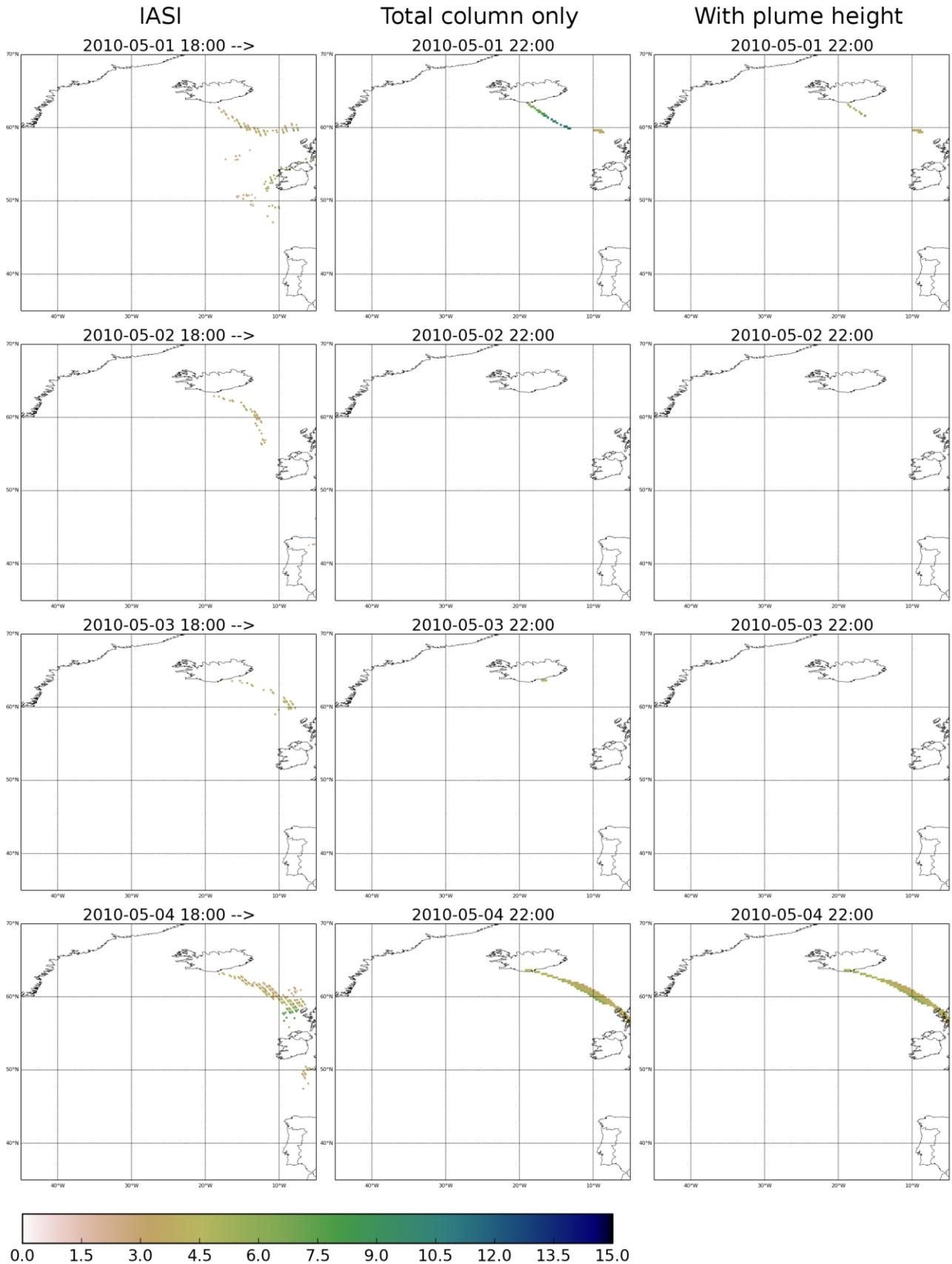


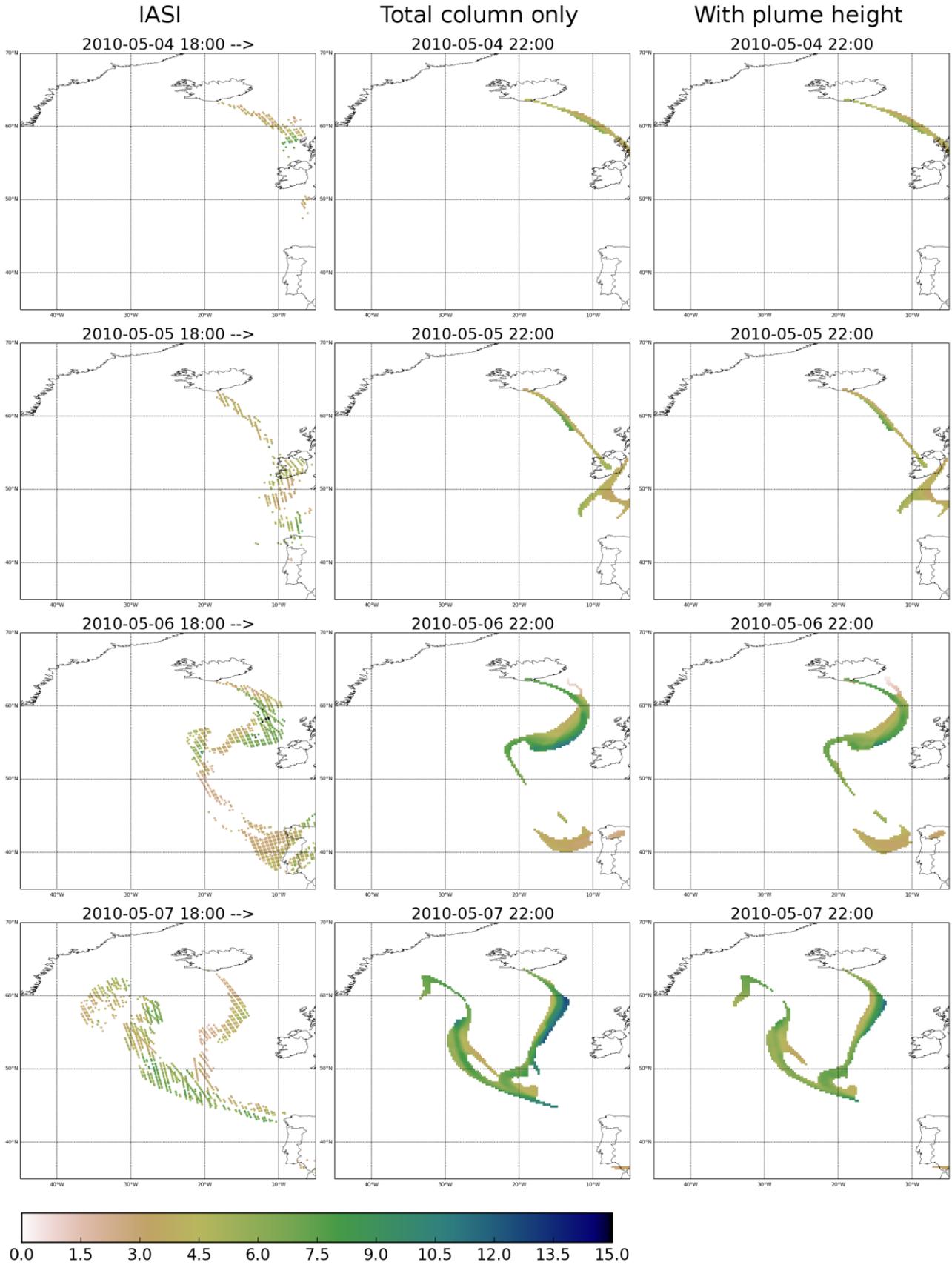


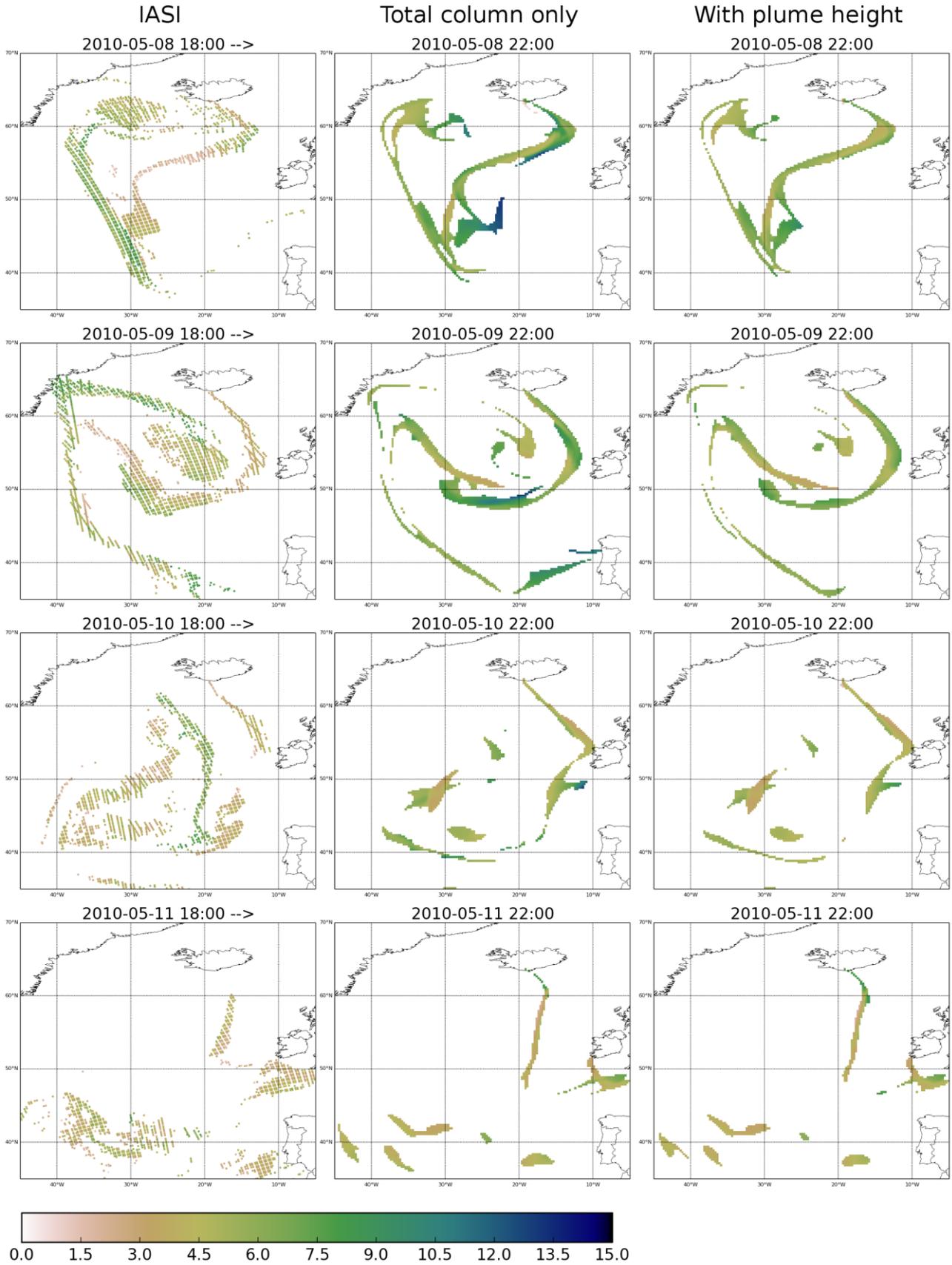


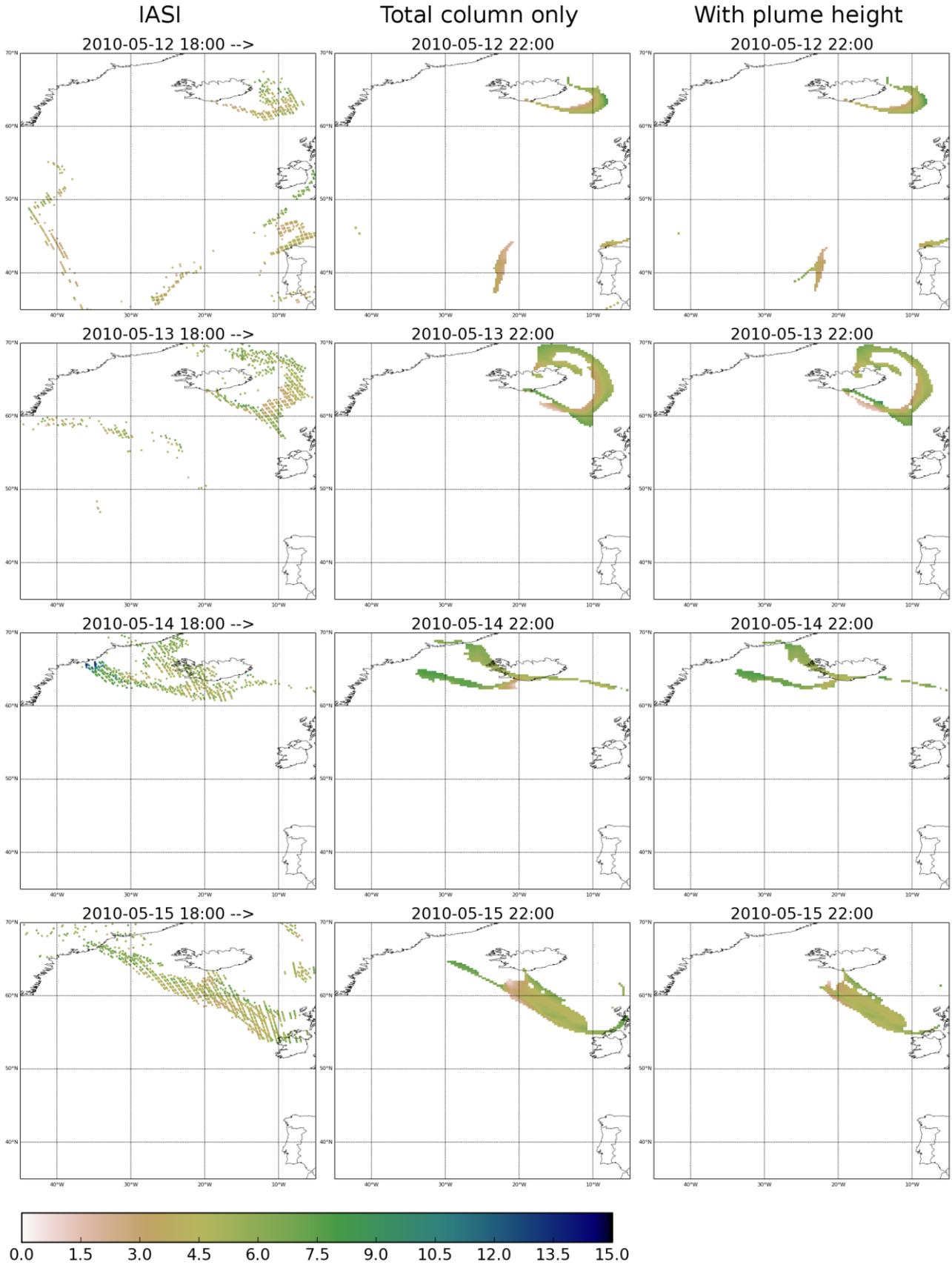
## 2. Comparison of simulated and IASI plume heights, 1-20 May 2010

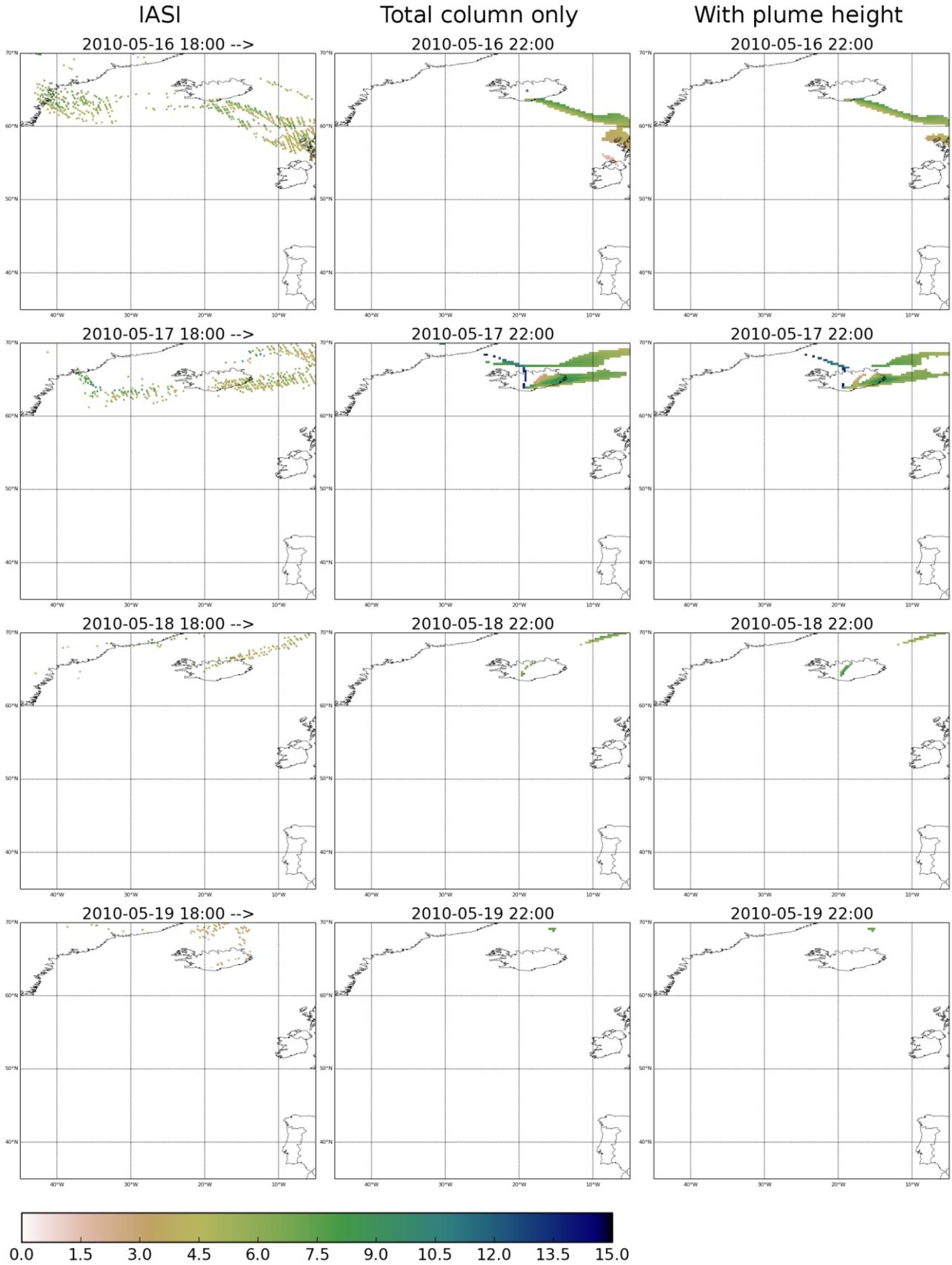
Plume heights are given in km. Further details are given in Fig. 10 of the main manuscript.

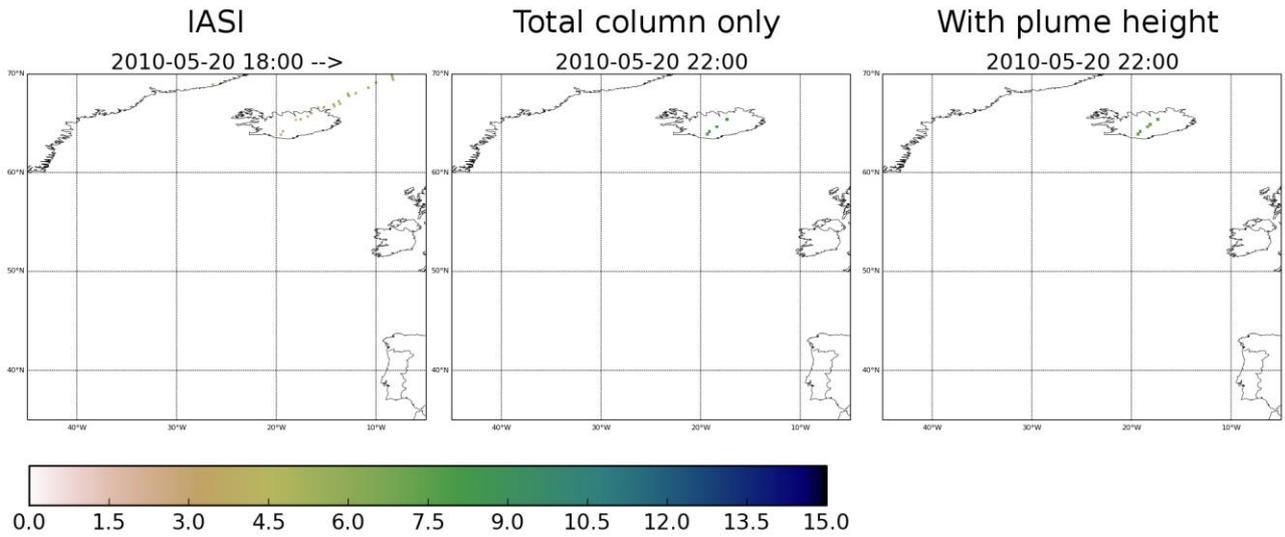












### 3. L-curves for the inversions for Eyjafjallajökull

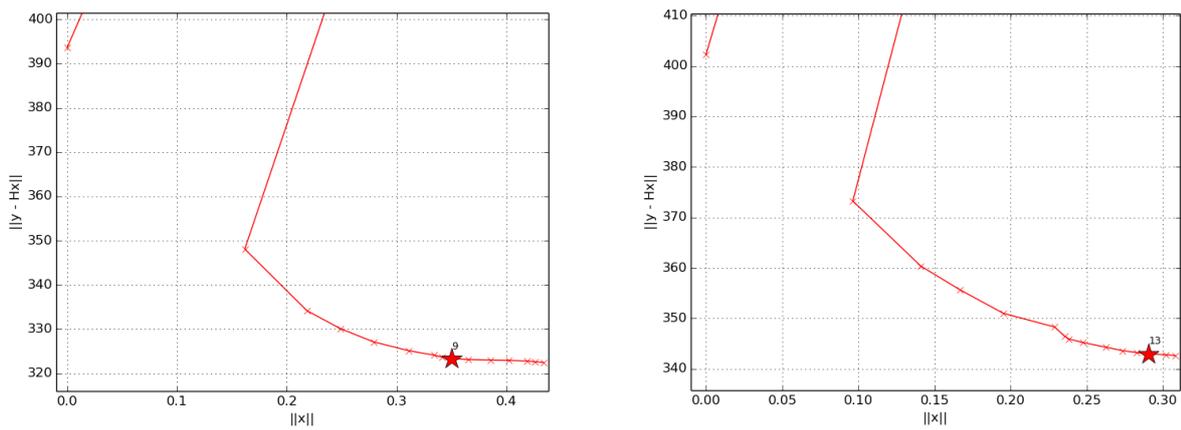


Figure 1. The L-curves (see Section 3.4 in the main manuscript) for the inversion for Eyjafjallajökull, left with assimilation of total columns only, right with assimilation of total column and plume height retrievals. The second iterate has a large discrepancy due to the optimisation algorithm taking a first step normalised with  $\|x\| = 1$ .