

Fewer contrails would be good for the climate

减少凝结尾迹，对气候是件好事

It could take care of at least a little global warming

它或许能解决至少一小部分全球变暖问题

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两名工作人员在空管塔台内面对显示屏，窗外可见机场跑道和航站区灯光。

难度 63 / 100

建议60–80分钟；选做作文另计。

适用读者：能阅读一般英语新闻，希望读准长句、搭配与作者语气的学习者。

入门准备：能辨认基本主谓结构和常见从句，愿意结合语境查词。

About this lesson 本课导读

飞机留下的白色云迹，既可能反射阳光，也会拦住向外散失的热量。文章先解释调整航路为何可能减少航空业的气候影响，再讨论一个更难的问题：如果某条尾迹被成功避免，我们怎样给这件没有发生的事准确计价？

- 区分降温作用、增暖作用和净效果
- 拆解三组how从句与让步结构
- 理解反事实估值为什么难
- 保留试验前提、数字分母与作者的论证转折

Before you read 读前思考

Could a flight change use slightly more fuel and still reduce its overall climate impact? What would need to be compared?

拓展例句与练习情境用于说明用法。

书末答案 (p.12)

Text 课文

[P01] GOOD NEWS on global warming is thin on the ground.^{V01} But there may be some up in the air. Operation Blue Skies, announced on August 18th, is a scientific study being undertaken by Britain's air-traffic-control service, NATS, and various organisations where people study the effects on climate of the streaks of cloud created by aircraft—known as contrails.^{V02V03V04}



两名工作人员在空管塔台内面对显示屏，窗外可见机场跑道和航站区灯光。

5 [P02] Over the next two winters the consortium aims to see if it is possible to reduce the number of persistent contrails—the class with the largest such effects—over a swathe of the North Atlantic, thereby measurably reducing the climate impact of civil aviation.^{V05V06V07V08} If this experiment works, a worldwide application of the same techniques might cut the climate effects of air travel by as much as half.

10 [P03] On a sunny day the wispy cirrus clouds into which some contrails are transformed can look as if they might be cooling the planet in the manner of a delicate parasol.^{V09V10V11K01} And some contrails do indeed cool things down beneath them a bit. But they also warm things up by trapping some of the upwelling infrared radiation that would otherwise escape into space.^{V12V13K02} On average, that warming effect, found in all contrails (and the cirrus clouds
15 they turn into), handsomely outweighs the cooling provided by some.^{V14V15} In the climate scheme of things, contrails are a liability.^{V16}

[P04] Happily, it appears that much harm can be avoided by small changes to flight paths. Persistent contrails appear only in what are known as “ice-supersaturated regions” (ISSRs).^{K03} Often planes can avoid such regions just by flying a little bit lower. The purpose of Operation
20 Blue Skies is to find out how well the presence of ISSRs can be predicted, how effective such little shifts in altitude can be in avoiding persistent contrails, and how easily and safely the changes in flight path needed to bring them about can be integrated into routines for airlines and air-traffic control.^{V17V18K04}

[P05] The cut of up to half in the climate-effects of air travel would come at a very small cost.
 25 The number of flights at lowered altitude might be small—as little as 5% of the total. Because altitude buys efficiency, those flights would consume more jet fuel, but less than 2% more.

[P06] Burning even that little extra fuel would be anathema to airlines.^{V19} So some suggest the costs of action might be minimised, and the airlines incentivised, by setting up a market which somehow links contrail cooling to carbon prices.^{V20} The European Union, which has
 30 had some success and plenty of experience with carbon markets, recently took a small step towards something along these lines.^{V21} It is also the sort of idea to which economists—and The Economist—tend to be partial.^{V22K05} But it would be a mistake nonetheless.^{V23}

[P07] Markets for pollutants have worked best when both the aim and the remedy are fairly simple—most famously, reducing sulphur-dioxide emissions from power stations in Amer-
 35 ica.^{V24} Contrails, by contrast, are complicated. Though there is no doubt that their net effect is warming, saying how much warming a particular contrail might produce is often difficult and sometimes next to impossible.^{K06}

[P08] The difficulties are made yet worse when the contrail being assessed is a purely notional one—as would be the case for the contrails avoided by changing flight paths.^{V25K07} Valuing
 40 counterfactuals is always hard.^{V26}

[P09] If contrail-avoidance turns out to be as useful as it looks, it would be much simpler to simply have air-traffic controllers assign routes that limit persistent contrails when it is possible and safe to do so.^{V27K08} If some airlines choose to avoid the affected routes, others will surely be happy to take their place. And if such a scheme were also to show the benefits of innovations
 45 in air-traffic control (quite a few have been suggested) the industry would end up better off, as well as less polluting.^{V28}

New words and expressions 生词和短语

按原文出现顺序排列；★为优先练习表达。

V01 · P01 thin on the ground★

/θɪn ɒn ðə graʊnd/ phr. 稀少；难得一见

先用固定表达说好消息少，再以空中的航迹接出地面与天空的双关。

Reliable information was thin on the ground.

可靠信息寥寥无几。

V02 · P01 undertake★

/ʌndə'teɪk/ v. 开展；承担

being undertaken为进行中的被动修饰；过去式undertook，过去分词undertaken。

V03 · P01 streak

/stri:k/ n. 条纹；条带状痕迹

streaks of cloud指可见云迹，不是连续获胜纪录。

V04 · P01 contrail

/kɒn'treɪl/ n. 飞机凝结尾迹

condensation trail的缩合；可见白迹由冰晶等形成，不是可直接看见的二氧化碳。

V05 · P02 consortium

/kən'sɔːtiəm/ n. 联合体；联合研究团队

指多个参与机构联合开展试验，不是单独一家航空公司。

V06 · P02 persistent★

/pə'sɪstənt/ adj. 持续存在的；持久的

强调尾迹维持较久，区别于很快消散的尾迹。

V07 · P02 swathe

/sweɪð/ n. 大片区域；宽带状区域

a swathe of the North Atlantic是一片试验区域，不等于整个北大西洋。

V08 · P02 thereby*

/ðeə'baɪ/ adv. 由此；从而

thereby reducing连接前述减少尾迹与降低影响的预期结果。

V09 · P03 wispy

/'wɪspi/ adj. 纤细的；一缕缕的

描绘卷云外观，为阳伞比喻铺垫。

V10 · P03 cirrus

/'sɪrəs/ n. 卷云

高空纤细云状物；本文说部分尾迹可以扩展转化为卷云。

V11 · P03 parasol

/'pærəsəl/ n. 阳伞；遮阳伞

突出阻挡日照的一面，后面的But再补充拦住热辐射的另一面。

V12 · P03 infrared

/ɪnfrə'red/ adj. 红外的

此处为地表及大气向外散失能量涉及的辐射，不是飞机发动机可见火光。

V13 · P03 otherwise*

/ʌðəwaɪz/ adv. 否则；若非如此

would otherwise escape指如果没有被截留，本来会散逸出去。

V14 · P03 outweigh*

/aʊt'weɪ/ v. 超过；比.....更重要

比较增暖与降温两种作用，不只是称重量。

The long-term benefits may outweigh the initial cost.

长期收益可能超过最初的成本。

V15 · P03 handsomely

/'hænsəmli/ adv. 大幅地；显著地

这里修饰超过的程度，不是外观英俊。

V16 · P03 liability

/laɪə'bɪləti/ n. 不利因素；累赘

气候意义上的负担，不是企业资产负债表中的确定负债金额。

V17 · P04 altitude*

/æltɪtju:d/ n. 高度；海拔

shifts in altitude指飞行高度调整，不能误看为态度attitude。

V18 · P04 integrate into*

/ɪntɪgreɪt 'ɪntu:/ phr. v. 纳入；融入

需要进入航空公司与空管的日常程序，区别于纸面上的技术设想。

V19 · P06 anathema

/ə'næθəmə/ n. 极不受欢迎的事物；深恶痛绝之物

be anathema to somebody表现航空公司对额外燃油成本的反感，语气很强。

V20 · P06 incentivise*

/ɪn'sentɪvaɪz/ v. 激励；提供激励

airlines incentivised省略了与前面共享的might be，被动表示航空公司得到激励。

V21 · P06 along these lines

/ə'lɒŋ ði:z laɪnz/ phr. 按这一思路；以类似方式

lines为思路或方式，不是上文飞行航线的字面指代。

V22 · P06 be partial to*

/bi: 'pɑ:ʃəl tə/ phr. 偏爱；喜欢

此处承认对市场办法的通常偏好，随后仍反对这个具体应用。

V23 · P06 nonetheless*

/nʌnðə'les/ adv. 尽管如此；然而

让步之后回到作者结论；不是否认自己刚承认的市场经验。

V24 · P07 remedy

/'remədi/ n. 补救办法；解决措施

aim是要达到什么，remedy是用什么方法达到。

V25 · P08 notional

/'nəʊʃənəl/ adj. 假设中的；概念上的

成功规避的尾迹没有实际形成，只能估计本来会怎样。

V26 · P08 counterfactual

/kaʊntə'fæktʃuəl/ n./adj. 反事实情形；与事实相反的假设的

设想未采取行动时可能出现的世界；不是简单的谎言或错误事实。

V27 · P09 assign*

/ə'saɪn/ v. 分配；安排

have controllers assign routes中assign用动词原形，不加to。

V28 · P09 better off*

/betər 'ɒf/ adj. phr. 处境更好；状况改善

本文指整个行业可能受益，与less polluting并列，不只指排放量更少。

Both teams would be better off with a clearer schedule.

两支团队如果有更清晰的日程，处境都会更好。

Notes on the text 课文注释

1 地面上少见，空中或许有：双关与试验语气

[P01 / P02]

thin on the ground先作习语说好消息稀少，up in the air再回到天空中的尾迹。后者在其他语境也可说“悬而未决”，但此处最直接的作用是把读者引到航空研究；may同时保留希望尚待验证的语气。

aims to see if与If this experiment works先设试验门槛，再谈全球推广。as much as half是可能达到的较大减幅，对象是航空旅行的气候影响，不是全球变暖的一半，更不是已实现的排放削减。

2 阳伞与保温层：必须把两种能量作用相减

[P03]

太阳光从外面进入，云可以把其中一部分反射走，产生降温作用；地表和大气也向外释放红外辐射，云拦住一部分，就会有增暖作用。parasol只描述前一面，But与outweigh把读者带到两面相抵后的结果。

On average限制了总结范围：文章说总体净效果增暖，不能据此断言每一条尾迹、任何时段都产生同等净增暖。NASA介绍也说明，局地效果随条件和时间变化，而全球尺度估计的增暖作用更大。

3 不是简单地让所有飞机一直飞低一点

[P04 / P05]

研究需要同时解决三件事：能否预测有利于持续尾迹形成的区域、改高度是否有效、能否安全地纳入实际运行。ice-supersaturated说空气相对于冰面达到水汽过饱和，名字不是指空中挤满冰块。

P5的5%以航班数为分母，少于2%说那些改高度航班的额外燃油消耗。不能直接说全球航空燃油一定只多0.1%：把两者相乘还需要受影响航班与其他航班基准耗油可比等假设。更不能把“最高可减少一半气候影响”改成“燃油省一半”。

英国气象局的项目介绍将两个试验冬季明确为2026/27与2027/28，地点为北大西洋东部的Shanwick洋区空域；研究要检验预测及运行调整的效果。因此文章里的next two winters以发表时点为参照，并非任何读者打开网页后的两个冬季。

4 通常支持市场，为什么这一次反对？

[P06 / P07]

P6先给提出市场的动机：航空公司不愿多烧燃料，需要激励。作者承认欧盟的经验，也承认经济学家和本刊通常喜欢市场办法，然后用But ... nonetheless宣布例外。这个转折不是前后自相矛盾，而是在区分一般偏好与具体条件。

P7用简单目标和简单补救作比较，再指出单条尾迹的效果复杂。论点是某种工具在这里难以可靠定价，并不是文章已经证明所有污染物市场都无效。

5 成功避免的东西，为什么反而更难估价？

[P08 / P09]

一条实际出现的尾迹已经难以精确量化；成功改航路后，那条原本可能出现的尾迹没有出现，必须先估计“若不改变会怎样”。再把其假设增暖与实际行动后结果作比较，才能谈避免了多少影响。

假设调整后没有尾迹：模型甲认为原航路本来会产生10单位增暖，模型乙只估为3单位。同一个已观察结果会对应不同估计收益；如果原先根本不会形成持久尾迹，避免的那部分影响又不同。这些单位仅用于说明反事实问题，并非本试验数据。

P9因此提出在安全可行时由空管直接安排航路的办法。它不意味着预测不再需要准确，而是作者认为逐条把不存在的尾迹变成交易价格更复杂。后面行业受益仍用if与would，属于有条件的展望。

Special difficulties 难点辨析

1 only、often、as little as与less than不能互换

[P04 / P05]

only in把持续性尾迹与特定区域联系起来；Often只说飞机往往能通过降低高度避开，并不承诺任何航班都能这样飞。as little as 5%强调所需调整的航班可能很少，不能说固定每20班必有1班。

less than 2%不包括恰好2%；up to half表示上限式估计，而非至少一半。复述数字时，范围词和分母都应一起保留。

2 contrail cooling指减少净增暖，不是制造更多冷尾迹

[P03 / P06]

P6的市场设想接续前文避免尾迹的行动。contrail cooling在这里可理解为尾迹相关的降温收益或避免的增暖，不是在倡议多造某种尾迹，更不是认为所有尾迹本来都冷却地球。

同样，less polluting是行业整体影响的比较；文中承认改高度可能略多烧燃油，作者期待的是净气候收益。减少尾迹也不能替代对其他航空影响的处理。

Background 背景与延伸

1 能评估整体方案，不等于能给每次避免行为精确定价

[P07 / P08 / P09]

方案评估可以比较大量航班调整前后的总体效果，并报告不确定范围；逐笔交易却要为一航班避免的一条假设尾迹归属和计量效益。两者都需要模型，但对单次归属与估值的要求不同。

这解释了全文为何一面支持试验，一面质疑特定交易市场。读者可以不同意作者的政策选择，但应先把其理由还原为“复杂且反事实的收益难计价”，而不是“科学试验已经失败”。

Key structures 关键句型

K01·P03 into which ... can look as if ... : 外观不是完整结论

On a sunny day the wispy cirrus clouds into which some contrails are transformed can look as if they might be cooling the planet in the manner of a delicate parasol.

晴天时，一些凝结尾迹转化成的纤细卷云，看起来可能像一把轻巧的阳伞，正在给地球降温。

主句主语中心是cirrus clouds，谓语can look into which some contrails are transformed修饰clouds；还原为Some contrails are transformed into cirrus clouds，into来自transform into。

as if they might be cooling描述看起来像在降温，they指这些云；might保留表象和推测。下一句承认部分降温，再补充增暖作用，所以不要把外观比喻直接当作全文的净效果结论。

The building into which the old factory was transformed can look as if it belongs in a different city.

由旧工厂改造成的这栋建筑，看上去像是属于另一座城市。

K02·P03 that would otherwise escape : 把未发生的条件藏进副词

But they also warm things up by trapping some of the upwelling infrared radiation that would otherwise escape into space.

但它们也会截留一部分原本将散逸到太空的向上红外辐射，从而产生增暖作用。

by trapping解释如何增暖，宾语为some of the upwelling infrared radiation。that从句修饰radiation，would otherwise escape意为“如果未被截留，本来会散逸”。

otherwise提供隐含条件，不是改说另一种红外辐射；其功能为后文counterfactuals预先搭桥：比较发生了什么与若未干预本来会怎样。

The barrier holds back water that would otherwise enter the street.

这道屏障挡住了原本会流进街道的水。

K03 · P04 only in what are known as ... : 介词后的名词性从句

Persistent contrails appear only in what are known as “ice-supersaturated regions” (ISSRs).

持续性尾迹只出现在所谓的“冰面过饱和区”(ISSR)。

主干Persistent contrails appear only in ...。what are known as “ice-supersaturated regions”整体作in的宾语，可理解为the regions that are known as ...。what在内部作are known的主语。

what结构本身已经含有“.....的地方 / 事物”之意，前面不用再加一个重复的the regions。这里用复数are，与多片regions的所指相应。

The plants grow only in what are known as cloud forests.

这些植物只生长在所谓的云雾林中。

K04 · P04 find out后有三组how : 把最长的一项拆成四层

The purpose of Operation Blue Skies is to find out how well the presence of ISSRs can be predicted, how effective such little shifts in altitude can be in avoiding persistent contrails, and how easily and safely the changes in flight path needed to bring them about can be integrated into routines for airlines and air-traffic control.

“蓝天行动”的目的，是弄清楚能多准确地预测这些区域的存在，小幅高度调整能多有效地避免持续性尾迹，以及为实现前述调整所需的飞行路径变化，能多方便、多安全地纳入航空公司和空管的常规操作。

主干The purpose ... is to find out ...，后面三个并列宾语从句依次问预测多准、调整多有效、进入运行多方便且安全。每组都是陈述语序：how well + the presence + can be predicted；how effective + such little shifts + can be；how easily and safely + the changes + can be integrated。

第三组的主语中心changes, in flight path说明变化领域，needed to bring them about后置修饰changes；最后into routines ...才接到integrated。them接前述小幅高度调整，不是要制造persistent contrails；不要把needed错当主句谓语，也不要一见how就写成疑问倒装。

此处contrails后有一个孤立中点，阅读句法时略去，不作为英语标点仿写。

The trial will test how accurately rain can be forecast, how effective the barriers are and how easily changes needed for wider use can be introduced.

试验将检验降雨预报有多准确、屏障有多有效，以及扩大使用所需的变化有多容易实施。

K05 · P06 to which ... be partial : 介词在前，偏好仍在后

It is also the sort of idea to which economists—and The Economist—tend to be partial.

这也是经济学家——以及《经济学人》——通常偏爱的一类想法。

the sort of idea为先行词，to which ... tend to be partial修饰idea。还原为Economists tend to be partial to this sort of idea，to来自be partial to。

—and The Economist—插入把本刊也纳入偏好者范围。tend to说通常倾向，后面nonetheless否定具体方案；并不要求作者因为常支持市场就支持所有市场设计。

It is the sort of design to which our team tends to be partial.

这正是我们团队通常偏爱的一类设计。

K06 · P07 Though ... , saying how much ... is ... : 先越过让步, 再找主语

Though there is no doubt that their net effect is warming, saying how much warming a particular contrail might produce is often difficult and sometimes next to impossible.

虽然毫无疑问它们的净效果是增暖, 但要说清某一条尾迹可能造成多少增暖, 往往很难, 有时几乎不可能。

Though从句承认总体净效果增暖。主句主语是saying how much warming a particular contrail might produce这一整个动名词结构, 谓语为is often difficult and sometimes next to impossible。how much warming是produce的宾语, 被放到间接疑问从句前面; 从句内部仍是a particular contrail might produce的陈述语序。总体方向有把握与单条量值难判断, 可以同时成立。

Though the programme helps overall, saying how much each participant benefits is difficult.

虽然这个项目总体有帮助, 但要说清每位参与者获益多少却很困难。

K07 · P08 being assessed + as would be the case : 假设情形的呼应

The difficulties are made yet worse when the contrail being assessed is a purely notional one—as would be the case for the contrails avoided by changing flight paths.

当被评估的尾迹纯属假设时, 困难还会更大; 通过改变飞行路径而避免的那些尾迹, 正是这种情况。

主句The difficulties are made yet worse, yet在比较级前进一步加强程度。when从句中being assessed后置修饰contrail, 说明正在被评估的对象。

as would be the case for ...作为插入说明, 意为“对.....也会是这种情况”; be the case表示情况如此, would保留假设语气。这里呼应尾迹只是设想中的情况; avoided by changing flight paths再修饰contrails, 解释为什么没有实际对象可直接测。

The estimate becomes less certain when demand is hypothetical, as would be the case for a service not yet offered.

需求若只是设想, 估计就更不确定; 尚未推出的服务正是这种情况。

K08 · P09 have somebody do与safe to do so : 安排动作仍有条件

If contrail-avoidance turns out to be as useful as it looks, it would be much simpler to simply have air-traffic controllers assign routes that limit persistent contrails when it is possible and safe to do so.

如果尾迹规避被证明像看起来那样有用, 那么在可行且安全的条件下, 直接让空管人员安排能限制持续性尾迹的航路, 会简单得多。

If从句先要求规避有用, 主句it would be much simpler ...中的it为形式主语, 后面的to simply have ...说明什么更简单。have air-traffic controllers assign routes采用have + 人 + 动词原形, 不是have somebody to assign。

that limit persistent contrails修饰routes。when it is possible and safe to do so进一步限定实际执行, do so回指安排这类规避航路的行动; 不能删掉安全可行条件, 教成每架飞机都必须任意降低高度。

It would be simpler to have the coordinator assign rooms when it is practical to do so.

在切实可行时, 让协调员分配房间会更简单。

Exercises 练习与写作

Listening 听力 (选做)

选做：听开头，识别试验范围与时间。

02 Where and over what period does the article say the consortium will test the approach?

Comprehension 理解

保留条件、分母和作者立场的范围。

03 How can contrails have both cooling and warming effects?

04 What three practical questions will Operation Blue Skies investigate?

05 What do the figures 5% and less than 2% refer to?

06 Why does the author oppose the proposed market despite generally favouring such ideas?

07 What alternative does the article suggest, and with what conditions?

Words in use 词汇

用词库填空，每项一次。

词库：thin on the ground / outweigh / integrated into / partial to / better off

08 During the shortage, spare parts were ____.

09 The benefits may ____ the extra expense.

10 The new checks must be ____ normal routines.

11 The designer is ____ simple shapes.

12 With clearer instructions, both teams would be ____.

Key structures 句型

定位从句、还原隐含条件，并完成改写。

- 13 Join with into which: “The hall is spacious. The factory was transformed into it.”
- 14 Explain otherwise in “The barrier holds back water that would otherwise enter the street.”
- 15 Use what are known as: “The plants grow in areas known as cloud forests.”
- 16 In P4’s third how clause, identify the subject’s head noun and its main verb phrase.
- 17 Use to which: “It is a style. The team is partial to it.”
- 18 Identify the main-clause subject in P7’s sentence beginning Though there is no doubt.
- 19 Why is a contrail avoided by changing the flight path a notional one in P8?
- 20 Choose assign or to assign: “We could have the coordinator ____ rooms.”

Summary writing 摘要

用80–100词概括气候机制、试验与作者反对市场计价的原因。

- 21 Write an 80–100-word summary.

Composition 作文（选做）

选做：用100–120词，以校园或工作场景说明“没有发生的问题”为什么仍可能难以评估。

- 22 Explain why evaluating prevention requires more than observing that nothing went wrong.

Reference translation 参考译文

P01 关于全球变暖的好消息难得一见。不过，空中或许就有一些。8月18日公布的“蓝天行动”是一项科学研究，由英国空中交通管制机构NATS与其他多个机构共同开展；这些机构研究飞机制造的条带状云迹——即凝结尾迹——对气候的影响。

P02 未来两个冬季，联合研究团队希望看看，能否减少北大西洋一大片区域上空的持续性凝结尾迹——这是气候影响最大的一类——从而可测量地降低民用航空的气候影响。如果试验成功，在全球应用同样技术，或许能使航空旅行的气候影响减少多达一半。

P03 晴天时，一些凝结尾迹转化成的纤细卷云，看起来可能像一把轻巧的阳伞，正在给地球降温。有些尾迹确实会让下方稍微凉快一些。但它们也会截留一部分原本将散逸到太空的向上红外辐射，从而产生增暖作用。平均而言，所有尾迹及其转化成的卷云都有的这种增暖作用，明显超过部分尾迹产生的降温作用。从气候角度看，凝结尾迹是一项不利因素。

P04 令人欣慰的是，小幅改变飞行路径，似乎就能避免很多危害。持续性尾迹只出现在所谓的“冰面过饱和区”（ISSR）。飞机往往只需稍微降低高度，就能避开这类区域。“蓝天行动”的目的，是弄清楚能多准确地预测这些区域的存在，小幅高度调整能多有效地避免持续性尾迹，以及为实现前述调整所需的飞行路径变化，能多方便、多安全地纳入航空公司和空管的常规操作。

P05 航空旅行气候影响最多减少一半，所需代价可能很小。需要降低高度的航班比例或许很低——最低可能只占总数的5%。由于较高的飞行高度能带来效率，这些航班会消耗更多航空燃料，不过增加幅度不到2%。

P06 即使只多烧这一点燃料，航空公司也会深恶痛绝。因此，有人建议建立一个以某种方式把尾迹相关降温效益与碳价联系起来的市場，从而尽量降低行动成本，并给航空公司提供激励。欧盟在碳市场方面有過一些成功，也积累了大量经验，最近朝着这一思路迈出了一小步。这也是经济学家——以及《经济学人》——通常偏爱的一类想法。但即便如此，它仍会是一个错误。

P07 当目标和解决办法都相当简单时，污染物市场运行得最好；最著名的例子，是减少美国发电厂的二氧化硫排放。相比之下，凝结尾迹要复杂得多。虽然毫无疑问它们的净效果是增暖，但要说清某一条尾迹可能造成多少增暖，往往很难，有时几乎不可能。

P08 当被评估的尾迹纯属假设时，困难还会更大；通过改变飞行路径而避免的那些尾迹，正是这种情况。为反事实情形估值，总是很难。

P09 如果尾迹规避被证明像看起来那样有用，那么在可行且安全的条件下，直接让空管人员安排能限制持续性尾迹的航路，会简单得多。如果一些航空公司选择避开受影响的航线，其他公司想必很乐意取代它们。而且，如果这样的方案还展示出空管创新的好处——人们已经提出了不少创新建议——那么这个行业最终不仅污染更少，处境也会更好。

Reference answers 参考答案与解析

开放题不要求与参考答案逐字一致；先检查信息和意思，再修改表达。

Before you read 读前思考

01 读前思考

Possibly. The extra impact from fuel would need to be compared with any warming avoided by reducing persistent contrails.

这是提出评估框架，不是提前假定每次改航路都有净收益。

Listening 听力

02

Over a part of the North Atlantic during the next two winters.

next two winters以2026年发表时点为参照，不能写成已经完成的两年结果。

Comprehension 理解

03

They can reflect incoming sunlight and also trap outgoing infrared radiation. The article says the warming effect outweighs the cooling on average.

区分两种能量方向；平均净增暖不等于每条净效果完全相同。

04

How well relevant atmospheric regions can be predicted, how effectively altitude changes avoid persistent contrails, and how safely and easily the changes can enter normal operations.

三组how不是三个已经证实的结论。

05

As few as 5% of flights might need lower altitudes; those affected flights would use less than 2% extra fuel.

两个分母不同，不直接把乘积当成已核实的全行业燃油变化。

06

Individual contrail effects are difficult to measure, and the effects of contrails that never formed must be estimated counterfactually, making reliable pricing harder.

反对具体计价设计，不是宣告所有污染市场失败。

07

Air-traffic controllers could assign routes that limit persistent contrails if avoidance proves useful and the changes are possible and safe.

必须保留试验有效、安全与可行三个门槛。

Words in use 词汇

08

thin on the ground

稀少，不是在地上薄薄铺开。

09

outweigh

may后接原形，意思是收益超过额外成本。

10

integrated into

be之后用过去分词，into连接纳入的目标程序。

11

partial to

be partial to表示偏爱。

12

better off

指处境改善；不是更好的关闭方式。

Key structures 句型**13**

The hall into which the factory was transformed is spacious.

可接受表达：

- The hall, into which the factory was transformed, is spacious.

into来自transform into，was transformed保持被动。

14

Without the barrier holding it back, the water would enter the street.

隐含与实际拦住水相对的条件，不是另一种水。

15

The plants grow in what are known as cloud forests.

what从句整体作in的宾语，不再在前面重复areas。

16

The head noun is changes; the main verb phrase is can be integrated.

in flight path与needed ...处于主语修饰层，how easily and safely描述整合方式。

17

It is a style to which the team is partial.

to来自be partial to；不是to后再补it。

18

Saying how much warming a particular contrail might produce.

整个动名词结构作主语，is为主句谓语；Though内部另有从句。

19

It does not actually form when the flight path is changed; its possible effects must be estimated for the scenario without that change.

比较实施规避时未形成的尾迹与假设不改航路时可能形成的尾迹；notional不限定过去，也不表示试验已完成。

20

assign

have somebody do使用动词原形；could修饰have。

Summary writing 摘要

21

Persistent aircraft contrails can reflect sunlight but trap enough outgoing heat to cause warming overall. A trial will test whether small altitude changes can avoid them safely, potentially reducing aviation's climate impact at limited extra fuel cost. The author supports this possibility but rejects linking avoided contrails to a trading market. Individual effects are hard to measure, especially when the contrails never formed and their impact must be estimated. If the approach works, the article favours safe route assignments by air-traffic controllers instead.

核心不是航空业已减排一半，而是技术潜力、验证门槛与估值困难。

Composition 作文

22

Suppose a school installs a new alarm system and no equipment is stolen during the next term. It would be tempting to credit the system with preventing every possible theft. Yet the school cannot directly observe what would have happened without it. Theft may already have been rare, or better lighting and staff routines may also have helped. Evaluators could compare longer periods or similar buildings, while allowing for differences between them. The absence of theft is welcome, but it is not a complete estimate of the alarm's benefit. A fair assessment should describe the comparison it uses and the uncertainty that remains.

示例展示结果、无措施情形和其他因素的区别；不要把没有损失自动等同避免了某个确定金额。